



Start Active, Stay Active

A report on physical activity for health
from the four home countries'
Chief Medical Officers

Contents

Foreword by the Chief Medical Officers	3
Acknowledgements	5
Executive summary	6
CHAPTER ONE – Introduction	9
What is physical activity?	9
Physical activity and the prevention of chronic disease	10
Promotion of mental health and well-being	13
Sedentary behaviour	13
Just how active are we?	13
The cost of inactivity	14
Development of UK-wide CMO guidelines for physical activity	15
CHAPTER TWO – Key principles	16
Who do the guidelines apply to?	16
Risks of physical activity	17
Dose–response relationship	17
What type of activity counts?	17
Other health benefits	19
CHAPTER THREE – Early years (under 5s)	20
Introduction	20
Guidelines for early years	20
Summary of supporting scientific evidence	21
Understanding the guidelines for early years	22

CHAPTER FOUR – Children and young people (5–18 years)	26
Introduction	26
Guidelines for children and young people	26
Summary of supporting scientific evidence	27
Understanding the guidelines for children and young people	28
CHAPTER FIVE – Adults (19–64 years)	32
Introduction	32
Guidelines for adults	32
Summary of supporting scientific evidence	33
Understanding the guidelines for adults	34
CHAPTER SIX – Older adults (65+ years)	38
Introduction	38
Guidelines for older adults	39
Summary of supporting scientific evidence	39
Understanding the guidelines for older adults	41
CHAPTER SEVEN – Taking action	45
Introduction	45
What is new in this report?	45
How can the guidelines be used?	46
Examples of effective action	47
New opportunities for action	48
Challenges	48
Conclusion	49
ANNEX A – Process and methodology	50
ANNEX B – Glossary	53
ANNEX C – Expert working groups	55
ANNEX D – References	57

Foreword by the Chief Medical Officers



Professor Dame Sally Davies,
CMO for England



Harry Burns, CMO for Scotland



Dr Tony Jewell, CMO for Wales



Dr Michael McBride,
CMO for Northern Ireland

Whatever our age, there is good scientific evidence that being physically active can help us lead healthier and even happier lives. We also know that inactivity is a silent killer. Therefore, it is important that the public health community provides people with the information on which to base healthy lifestyle choices. *Start Active, Stay Active* is aimed at professionals and policy makers and is the first link in a chain of communication to inform behaviour change.

This report establishes a UK-wide consensus on the amount and type of physical activity we should all aim to do at each stage of our lives. In reaching this consensus, we have drawn upon recent international, large-scale reviews in the United States and Canada and have benefited from the contribution of international experts engaged in the World Health Organization Global

Recommendations on Physical Activity for Health. We are grateful to all who have been involved in this collaborative effort.

Start Active, Stay Active updates the existing guidelines for children, young people and adults, and includes new guidelines for early years and older people for the first time in the UK. The flexibility of the guidelines creates new ways to achieve the health benefits of an active lifestyle, while retaining a strong link to previous recommendations. For all age groups, they highlight the risks of excessive sedentary behaviour, which exist independently of any overall volume of physical activity.

Our aim is that as many people as possible become aware of these guidelines and use them to achieve the recommended activity levels. However, this report does not and indeed cannot set out the

specific messages we need to reach communities across the UK with diverse needs, lifestyles and attitudes to activity. This is an important next step for the individual home countries.

Similarly, helping people to achieve these guidelines will require new and exciting partnerships to help create a more active society. Across the physical activity sector, we need to build upon the diversity of opportunities to be active including sport, active travel, dance, gardening and exercising in a natural environment – the list goes on.

We also need to recognise that people will draw upon a range of different activities, varying their participation according to where they are in the lifecourse. However, parents, grandparents and siblings can be important role models, and when families are active together everyone stands to benefit.

The guidelines for each life stage apply to all; however, barriers related to gender, ethnicity, disability and access need to be addressed. The challenge then is to work across communities, bringing together all those organisations and professions with a part to play – local government, business, third sector organisations, planners, sport and local champions – to make physical activity not just an aspiration for the few, but rather a reality for all.

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PAGEG members

Dr Len Almond	BHF National Centre for Physical Activity and Health, Loughborough University
Professor Stuart Biddle	School of Sport, Exercise and Health Sciences, Loughborough University
Professor Fiona Bull	School of Sport, Exercise and Health Sciences, Loughborough University
Dr Nick Cavill	Cavill Associates and BHF Health Promotion Research Group, University of Oxford
Dr Richard Ferguson	School of Sport, Exercise and Health Sciences, Loughborough University
Dr Charlie Foster	BHF Health Promotion Research Group, University of Oxford
Professor Ken Fox	Centre for Exercise, Nutrition and Health Sciences, University of Bristol
Professor Marie Murphy	School of Sports Studies, University of Ulster
Professor John Reilly	Division of Developmental Medicine, University of Glasgow
Professor Gareth Stratton	School of Sport and Exercise Science, Liverpool John Moores University

Thanks also to Andy Atkin (BHF National Centre for Physical Activity and Health) and Alison Hardy (Department of Health), who both undertook editing of this report, as well as Professor Mark Bellis (Centre for Public Health, Liverpool John Moores University) and the representatives of the four home countries for their contributions.

Finally, a special thanks to the Department of Health and, in particular, Kay Thomson and Deborah Moir who project managed this work on behalf of the four home countries.

Executive summary

These guidelines are issued by the four Chief Medical Officers (CMOs) of England, Scotland, Wales and Northern Ireland. They draw on global evidence for the health benefits people can achieve by taking regular physical activity throughout their lives. Regular physical activity can reduce the risk of many chronic conditions including coronary heart disease, stroke, type 2 diabetes, cancer, obesity, mental health problems and musculoskeletal conditions. Even relatively small increases in physical activity are associated with some protection against chronic diseases and an improved quality of life.

These benefits can deliver cost savings for health and social care services. However, the benefits of physical activity extend further to improved productivity in the workplace, reduced congestion and pollution through active travel, and healthy development of children and young people.

The four UK home countries all previously had physical activity guidelines. As our understanding of the relationship between physical activity and health has grown, we have evolved the guidelines to reflect the evidence base and address inconsistencies. These new guidelines are broadly consistent with previous ones, while also introducing new elements.

This report emphasises for the first time the importance of physical activity for people of all ages. We have therefore updated the existing guidelines for children and young people and for adults and have developed new guidelines for early years and for older adults.

In addition, the report highlights the risks of sedentary behaviour for all age groups. Emerging evidence shows an association between sedentary behaviour and overweight and obesity, with some research also suggesting that sedentary behaviour is independently associated with all-cause mortality, type 2 diabetes, some types of cancer and metabolic dysfunction.⁶ These relationships are independent of the level of overall physical activity. For example, spending large amounts of time being sedentary may increase the risk of some health outcomes, even among people who are active at the recommended levels.⁶

These guidelines also allow greater flexibility for achieving the recommended levels of physical activity. Bringing all of these aspects together creates a number of key features of this report, including:

- a lifecourse approach
- a stronger recognition of the role of vigorous intensity activity
- the flexibility to combine moderate and vigorous intensity activity
- an emphasis upon daily activity
- new guidelines on sedentary behaviour.

Each of us should aim to participate in an appropriate level of physical activity for our age. Each of the lifecourse chapters provides an introduction, sets out the guidelines for that age group, summarises the evidence and discusses what the guidelines mean for people. We hope that this report will be read by policy makers, healthcare professionals and others working in health improvement. The guidelines are designed to help professionals to provide people with information on the type and amount of physical activity that they should undertake to benefit their health, in particular to prevent disease. The age groups covered in this report are:

- early years (under 5s)
- children and young people (5–18 years)
- adults (19–64 years)
- older adults (65+ years).

EARLY YEARS (under 5s)

1. Physical activity should be encouraged from birth, particularly through floor-based play and water-based activities in safe environments.
2. Children of pre-school age who are capable of walking unaided should be physically active daily for at least 180 minutes (3 hours), spread throughout the day.
3. All under 5s should minimise the amount of time spent being sedentary (being restrained or sitting) for extended periods (except time spent sleeping).

CHILDREN AND YOUNG PEOPLE (5–18 years)

1. All children and young people should engage in moderate to vigorous intensity physical activity for at least 60 minutes and up to several hours every day.
2. Vigorous intensity activities, including those that strengthen muscle and bone, should be incorporated at least three days a week.
3. All children and young people should minimise the amount of time spent being sedentary (sitting) for extended periods.

ADULTS (19–64 years)

1. Adults should aim to be active daily. Over a week, activity should add up to at least 150 minutes (2½ hours) of moderate intensity activity in bouts of 10 minutes or more – one way to approach this is to do 30 minutes on at least 5 days a week.
2. Alternatively, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or a combination of moderate and vigorous intensity activity.
3. Adults should also undertake physical activity to improve muscle strength on at least two days a week.
4. All adults should minimise the amount of time spent being sedentary (sitting) for extended periods.

OLDER ADULTS (65+ years)

1. Older adults who participate in any amount of physical activity gain some health benefits, including maintenance of good physical and cognitive function. Some physical activity is better than none, and more physical activity provides greater health benefits.
2. Older adults should aim to be active daily. Over a week, activity should add up to at least 150 minutes (2½ hours) of moderate intensity activity in bouts of 10 minutes or more – one way to approach this is to do 30 minutes on at least 5 days a week.
3. For those who are already regularly active at moderate intensity, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or a combination of moderate and vigorous activity.
4. Older adults should also undertake physical activity to improve muscle strength on at least two days a week.
5. Older adults at risk of falls should incorporate physical activity to improve balance and co-ordination on at least two days a week.
6. All older adults should minimise the amount of time spent being sedentary (sitting) for extended periods.

Despite the widely reported benefits of physical activity, the majority of adults and many children across the UK are insufficiently active to meet the previous recommendations. There are clear and significant health inequalities in relation to physical inactivity according to income, gender, age, ethnicity and disability.^{7–10}

These guidelines apply across the population, irrespective of gender, race or socio-economic status. However, barriers related to safety, culture and access, for example, can have a disproportionate effect upon the ability of individuals to respond to the guidelines; therefore, interventions to promote physical activity must consider this. This is particularly significant where efforts are focused in locations comprising large numbers of traditionally sedentary groups and individuals.

This report sets out clearly what people need to do to benefit their health, and can help them to understand the options for action that fit their own busy lives. There now needs to be careful and planned translation of these guidelines into appropriate messages for the public, which relate to different situations. However, communication alone is not enough: this has to be matched with concerted action at all levels to create environments and conditions that make it easier for people to be active. New aspects of the guidelines also provide fresh opportunities for action.

A new approach that makes physical activity everyone's business is not without challenge – for example, transferring knowledge and understanding to professionals in other sectors, and managing the competing pressures on urban environments to retain green space and promote active travel.

Finally, these new guidelines may require some changes to the way we monitor and report on physical activity.

In conclusion, we know enough now to act on physical activity. The evidence for action is compelling, and we have reached a unique UK-wide consensus on the amount and type of physical activity that is needed to benefit health. This new approach opens the door to new and exciting partnerships and will help to create a more active society.

Introduction

Promoting active lifestyles can help us address some of the important challenges facing the UK today. Increasing physical activity has the potential to improve the physical and mental health of the nation, reduce all-cause mortality and improve life expectancy. It can also save money by significantly easing the burden of chronic disease on the health and social care services. Increasing cycling and walking will reduce transport costs, save money and help the environment. Fewer car journeys can reduce traffic, congestion and pollution, improving the health of communities.¹ Other potential benefits linked to physical activity in children and young people include the acquisition of social skills through active play (leadership, teamwork and co-operation), better concentration in school and displacement of anti-social and criminal behaviour.²

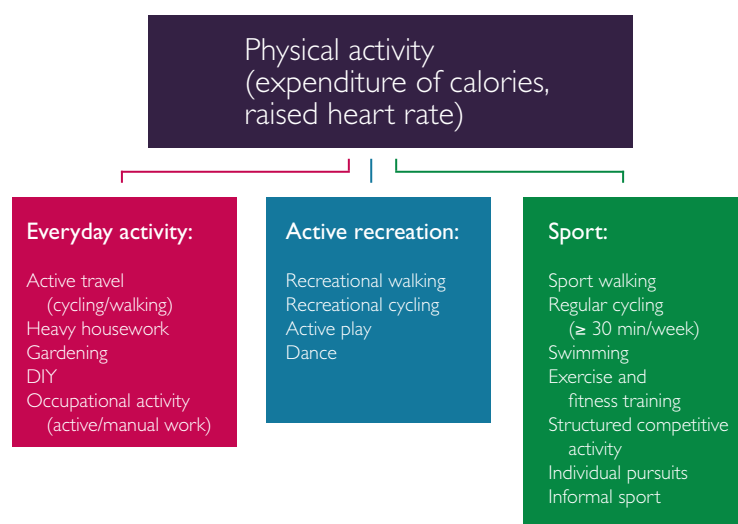
The importance of physical activity for health was identified over 50 years ago. During the 1950s, comparisons of bus drivers with more physically active bus conductors and office-based telephonists with more physically active postmen demonstrated lower rates of coronary heart disease and smaller uniform sizes in the more physically active occupations.³ This research led the way for further investigation, and evidence now clearly shows the importance of physical activity in preventing ill health.

It is important for us to be active throughout our lives. Physical activity is central to a baby's normal growth and development. This continues through school, and into adulthood and older years. Being physically active can bring substantial benefits and there is consistent evidence of a dose-response relationship, i.e. the greater the volume of physical activity undertaken, the greater the health benefits that are obtained.

This report emphasises the importance of physical activity for individuals of all ages and, for the first time, provides specific guidelines for those aged under 5 and older adults. Building upon the emerging evidence base, we are also recommending that individuals should minimise sedentary behaviour (e.g. sitting for long periods) which is now recognised as an independent risk factor for ill health.

What is physical activity?

Physical activity includes all forms of activity, such as everyday walking or cycling to get from A to B, active play, work-related activity, active recreation (such as working out in a gym), dancing, gardening or playing active games, as well as organised and competitive sport.



In addition to defining the appropriate levels of physical activity, this report also looks at sedentary behaviour. Sedentary behaviour is not simply a lack of physical activity but is a cluster of individual behaviours where sitting or lying is the dominant mode of posture and energy expenditure is very low.

Sedentary behaviours are multi-faceted and might include behaviours at work or school, at home, in transit and in leisure time. Typically, sedentary behaviours include watching TV; using a computer; travelling by car, bus or train; and sitting to read, talk, do homework or listen to music.

Physical activity and the prevention of chronic disease

Physical inactivity is the fourth leading risk factor for global mortality (accounting for 6% of deaths globally). This follows high blood pressure (13%), tobacco use (9%) and high blood glucose (6%). Overweight and obesity are responsible for 5% of global mortality.⁴

The benefits of regular physical activity have been clearly set out across the lifecourse. In particular, for adults, doing 30 minutes of at least moderate intensity physical activity on at least 5 days a week helps to prevent and manage over 20 chronic conditions, including coronary heart disease, stroke, type 2 diabetes, cancer, obesity, mental health problems and musculoskeletal conditions.⁴ The strength of the relationship between physical activity and health outcomes persists throughout people's lives, highlighting the potential health gains that could be achieved if more people become more active throughout the lifecourse.

There is a clear causal relationship between the amount of physical activity people do and all-cause mortality.⁴ While increasing the activity levels of all adults who are not meeting the recommendations is important, targeting those adults who are significantly inactive (i.e. engaging in less than 30 minutes of activity per week) will produce the greatest reduction in chronic disease.

Table 1. The relationship between physical activity and health outcomes

Health outcome	Nature of association with physical activity	Effect size	Strength of evidence
All-cause mortality	Clear inverse relationship between physical activity and all-cause mortality.	There is an approximately 30% risk reduction across all studies, when comparing the most active with the least active.	Strong
Cardiorespiratory health	Clear inverse relationship between physical activity and cardiorespiratory risk.	There is a 20% to 35% lower risk of cardiovascular disease, coronary heart disease and stroke.	Strong
Metabolic health	Clear inverse relationship between physical activity and risk of type 2 diabetes and metabolic syndrome.	There is a 30% to 40% lower risk of metabolic syndrome and type 2 diabetes in at least moderately active people compared with those who are sedentary.	Strong
Energy balance	There is a favourable and consistent effect of aerobic physical activity on achieving weight maintenance.	Aerobic physical activity has a consistent effect on achieving weight maintenance (less than 3% change in weight).	Strong
		Physical activity alone has no effect on achieving 5% weight loss, except for exceptionally large volumes of physical activity, or when an isocaloric diet is maintained throughout the physical activity intervention.	Strong
		Following weight loss, aerobic physical activity has a reasonably consistent effect on weight maintenance.	Moderate
Musculoskeletal health	<p>Bone: There is an inverse association of physical activity with relative risk of hip fracture and vertebral fracture.</p> <p>Increases in exercise and training can increase spine and hip bone marrow density (and can also minimise reduction in spine and hip bone density).</p>	<p>Bone: Risk reduction of hip fracture is 36% to 68% at the highest level of physical activity. The magnitude of the effect of physical activity on bone mineral density is 1% to 2%.</p>	Moderate (weak for vertebral fracture)

Health outcome	Nature of association with physical activity	Effect size	Strength of evidence
Musculoskeletal health (continued)	<p>Joint: In the absence of a major joint injury, there is no evidence that regular moderate physical activity promotes the development of osteoarthritis.</p> <p>Participation in moderate intensity, low-impact physical activity has disease-specific benefits in terms of pain, function, quality of life and mental health for people with osteoarthritis, rheumatoid arthritis and fibromyalgia.</p>	<p>Joint: Risk reduction of incident osteoarthritis for various measures of walking ranges from 22% to 83%.</p> <p>Among adults with osteoarthritis, pooled effect sizes (ES) for pain relief are small to moderate, i.e. 0.25 to 0.52. Function and disability ES are small; function ES = 0.14 to 0.49 and disability ES = 0.32 to 0.46.</p>	<p>Weak</p> <p>Strong</p>
	<p>Muscular: Increases in exercise training enhance skeletal muscle mass, strength, power and intrinsic neuromuscular activation.</p> <p>There is observational evidence that mid-life and older adults who participate in regular physical activity have reduced risk of moderate/severe functional limitations and role limitations.</p> <p>There is evidence that regular physical activity is safe and reduces the risk of falls.</p>	<p>Muscular: The effect of resistance types of physical activity on muscle mass and function is highly variable and dose-dependent.</p> <p>There is an approximately 30% risk reduction in terms of the prevention or delay in function and/or role limitations with physical activity.</p> <p>Older adults who participate in regular physical activity have an approximately 30% lower risk of falls.</p>	<p>Strong</p> <p>Moderate to strong</p> <p>Strong</p>
Cancer	<p>There is an inverse association between physical activity and risk of breast and colon cancer.</p>	<p>There is an approximately 30% lower risk of colon cancer and approximately 20% lower risk of breast cancer for adults participating in daily physical activity.</p>	<p>Strong</p>
Mental health	<p>There is clear evidence that physical activity reduces the risk of depression and cognitive decline in adults and older adults.</p> <p>There is some evidence that physical activity improves sleep.</p>	<p>There is an approximately 20% to 30% lower risk for depression and dementia, for adults participating in daily physical activity.</p>	<p>Strong</p> <p>Moderate</p>
	<p>There is limited evidence that physical activity reduces distress and anxiety.</p>	<p>There is an approximately 20% to 30% lower risk for distress for adults participating in daily physical activity.</p>	<p>Limited</p>

Source: Adapted from Department of Health and Human Services (2008) *Physical Activity Guidelines Advisory Committee Report*, Washington, DC: US Department of Health and Human Services.⁵

Promotion of mental health and well-being

Physical activity has an important role to play in promoting mental health and well-being by preventing mental health problems and improving the quality of life of those experiencing mental health problems and illnesses.

For example, evidence shows that physical activity can reduce the risk of depression, dementia and Alzheimer's. It also shows that physical activity can enhance psychological well-being, by improving self-perception and self-esteem, mood and sleep quality, and by reducing levels of anxiety and fatigue.

Sedentary behaviour

The evidence suggests a growing concern over the risks of sedentary behaviour. Although most of this research has focused on the relationship between sedentary behaviour and overweight and obesity, some research also suggests that sedentary behaviour is independently associated with all-cause mortality, type 2 diabetes, some types of cancer and metabolic dysfunction.⁶

Sedentary behaviours in adults are impacted by age, gender, socio-economic conditions, occupation, weight status and some characteristics of the physical environment. These relationships are independent of the level of overall physical activity.

For example, spending large amounts of time being sedentary may increase the risk of some health outcomes, even among people who are active at the recommended levels.⁶

Just how active are we?

Levels of physical activity in both adults and children are regularly measured throughout the UK, although there are some differences in the methods used to collect the data. However, despite the multiple health gains associated with a physically active lifestyle, there are high levels of inactivity across the UK.

Adults including older adults

Based on self-reported data, the percentage of adults in each of the home countries shown to meet previous physical activity recommendations is set out in Table 2.⁷⁻¹⁰

Table 2. The percentage of adults meeting previous physical activity guidelines

Country	Men	Women
England	40%	28%
Northern Ireland	33%	28%
Wales	36%	23%
Scotland	43%	32%

Note:

England, Northern Ireland and Wales: based on the physical activity guideline for adults of 30 minutes or more of moderate intensity on **at least 5 days** a week.

Scotland: based on the physical activity guideline for adults of 30 minutes or more of moderate intensity on **most** days of the week.

These data show that more than half of adults do not meet the previous recommended levels of physical activity. However, the true position is likely to be worse than this as individuals appear to over-estimate the amount of physical activity they do in self-reported surveys. Recent objective measurements of physical activity suggest lower levels of participation; for example, accelerometry data collected in England reported that only 6% of men and 4% of women met the previous guidelines.⁷

Across the UK, participation in physical activity declines significantly with age for both men and women and also varies between geographical areas of the UK and socio-economic position.

Children and young people

Based on self-reported data, the percentage of children in each of the home countries shown to meet previous physical activity recommendations is set out in Table 3.^{7, 9-11}

Table 3. The percentage of children meeting previous physical activity guidelines

Country	Boys	Girls
England (aged 2–15)	32%	24%
Northern Ireland (Years 8–12)	19%	10%
Wales (aged 4–15)	63%	45%
Scotland (aged 2–15)	76%	67%

Note:

England and Northern Ireland: based on the physical activity guideline for children of 60 minutes or more of moderate intensity **each** day.

Wales and Scotland: based on the physical activity guideline for children of 60 minutes or more of moderate intensity on **5 days** a week.

Across the UK, boys are more likely than girls to be active at almost every age. Physical activity declines with age in both sexes, but more steeply in girls.

Early years

For those aged under 5, UK data are only available for 3 and 4 year olds. These data show that the mean total time spent being physically active is 120–150 minutes per day with 10–11 mean hours spent being sedentary.¹²

What about sedentary behaviour?

According to self-reported measures of sedentary behaviour, approximately two-thirds of adults spend more than two hours per day watching TV and using the computer. Significant proportions of adults report spending between three and four hours sitting during their leisure time. These estimates highlight the pervasiveness of sedentary behaviours. The studies that have used objective measures to assess the time adults spend sitting or lying confirm the self-reported estimates, suggesting that the majority of adults and older adults spend substantial proportions of the day in sedentary pursuits.⁶

Health inequalities

There are clear and significant health inequalities in relation to physical inactivity according to income, gender, age, ethnicity and disability.^{7–11}

For example, across the UK:

- Physical activity is higher in men at all ages.
- Physical activity declines significantly with increasing age for both men and women.
- Physical activity is lower in low-income households.
- Certain ethnic groups have lower levels of physical activity. For example, in England, physical activity is lower for black or minority ethnic groups, with the exception of African-Caribbean and Irish populations.
- Boys are more active than girls.
- Girls are more likely than boys to reduce their activity levels as they move from childhood to adolescence.

The cost of inactivity

Inactivity not only has consequences for health, it also places a substantial cost burden on health services, through the treatment of long-term conditions and associated acute events such as heart attacks, strokes, falls and fractures, as well as the costs of social care arising from the loss of functional capacity. As more of us live longer, there will be huge potential to derive benefits to health and social care services from increasing activity.

The estimated direct cost of physical inactivity to the NHS across the UK is £1.06 billion. This is based upon five conditions specifically linked to inactivity, namely coronary heart disease, stroke, diabetes, colorectal cancer and breast cancer. This figure represents a conservative estimate, since it excludes the costs of other diseases and health problems, such as osteoporosis and falls, which affect many older people.¹³

Inactivity also creates costs for the wider economy, through sickness absence and through the premature death of productive individuals. It also increases costs for individuals and for their carers. In England, the costs of lost productivity have been estimated at £5.5 billion per year from sickness absence and £1 billion per year from the premature death of people of working age.¹⁴

Increasing physical activity can also support other important agendas; for example, the Netherlands has shown how increasing active travel can benefit the wider economy.¹⁵ Journeys made on foot or by bike rather than car will reduce emissions and can create a more pleasant local environment. Communities can benefit from safer and more pleasant streets, improved air quality, lower carbon emissions and reduced congestion.

Development of UK-wide CMO guidelines for physical activity

Why do we publish guidelines?

UK governments have a duty to inform their citizens about the relationship between lifestyle and health. People need to be aware of the levels of physical activity that deliver health benefits and the health impacts of leading an inactive lifestyle. These guidelines will not only assist with the work of policy makers, healthcare professionals and others who support health improvement, but can also help individuals to take responsibility for their own lifestyle choices.

Prior to this report, the four UK home countries already had physical activity guidelines. However, an emerging evidence base, the publication of updated international guidelines and differences between the existing UK guidelines gave rise to the need for a collaborative approach to updating the guidelines.

We have updated the guidelines from the perspective of disease prevention and have not included the role of physical activity as a treatment for people with pre-existing conditions. Furthermore, there were no guidelines for early years or for sedentary behaviour across the UK, so our task has been to assess the available evidence and develop new guidelines in these areas.

The development of new UK guidelines was also facilitated by the publication of revised guidelines in the US and Canada and by the World Health Organization, since these provided an opportunity to capitalise on a scientific review of the evidence base. In particular, the US Government reported on a comprehensive two-year review of the health benefits of physical activity and the Canadian Government undertook similar and complementary work.

What evidence have we considered?

Given these recent large-scale scientific reviews, it was unnecessary to undertake another full review of the primary literature. Instead, a set of key documents were identified as the primary sources of evidence and used to underpin the UK work. The key sources were:

- *Physical Activity Guidelines Advisory Committee Report* (2008) from the Physical Activity Guidelines Advisory Committee formed by the US Department of Health and Human Services
- scientific reviews undertaken as part of the Canadian Physical Activity Guidelines review process
- review papers undertaken as part of the British Association of Sport and Exercise Sciences (BASES) consensus process
- where needed, individual high quality review papers or individual study papers reporting on relevant issues not covered in the US, Canadian or BASES review process.

We have based this report on the evidence from these sources. Statements that are based on evidence from alternative sources have been referenced (see Annex D).

The process for reviewing the evidence and developing the guidelines is explained in Annex A. However, in brief, expert advisory working groups were set up and tasked with reviewing the key sources of evidence and developing draft recommendations for new physical activity and sedentary behaviour guidelines. After national consultation phases involving a large scientific meeting and web-based consultation, a Physical Activity Guidelines Editorial Group (PAGEG) was established. The PAGEG was responsible for translating the recommendations into this report.

This report is organised by four age groups, with a dedicated chapter for each age group detailing the guidelines, supporting scientific evidence and interpretation of what the guidelines entail. Some readers will only be interested in specific age groups, so where statements apply to more than one age group, we have replicated them in each chapter, to enable easy use of the report.

Key principles

Who do the guidelines apply to?

The age groups covered in this report are:

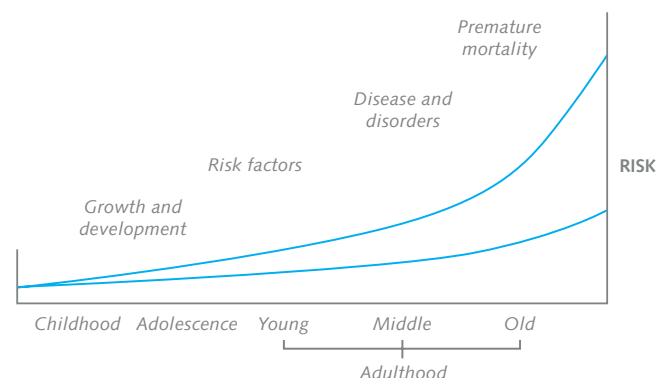
- early years (under 5s)
- children and young people (5–18 years)
- adults (19–64 years)
- older adults (65+ years).

The guidelines differ across the age groups because people have different needs at different ages and stages of development. For example, as soon as they can walk, pre-school children need unstructured, active and energetic play to allow them to develop their fundamental movement skills and master their physical environment. They need to be active for several hours a day in order to achieve this. By the time children start school, however, they are developmentally ready to benefit from more intensive activity, over shorter periods, so a daily minimum of 60 minutes of moderate intensity activity is recommended.

We recognise that differences exist within age groups and that individuals will have different developmental needs. The age groups used are only a guide, reflecting the best available evidence and harmonising with those used by other countries and organisations. There is also much to be gained from families being active together. Active parents and the opportunity to do things with other family members influence young people's participation in physical activity.¹⁶

The benefits of different types of physical activity are different at key life stages. While it is not until adulthood and older age that the increase in morbidity and premature mortality is seen, the exposure to risk through inactivity begins in childhood. Furthermore, people's lifestyles, and the role of physical activity within their lifestyles, vary throughout their lives.¹⁷

Figure 1. Key stages of disease development throughout the life course



Source: Department of Health (2004) *At least five a week: Evidence on the impact of physical activity and its relationship to health*. A report from the Chief Medical Officer

Figure 1 shows a hypothetical model of the key stages of disease development throughout the lifecourse. The upper line on the graph represents theoretical rates of progression – through growth and development, development of risk factors, onset of disease and disorders, and premature mortality – for inactive individuals. The lower line represents active individuals. In this model, physical inactivity has negative effects at all stages of life in terms of impaired growth and development, or high risk factors, with the final expression as disease or early death being seen primarily from mid-adulthood.

Disability

Many people have physical, emotional, mental and/or intellectual impairments or challenges. We did not specifically review the available evidence in this area and the array of different impairments and disabilities makes generalisation very difficult. Nevertheless, most disabled people would benefit from physical activity according to their capacity. The expert advisory working groups agreed that the guidelines in this report would be broadly applicable. Specific activities may however require adaptation to individual needs and abilities and safety concerns must be addressed. Environmental barriers, social oppression and psychological challenges also need to be considered.

Risks of physical activity

The risks associated with taking part in physical activity are low and continuing with an inactive or sedentary lifestyle presents greater health risks than gradually increasing physical activity levels. Previously inactive people who increase their activity gradually are unlikely to encounter significant risks.¹⁷

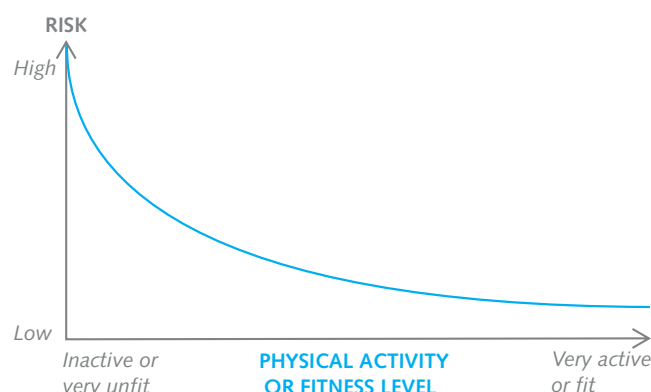
Risks occur predominantly among those exercising at vigorous levels and those taking part in contact sports. However, most of these risks are preventable. Extremely rarely, inactive and unfit individuals who start vigorous physical activity may face increased cardiovascular risks.¹⁷

Dose–response relationship

As outlined in Chapter 1, becoming more physically active can bring substantial benefits. There is a clear dose–response relationship between physical activity and diseases such as coronary heart disease and type 2 diabetes, in that greater benefits occur with greater participation (see Figure 2). From a public health perspective, helping people to move from inactivity to low or moderate activity will produce the greatest benefit.

This curvilinear dose–response curve generally holds for coronary heart disease and type 2 diabetes; the higher the level of physical activity or fitness, the lower the risk of disease. Curves for other diseases will become more apparent as the volume of evidence increases.¹⁷

Figure 2. Dose–response curve



Source: Department of Health (2004) *At least five a week: Evidence on the impact of physical activity and its relationship to health*. A report from the Chief Medical Officer

The prevention of different conditions may require different amounts ('doses') of activity. For example, it may be that more activity is required to reduce the risk of colon cancer than is needed to reduce the risk of coronary heart disease. However, there is not enough evidence to recommend specific amounts of activity for different conditions. These guidelines outline the recommended amount needed for general health benefit.

What type of activity counts?

For most people, the easiest and most acceptable forms of physical activity are those that can be incorporated into everyday life. Examples include walking or cycling instead of travelling by car, bus or train. However, a larger quantity of activity at higher intensity (such as playing sport) can bring further benefits, and this might be the aspiration for many people.

Table 4 gives some examples of activities that would be light, moderate and vigorous intensity. It also shows the intensity of different activities measured in METs (metabolic equivalents – a measure of how far energy expenditure is raised above the energy required at rest) and the total energy expenditure (in kilocalories (kcal), for a person of 60kg exercising for 30 minutes).

Table 4. Intensities and energy expenditure for common types of physical activity

Activity	Intensity	Intensity (METS)	Energy expenditure (Kcal equivalent, for a person of 60kg doing the activity for 30 minutes)
Ironing	Light	2.3	69
Cleaning and dusting	Light	2.5	75
Walking – strolling, 2mph	Light	2.5	75
Painting/decorating	Moderate	3.0	90
Walking – 3mph	Moderate	3.3	99
Hoovering	Moderate	3.5	105
Golf – walking, pulling clubs	Moderate	4.3	129
Badminton – social	Moderate	4.5	135
Tennis – doubles	Moderate	5.0	150
Walking – brisk, 4mph	Moderate	5.0	150
Mowing lawn – walking, using power-mower	Moderate	5.5	165
Cycling – 10–12mph	Moderate	6.0	180
Aerobic dancing	Vigorous	6.5	195
Cycling – 12–14mph	Vigorous	8.0	240
Swimming – slow crawl, 50 yards per minute	Vigorous	8.0	240
Tennis – singles	Vigorous	8.0	240
Running – 6mph (10 minutes/mile)	Vigorous	10.0	300
Running – 7mph (8.5 minutes/mile)	Vigorous	11.5	345
Running – 8mph (7.5 minutes/mile)	Vigorous	13.5	405

MET = Metabolic equivalent

1 MET = A person's metabolic rate (rate of energy expenditure) when at rest

2 METS = A doubling of the resting metabolic rate

For a full definition of METS, see Annex B.

Source: Department of Health (2004) *At least five a week: Evidence on the impact of physical activity and its relationship to health*. A report from the Chief Medical Officer

Moderate intensity activity stimulates the body's cardiorespiratory, musculoskeletal and metabolic systems and, over time, causes them to adapt and become more efficient. People can tell when their activity is moderate intensity because they will breathe faster, experience an increase in heart rate and feel warmer. They may even sweat on hot or humid days. The amount of activity needed to reach this varies from one person to another. An unfit or overweight person may only have to walk up a slope, whereas a very fit athlete may be able to run quite fast before he or she notices these signs. Over time, a person's fitness level will improve so that in walking, for example, focusing on the perceived effort to reach moderate intensity may mean that their speed increases. Vigorous intensity activity can bring health benefits over and above moderate intensity. A person who is doing vigorous intensity activity will usually be breathing very hard, be short of breath, have a rapid heartbeat and not be able to carry on a conversation comfortably.

Muscle strengthening activity

Training with weights (or body weight), where the body's muscles work or hold against an applied force or weight, can also bring about health benefits and should be promoted across the age ranges. Muscle strengthening activity should work all the large muscle groups of the body. Higher amounts of activity can improve muscle function to a greater degree. There is good evidence for the health benefits of muscle strengthening activities, including the maintenance of functional ability, the stimulation of bone formation and a reduction in bone loss. The evidence also supports the beneficial effect of this type of activity on glucose metabolism and blood pressure.

Shorter sessions of activity

The evidence shows that the benefits of physical activity can be achieved through sessions of 10 minutes or more of moderate to vigorous intensity activity. This duration is sufficient to improve cardiovascular fitness and lessen some risk factors for heart disease and type 2 diabetes. Although more research is required, there is also some evidence that sessions of vigorous intensity activity less than 10 minutes may be beneficial to health.

Shorter sessions of physical activity offer an easier starting point for people who have been inactive for some time, and for those who have busy lives and find it hard to prioritise activity. For people who have been inactive, it is important to allow the body time to adapt. Gradually progressing from shorter to more sustained sessions will increase an individual's fitness while reducing any potential risks. Moreover, shorter bouts of activity such as just one to two minutes will break up sedentary time and should be encouraged.

Other health benefits

Activity also provides benefits for well-being, for example improved mood, a sense of achievement, relaxation or release from daily stress. These outcomes can play an important role in improving people's adherence to activity programmes and ensuring that physical health benefits are maintained.

Early years (under 5s)

Introduction

This set of guidelines applies to children from birth until they are 5. This age group has not previously been included in UK public health guidelines for physical activity.

During the early years, young children undergo rapid and wide-ranging physical and psychological developments that lay the foundation for their future health and well-being. It is therefore a key public health responsibility to provide the best possible conditions for under 5s to develop. These guidelines reflect a growing awareness that early life experiences impact upon future health outcomes, and draw on notable recent advances in the science of physical activity and health.

The evidence base for early years is relatively new. It comprises different types of studies including observational and, to a lesser extent, experimental research. Overall, it supports the conclusion that regular physical activity during the early years provides immediate and long-term benefits for physical and psychological well-being. Physical activity has very low risks for most under 5s. However, the risk that childhood inactivity will lead to poor health in later life is very high.

These guidelines are relevant to all children under 5 years of age, irrespective of gender, race or socio-economic status, but should be interpreted with consideration for individual physical and mental capabilities. All young children should be encouraged to be active to a level appropriate for their ability. In the absence of evidence for the benefits of physical activity for young disabled children, advice should be sought from healthcare professionals to identify the types and amounts of physical activity that are appropriate.

These guidelines describe the minimum amount of activity for many health benefits. However, regular participation in physical activity at a level greater than outlined in these guidelines will provide additional health gains. For very inactive under 5s, increasing activity levels, even if these are below the recommendation, will provide some health benefits. For these children, a gradual increase in the duration of activity is recommended.

All children under 5 who are overweight or obese can gain health benefits from meeting the guidelines, even in the absence of any changes to their weight status. To achieve and maintain a healthy weight, additional physical activity and a reduction in calorie intake may be required.

The new guidelines for early years are aimed at the following groups:

- infants who cannot yet walk unaided (Guideline 1)
- pre-school children who can walk unaided (Guideline 2)
- all those aged under 5 (Guideline 3).

Guidelines for early years

1. Physical activity should be encouraged from birth, particularly through floor-based play and water-based activities in safe environments.
2. Children of pre-school age* who are capable of walking unaided should be physically active daily for at least 180 minutes (3 hours), spread throughout the day.
3. All under 5s should minimise the amount of time spent being sedentary (being restrained

* See glossary (Annex B) for definition.

or sitting) for extended periods (except time spent sleeping).

Summary of supporting scientific evidence

In recent years, there has been considerable growth in research exploring the benefits of physical activity for children under 5. However, the depth and breadth of the evidence for this age group remains relatively small compared with that for older children and adults. These guidelines reflect evidence obtained from predominantly observational research, including reviews informing the development of the Australian early years guidelines and the combined input of experts in this field of study.

Physical activity is central to optimal growth and development in the under 5s. Evidence from observational research and a small number of experimental studies indicates that regular physical activity is valuable in developing motor skills, promoting healthy weight, enhancing bone and muscular development, and for the learning of social skills.^{17–21} Therefore, these guidelines highlight the essential role of physical activity in promoting physical and psychological development during these years and contributing towards establishing patterns of behaviour that may persist into later childhood and adulthood.

The guidelines for early years refer to activity of any intensity, i.e. light, moderate or vigorous (more energetic activity).

Physical activity should be encouraged from birth, particularly through floor-based play and water-based activities in safe environments.

This recommendation is consistent with recent evidence and expert opinion, and with evidence of associations between physical activity and health benefits, in particular preventing overweight and obesity.^{17–22}

There is considerable expert opinion from many international sources that letting children crawl, play and roll around on the floor in the home or childcare setting is essential during the early years, particularly for children who cannot yet walk. These activities are safe, accessible to all and enable unrestricted movement. They also provide valuable opportunities to build social and emotional bonds with parents, siblings and other children. Appropriate water-based activities, such as ‘parent and baby’ swim

sessions, provide similar opportunities and are also recommended.

Children of pre-school age who are capable of walking unaided should be physically active daily for at least 180 minutes (3 hours), spread throughout the day.

This recommendation is consistent with international expert opinion and recently developed, evidence-based public health guidelines for early years from other countries.^{19, 22–24} It is supported by research exploring associations between activity and various health outcomes in this age group, data on the patterns of activity during the early years and changes in activity patterns as children age.²⁰

There is some evidence of associations between physical activity and health benefits, in particular preventing overweight and obesity. Aligned with this, there is evidence indicating that for older children activity typically declines with age, for example between childhood and adolescence.²⁵ Data from tracking studies show support for an association between higher levels of activity in childhood leading to more sustained participation in physical activity in later years. Thus it is important to establish a high level of activity at the earliest age in order to encourage activity patterns later in childhood that are sufficient to benefit health.

The 180 minutes can be activity of any intensity. This aligns with the types of physical activity most naturally occurring during the early years, including intermittent and sporadic patterns.

All under 5s should minimise the amount of time spent being sedentary (being restrained or sitting) for extended periods (except time spent sleeping).

Sedentary behaviour refers to a group of behaviours that typically occur while seated or lying down and which require very low levels of energy expenditure. In the early years, typical sedentary behaviours might include watching TV; travelling by car, bus or train; or being strapped into a buggy. There is evidence that under 5s spend a large proportion of time being sedentary and that this is a barrier to physical activity.⁷

Although there is a lack of research exploring the health consequences of sedentary behaviour in children under 5 specifically, there is emerging evidence that sedentary behaviour in the early years is associated with overweight and obesity as well as lower cognitive development. Importantly, patterns

of sedentary behaviour, particularly TV viewing, are relatively stable over time. Thus there is a need to establish healthy patterns of behaviour during the early years in order to protect against possible health detriments in the future.^{6, 20}

Evidence that sedentary behaviour is independently associated with adverse health outcomes is accumulating rapidly. This evidence suggests that prolonged periods of sedentary behaviour are an independent risk factor for poor health.^{26, 27} However, the available data are not sufficient to suggest a time limit for this age group. Based on current evidence, reducing total sedentary time and breaking up extended periods of sitting is strongly advised for children during the early years.

Understanding the guidelines for early years

Why do we need guidelines for early years?

Children under 5 have not previously been included in UK public health guidelines for physical activity. However, there is concern over levels of habitual physical inactivity and sedentary behaviour among young children. The guidelines for those aged 5–18 years are not suitable for early years, as they specify a level of intensity that is not developmentally appropriate for most children under 5. Children of pre-school age who can stand and walk need opportunities to play that allow them to develop their fundamental movement skills and master their physical environment. One hour a day is not enough to achieve this.

The evidence suggests that physical activity, especially in the form of play, is a basic and essential behaviour that must be fostered and encouraged during the first five years of life. Conversely, opportunities for young children to be sedentary should be limited and replaced with more physically active options.²⁸

Further research is needed to identify and describe the health benefits of physical activity in the early years, along with the dose of physical activity required to achieve these benefits. This will help to refine future public health guidelines for this age group.

How do the guidelines reflect differences in the under 5 population?

'Under 5s' encompasses a very diverse population from the newborn through to children about to start school, and the stage of development can vary markedly in children of the same age. As children's motor skills develop at different rates, the key distinction we have used is between those not yet able to walk and those who are able to walk unaided.

Most children in the UK start school before their fifth birthday. By this time, children are developmentally ready to benefit from more intensive activity over shorter periods – a minimum of 60 minutes of moderate intensity every day is recommended (see Chapter 4 for more information). It is unlikely to be practical for schools to follow different guidelines for children within the school year (some of whom will have reached age 5 and some of whom will have not).

How can activity for early years be supported?

Ideally, children under 5 should build up the required quantity of physical activity across the course of their day. This is typically characterised by sporadic sessions of activity interspersed with periods of rest. This pattern of activity also protects against children engaging in prolonged periods of sedentary behaviour by prompting regular breaks from sitting or lying down.

The social and physical environments in which activity is most likely to occur, such as the home, childcare and leisure facilities, should be stimulating, fun and safe.

Young children also need the freedom to create their own opportunities for active play lead their own activities, direct their own play and engage in imaginative play. This will encourage independence and appropriate exploration in a safe and supervised environment. Parents and carers of young children need to take appropriate measures to ensure that play and other physical activity is safe.

Similarly, young children can participate in a wide range of activities planned by adult carers and parents (such as in daycare settings or to fit family circumstances). Adults might contribute some structure or formality or facilitate play by providing enabling environments within which young children play more constructively and generate their own physically active games and play – for example,

a designated play area with a range of equipment and challenges. Adult-led play (facilitating, prompting, stimulating or focusing) as well as more structured activities such as dancing and gymnastic-type movement or water-based activities such as learning to swim can make a significant contribution to the overall volume of daily physical activity.

Parents and carers can encourage activity by interacting with young children in a physically active way as often as possible. Adults are important role models and their involvement in physical activity and play will encourage a young child to be more active and enjoy their interactions, which will stimulate further participation.

Many young children are naturally active but some are shy, reserved or reluctant to join in with others and need to be guided and shown how to enjoy using different equipment and play spaces.

Olivia (not yet walking)

Olivia is 8 months old and is John and Laura's first child. John works full time. Laura is on maternity leave and cares full time for Olivia. Laura has always been active and she wants to bring Olivia up to enjoy being active as well. As Olivia is not yet walking, Laura often spends time with her on a play mat in their living room or outside when the weather is good. Laura uses toys and other objects to encourage Olivia to move and crawl to reach them and to explore the different shapes and textures. Once a week, Laura attends a 'parent and baby' swim held at the local leisure centre. These sessions are led by a qualified swim instructor and give Olivia the opportunity to explore other movements. Laura is also careful about the amount of time Olivia spends in her carrier or highchair, although it is often an easier option when she's in public places such as catching up with friends at the local café. As Laura's friends also have young children, they meet twice a week at someone's house or at the local park where they can let the children move around and play freely.

What types of activities are relevant for infants who are not yet walking?

For infants, being physically active means being allowed to move their arms and legs while lying on their stomach or back in a variety of free spaces and without being restrained by clothing. This includes reaching for and grasping objects, turning the head towards stimuli, pulling, pushing and playing with other people. Play spaces need to encourage young children to learn new movements and use their large muscle groups for kicking, crawling, pulling up to a standing position, creeping and eventually walking. Objects placed out of reach will encourage infants to move towards them.

What types of activities are relevant for pre-school children who are walking?

Once pre-school children can walk by themselves, they tend to be active in frequent and sporadic sessions but at low intensity. These sessions could add up to 180 minutes of physical activity per day; however, most UK pre-school children currently spend 120–150 minutes a day in physical activity, and so achieving this guideline would mean adding another 30–60 minutes per day.

For pre-school children, physical activity mainly comprises unstructured, active play and learning locomotor, stability and object-control skills. It is important that they have the opportunity to practise these skills in a variety of enabling environments and that they receive encouragement, regular feedback and support from adults. Active play will normally include activity that involves moving the trunk and more exertion than the minimal movement required to carry out simple everyday tasks such as washing, bathing and dressing, or activities such as playing board games or passive play (for example, craft activities, drawing, dressing up or playing at a sand table).

Active play opportunities should encourage young children to:

- use their large muscle groups
- practise a wide range of different movements
- experience a variety of play spaces and equipment
- set up their own play areas
- make up their own active play
- have fun and feel good about themselves and what they can do.

Under 5s also benefit from physical activity other than active play, such as walking to the shops.

Table 5. Typical activities providing health and developmental benefits

Active play: activities that involve movements of all the major muscle groups, i.e. the legs, buttocks, shoulders and arms, and translocation of the trunk (movement of the trunk from one place to another)	<ul style="list-style-type: none"> • Climbing frame or riding a bike • More energetic sessions of activity, e.g. running and chasing games • Water-based activities
Development of locomotor, stability and object-control skills	<ul style="list-style-type: none"> • Running, jumping, hopping, galloping and skipping • Balancing, riding and climbing • Kicking, catching, throwing, striking and rolling • Dance, gymnastics or water-based activities
Everyday activities	<ul style="list-style-type: none"> • Walking/skipping to shops, a friend's home, a park or to and from a nursery

Tariq (capable of walking)

Tariq is 3 years old. He has an older brother who has just started school. They enjoy playing games together and are lucky to have a park near their house. His father, Yusuf, is a keen footballer and so he often takes both boys to the park at the weekend and in the evenings when it's light enough to run around with a football. During the day, Tariq goes to nursery, as both his father and mother work. At the nursery, he takes part in a variety of games and activities including lots of supervised physically active play such as using climbing equipment and more energetic organised running games. He also plays with a range of equipment and toys which the nursery provides. Tariq's mother Sadia picks him up and they usually take the bus part of the way home and walk the rest.

What intensity of activity is appropriate for the under 5s?

The recommended 180 minutes (3 hours) for pre-school children who can walk can include light intensity activity, active play and more energetic activities, such as running, swimming and skipping. More energetic play will make children 'huff and puff' and this will encourage the development of their cardiorespiratory system.

The 180 minutes of physical activity should be spread throughout the day rather than in one long session. For this age group, the amount of physical activity is more important than the intensity.

Table 6. Examples of sedentary behaviour and activities at different intensities

Definition	Example activities
Sedentary	Naps, TV viewing, fidgeting, drawing, reading
Light	Pottering, slow movement of the trunk from one place to another, e.g. moving about, standing up, walking at a slow pace
Moderate to vigorous (more energetic)	Rapid movement of the trunk from one place to another, e.g. climbing, swinging/hanging, playing games in a park with friends, riding a bike, dancing to music, running, swimming, skipping

Decreasing sedentary behaviour

There is evidence from studies of infants and pre-school children that extended periods of sitting may be detrimental to their health. Sedentary behaviour also goes against the child's natural tendencies to be active. Physical restraint, such as long periods in pushchairs or highchairs, is a common barrier to physical activity that is unique to this age group.

For both infants and pre-school children, being sedentary for long periods during the day displaces their opportunities for physical activity. Attending to daily tasks while young children are roaming free may prove a challenge to busy parents. However, parents, carers and professionals should be aware of the need to reduce sedentary time in order to increase physical activity and to help establish more active behaviours.

Examples of reducing sedentary behaviour include:

- reducing time spent in infant carriers, car seats or highchairs
- reducing time spent in walking aids or baby bouncers (as these limit free movement)
- reducing time spent in front of the TV or other screens.

Children and young people (5–18 years)

Introduction

This set of guidelines applies to children and young people aged between 5 and 18. During this period, children and young people establish behaviour patterns that have important implications for their immediate and long-term health and well-being. Among the myriad social, emotional and institutional transitions that take place are reductions in habitual levels of physical activity and increased participation in certain sedentary behaviours; these changes have important public health implications. If we can help children and young people to establish and maintain high volumes of physical activity into adulthood, we will reduce the risk of morbidity and mortality from chronic non-communicable diseases later in their lives.

A strong and expanding body of evidence, drawing upon both observational and experimental methodologies, indicates that regular physical activity is associated with numerous health benefits for this age group. This includes reduced body fat and the promotion of healthy weight, enhanced bone and cardio-metabolic health, and enhanced psychological well-being. The evidence further supports recommendations on limiting sedentary behaviour, which may be associated with health risks that are independent of participation in physical activity. Physical activity has very low risks for most children and young people; however, the risk of poor health from inactivity is very high.

These guidelines are relevant to all children and young people aged between 5 and 18, irrespective of gender, race or socio-economic status, but should be interpreted with consideration of individual physical and mental capabilities. There is substantially less research on the health benefits of physical activity for disabled people. Based

on the evidence, the guidelines **can be applied to disabled children and young people, emphasising that they need to be adjusted for each individual based on that person's exercise capacity and any special health issues or risks.**

The guidelines describe the amount of activity required to achieve substantial health benefits. However, regular participation in physical activity at higher levels will provide additional health gains. For children and young people who are currently inactive, doing some physical activity, even if it is less than the guidelines, will provide some health benefits. For such children and young people, a gradual increase in the frequency, duration and intensity of activity to achieve the guidelines is recommended. Children and young people who are overweight or obese can gain health benefits from meeting the recommended levels of physical activity, even in the absence of any changes to their weight status. To achieve and maintain a healthy weight, additional physical activity and a reduction in calorie intake may be required.

Guidelines for children and young people

1. All children and young people should engage in moderate to vigorous intensity physical activity for at least 60 minutes and up to several hours every day.
2. Vigorous intensity activities, including those that strengthen muscle and bone, should be incorporated at least three days a week.
3. All children and young people should minimise the amount of time spent being sedentary (sitting) for extended periods.

Summary of supporting scientific evidence

A strong body of evidence, comprising both observational and experimental research, indicates that regular participation in physical activity among children and young people provides immediate and long-term benefits for physical and psychological well-being. The evidence base is growing rapidly; recent large-scale epidemiological studies, utilising valid measures of physical activity, have demonstrated stronger associations than have been observed previously and helped to clarify dose–response relationships between activity and specific health outcomes.^{6, 17, 25, 29–33}

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

Physical activity provides important health benefits for children and young people. This conclusion is based upon evidence from observational studies in which higher levels of activity were associated with more favourable health outcomes and experimental studies, in which exercise treatments resulted in improvements in health-related measures.^{34, 35} Reviews of the literature conclude that physical activity should be moderate to vigorous intensity to gain significant health benefits. The potential health benefits of light intensity physical activity have been little studied in this age group. Thus, while it is clear that moderate and vigorous intensity activities are associated with many health benefits, the same may not be true for low intensity activity.³⁴ Further research is needed to explore the impact of low intensity activity on health in children and young people.

The available evidence shows significant and meaningful health benefits associated with participation in 60 minutes of physical activity daily, over and above activities of daily living.^{34, 35}

A dose–response association between activity and health outcomes is further supported by the evidence, such that regular participation in activity at a higher level than this (greater duration, increased intensity) is associated with even greater benefits. In recommending up to several hours of activity daily, these guidelines acknowledge the dose–response relationship, supporting engagement in higher levels of activity in order to obtain maximal benefits.

In much of the research conducted to date, it has been the volume of physical activity that has typically been of primary interest rather than the distribution of activity throughout the week. Accordingly, the weekly distribution of activity associated with optimal health benefit is currently unknown.²⁹ However, at least some of the health benefits associated with physical activity result from acute responses that occur for up to 24–48 hours following activity. In order to reflect this evidence, as well as encourage regular activity habits across the week, it is recommended that children and young people engage in daily physical activity.

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

Reviews of the literature indicate that, for some health outcomes (such as cardiorespiratory fitness, muscular and bone strength), it is necessary to incorporate vigorous intensity physical activity.^{29, 35} The benefit of vigorous intensity activity was implied in previous guidelines. However, the evidence accumulated in recent years has furthered our understanding of its role in promoting health and supports the inclusion of a specific guideline for this type of activity.^{17, 34, 35} There is now a significant body of evidence to support the fact that vigorous activity is required to increase fitness in young people. In children, higher levels of fitness are positively related to better metabolic health. Further intense activity is also important in optimising bone health, particularly prior to the adolescent growth spurt. Muscular development is also positively related to self-esteem and resistance exercise has been effective at increasing strength.

There is, however, a lack of evidence regarding the health benefits associated with specific durations of vigorous activity. Therefore, an evidence-based recommendation for the length of individual sessions of vigorous intensity activity for children and young people cannot be provided at present.

Many of the health outcomes examined, including weight status and cardio-metabolic health, are mainly responsive to aerobic-type activities. However, bone health appears to be most favourably affected by resistance training and other high impact activities, such as jumping. Previous public health guidelines for the UK recommended activities that produced high physical stresses on the bones at least twice a week.¹⁷ Evidence accumulated in recent years has shown that

the optimal dose of activity required to benefit bone health may be greater than previously recommended.^{34, 35} To reflect these advances in our understanding, the new guidelines recommend that activities that strengthen muscle and bone should be incorporated on at least three days per week.

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

Sedentary behaviours require very low energy expenditure. Such behaviours – including travelling by car, bus or train, watching TV and playing computer or video games – are very common among children and young people. There is emerging evidence which indicates that sedentary behaviours, such as TV viewing or accumulated total sedentary time, are associated with overweight and obesity and metabolic dysfunction in young people.^{6, 26} This evidence suggests that prolonged periods of sedentary behaviour are an independent risk factor for poor health.

The available evidence supports a recommendation on limiting sedentary behaviour to manage overweight and obesity and metabolic markers of health in children and young people. However, there is currently insufficient evidence to quantify this precisely in terms of a time limit for sedentary behaviour. Therefore, based on available evidence, reducing total sedentary time and breaking up extended periods of sitting is strongly advised.

Understanding the guidelines for children and young people

Why do we need new guidelines for children and young people?

We have had guidelines for children and young people in the UK since 1998, with the most recent published in 2004.¹⁷ These new guidelines are based on the latest evidence; they update and strengthen previous versions and are, for the first time, fully consistent across the UK.

There are two key differences between these new guidelines and previous versions: the new guidelines state more clearly the health benefits of vigorous intensity activity and they include a new recommendation on sedentary behaviour. A minimum of 60 minutes of moderate to vigorous activity per day has been carried forward from

previously published guidelines for children and young people and remains the headline recommendation.

Are there particular challenges for children and young people?

There is a great deal of variation in physical activity behaviour between the ages of 5 and 18, with the pattern of physical activity changing from short bursts of high intensity activity in childhood to more adult patterns of physical activity and sedentary behaviour in late adolescence. Between the ages of 5 and 7, these guidelines build on those for early years, while the behaviour of older teenagers is likely to be more similar to that of adults.

These revised guidelines need to be interpreted with consideration for children and young people's growth and development. Children and young people are a heterogeneous population. The lifecourse of a young person includes the transition from childhood to adulthood, with the complexities of adolescence occurring in between. The transition from primary to secondary school is often associated with significant decreases in physical activity, especially in girls, while the transition from compulsory education into employment for young people who leave school coincides with a general decrease in physical activity in both girls and boys. Also, the majority of young people live with their parents or carers who act as role models and provide varying levels of social and logistical support.

Children and young people should be given the opportunity to be active whenever possible. However, parents who perceive the environment to be unsafe should consider what this level of risk entails and how to manage this without limiting a child's opportunity to be physically active. If children have positive experiences of physical activity, they will be more likely to remain active and further develop their skills. It is also important that children learn to manage physical risks themselves, as this will enhance their development of physical and social skills.

In some areas, the environment may not be conducive to being physically active. However, there is also a population trend towards spending more time inside, where technology and in-house entertainment systems can increase screen watching and sedentary behaviours. Subsequently, less time is spent in active pursuits.

Finally, encouraging childhood physical activity is especially important for children from disadvantaged or vulnerable groups or where family or peer support for being active is limited.

What do the guidelines mean for children and young people?

Given the opportunity, most children enjoy taking part in physical activity. To help children meet these guidelines, opportunities to be physically active need to be available on a daily basis, within the constraints of other pressures such as school learning time. Activities also need to be varied and should provide physical challenges appropriate for each age and stage of development. For young people and those approaching adulthood, physical activity becomes more structured, including regular physical education, sport, dance and active travel, whereas play is a key activity in younger children.

It is important to emphasise that the intensity of physical activity should be above and beyond that experienced during daily living.

This means that light activity such as moving around the house and walking slowly between school lessons or while shopping does not contribute towards the 60 minutes of physical activity.

However, the reduction in sedentary time should result in an increase in light physical activity and therefore total energy expenditure. For example, children and young people may engage in light activity and reduce sitting and lying time by playing active computer games or engaging in activities that involve moving in and around the home, classroom or community. It is also important to realise that sedentary behaviour and vigorous physical activity can co-exist, as children and young people may engage frequently in activities of vigorous intensity, but may also spend extended time sitting, for example in front of a screen.

While we do not have sufficient scientific evidence to recommend a maximum amount of sedentary time for children and young people and while time spent sleeping, studying and reading does necessitate sitting or lying, we recognise that many young people spend too much time in sedentary behaviours, and opportunities to reduce this should be sought.

Lisa (14 years old)

Lisa lives in a rural village. She used to go to the small local primary school but now travels eight miles by bus to a secondary school, where she has many friends. She used to do a lot of sport at her primary school but stopped taking part because it was difficult to get home from matches and training. Lisa's father is a single parent who cares for Lisa and her younger brother, Tom, but needs Lisa to help out. During her spare time, Lisa is constantly in touch with her school friends through social media but she also meets up after school regularly with friends in the same village to cycle or run together. Lisa's father, a physiotherapist, knows about the recommendations for children and young people's physical activity. He engages the children in family activities to reduce the amount of time they spend sitting down at home. They enjoy video game sport and fitness competitions at home but try to go out together once a week and during the weekend as a family to take part in a sporting activity such as tennis. The village youth club holds a monthly dance night, where Lisa and her friends dance for up to three hours.

What type of activities should children and young people participate in?

Children and young people should participate in physical activities that are appropriate for their age and stage of development. Patterns of activity in children commonly involve a mixture of running, jumping, climbing, hopping and skipping activities, interspersed with short periods of rest. These brief periods of activity can also involve the development of object-control (catching, throwing, striking, kicking) and stability (balancing) movement skills, as well as counting towards the bone and muscle strengthening recommendations. These patterns are characterised by high intensity activity interspersed with short periods of moderate and light activity or standing. These activities of varying intensity can cumulatively contribute towards the recommended 60 minutes a day if they are at least 10 minutes in duration.

Physical activity for children and young people naturally occurs throughout most days and in numerous settings. This ranges from active travel to school, outdoor play in the park, indoor play in dedicated play centres, physical education, school

playtime, participation in sports and dance clubs, swimming or cycling, outdoor and adventurous activities (for example, girl guides or scout groups) or martial arts clubs.

Younger children begin their active lives through play. This is important for their physical, cognitive and social development and is largely dictated by the opportunities that parents and carers give them. Young people become independent of their parents through the teenage years and are more influenced by friends and external role models.

Table 7. Types of activity

Type of activity	Examples
Unstructured (children)	Indoor or outdoor play, active travel
Unstructured (young people)	Social dancing, active travel, household chores, temporary work
Structured (children and young people)	Organised, small-sided games with equipment that maximises success (large racquets, low nets, big balls etc.) Educational instruction (through teaching and coaching) that promotes skill learning and development Sport and dance
Muscle strengthening and bone health (children)	Activities that require children to lift their body weight or to work against a resistance. Jumping and climbing activities, combined with the use of large apparatus and toys, would be categorised as strength promoting exercise
Muscle strengthening and bone health (young people)	Resistance-type exercise during high intensity sport, dance, water-based activities or weight (resistance) training in adult-type gyms

Activity can be structured or unstructured. Unstructured activity can be described as informal or free play and activities with little input or direction from parents or carers. Structured activity might include elements of formality or facilitation by adults. Examples of activities are given in Table 7.

The degree of structure and organisation of activity changes gradually with a shift away from unstructured, active play predominant at younger ages towards structured and organised physical activity in youth. A balance of unstructured and structured activity will enable young people to be active both independently and dependent on adults.

Peter (7 years old)

Peter is the youngest child in a sporty family. They live in a bustling town with good local amenities. His father and mother are active members of the local football club, where his brother, James, excels at under-14 level. His 11-year-old sister, Jane, is also an active member of the local dance school and represents her school at netball and athletics. On weekdays, he does at least 60 minutes of moderate to vigorous physical activity. He walks to school with his older sister. On arrival, he often joins in with playground games such as tag, as well as bone strengthening activities such as hopscotch. He has PE twice a week, where he develops his strength during gymnastics and his aerobic fitness during games. He also plays football during playtime on most days. During lessons, his teacher uses active learning approaches to reduce the amount of time Peter and his classmates spend sitting. After school on a Wednesday, he walks to dance school with his sister and best friend, John, where he develops his movement and rhythm skills through fun dance activities. His mother normally picks them up by car from dance school during the winter months but occasionally walks the mile home with them during the spring and summer. Peter has swimming lessons on Saturday mornings and plays tag-rugby on Sundays. During his free time, he enjoys playing video games, but his mother limits this to short periods. On Sundays, the family normally walk to visit their grandmother, who lives a mile away and Peter, his father and brother play football in the park opposite his grandmother's house, whatever the weather.

There is evidence of a substantial positive association between parental and social support and physical activity in young people. For girls in particular, the main facilitators to being physically active are likely to be social and family influences (for example, having a peer group who approve of activity or having active siblings and supportive parents).

Helen (14 years old)

Helen lives in a town in the south west of England with her parents. She is deaf. Her parents have always enjoyed being active. Her younger brother, Mark, spends a great deal of time playing football. She doesn't enjoy PE at school. Outside, she prefers to spend her leisure time painting and chatting with friends on the internet. Her parents have realised she lives a largely sedentary lifestyle and they have decided to make changes. So, rather than parking at school, Helen's mother now parks 15 minutes away and they walk the rest of the journey together. After discussing this with Helen's teacher, they gave her a gift of chalk, water paint and a book of school playground activities. When the weather is good, Helen now spends most playtimes drawing or painting playground games like hopscotch and playing these games with her younger friends. On a Tuesday evening, after dropping Mark off at football practice, Helen's mother or father takes her swimming. Helen's parents take her and her brother camping whenever they can and, during the summer, they will take the family bodyboarding, surfing and paddleboarding. Together, they visit National Trust properties, take walks in the countryside and explore the coastal paths. Wherever they go, they take Helen's painting kit and have breaks in the day to allow her to paint or draw. They also encourage her to take photographs as they walk.

What is the role of these guidelines for weight management?

Children and young people who are overweight or obese will gain significant health benefits from being physically active at the recommended level, even in the absence of any changes in weight status. Physical activity is the most variable component of daily energy expenditure and therefore plays an important role in weight management. However, weight status is a result of the balance between energy intake and energy expenditure at the individual level, and is complicated by an adolescent's maturity status. This makes it difficult to determine the amount of activity required for healthy weight maintenance at a population level. To achieve a healthy weight, children and young people who are overweight or obese may need to engage in additional physical activity beyond the 60 minutes recommended in these guidelines, combined with a reduced calorie intake. Children and young people of any weight should first aim to achieve and sustain the level of activity recommended in the current guidelines.

Adults (19–64 years)

Introduction

This set of guidelines applies to adults aged 19–64 years. In the modern world, opportunities for physical activity have become limited due to agricultural, technological, social and institutional changes that have progressively removed the need for activity from our daily lives. Ongoing physical activity surveillance systems, both in the UK and abroad, have consistently demonstrated low levels of physical activity in the adult population, particularly among specific social and demographic sub-groups. Inadequate physical activity and excessive sedentary behaviour, both highly prevalent in the adult population, represent critical public health issues in the UK.

A large body of observational and experimental evidence indicates that regular physical activity reduces the risk of all-cause mortality, coronary heart disease, stroke, type 2 diabetes, osteoporosis, some cancers and depression, as well as bringing many positive benefits for psychological health and well-being. An evidence base linking sedentary behaviour adversely and independently with all-cause and cardiovascular mortality, type 2 diabetes, some types of cancer and metabolic dysfunction is growing rapidly. While adults aged 19–64 are a large and diverse population, the evidence demonstrates that engaging in physical activity has very low risks for most, while the risk of poor health from inactivity is very high.

These guidelines for adults apply to everyone, irrespective of gender, race or socio-economic status, but should be interpreted with consideration of individual physical and mental capabilities. There is substantially less research on the health benefits of physical activity for disabled people. Based on

the evidence, the guidelines **can be applied to disabled adults, emphasising that they need to be adjusted for each individual, based on that person's exercise capacity and any special health or risk issues.**

The guidelines describe the amount of activity required to achieve substantial health benefits. However, regular participation in physical activity at a greater level will provide additional health gains. For those who are currently inactive, doing some physical activity, even if it is less than the recommended guidelines, will provide health benefits. In such cases, a gradual increase in the frequency, duration and intensity of activity to achieve the target is recommended.

Adults who are overweight or obese can gain health benefits from meeting the guidelines for physical activity even in the absence of any changes to their weight status. To reach a healthy weight, additional physical activity and a reduction in calorie intake may be required.

Guidelines for adults

1. Adults should aim to be active daily. Over a week, activity should add up to at least 150 minutes (2½ hours) of moderate intensity activity in bouts of 10 minutes or more – one way to approach this is to do 30 minutes on at least 5 days a week.
2. Alternatively, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or a combination of moderate and vigorous intensity activity.

3. Adults should also undertake physical activity to improve muscle strength on at least two days a week.
4. All adults should minimise the amount of time spent being sedentary (sitting) for extended periods.

Summary of supporting scientific evidence

An extensive evidence base, drawing from experimental and prospective observational research, clearly demonstrates a dose–response relationship in the adult population between physical activity and chronic disease morbidity and mortality.^{34–36} Concurrently, a rapidly expanding body of observational evidence indicates that sedentary behaviour (sitting) may be a risk factor for physical health that is independent of participation in physical activity.^{6, 26}

Adults should aim to be active daily. Over a week activity should add up to at least 150 minutes (2½ hours) of moderate intensity activity in bouts of 10 minutes or more – one way to approach this is to do 30 minutes on at least 5 days a week.

Recent systematic reviews have examined the amount, frequency, intensity and type of physical activity required to achieve physical and mental health benefits in the adult population.^{35–37} These reviews have consistently identified a weekly volume of 150 minutes of moderate intensity activity as being associated with substantial benefits across a number of health outcomes and in diverse populations. This overall volume of physical activity is more important than the specific type of activity, intensity or frequency of sessions.

Although this is a weekly target, we recommend that adults should aim to be active every day and therefore spread the 150 minutes across the course of the week. This emphasis on daily activity is based on the scientific evidence indicating that changes such as improved mood, increased insulin sensitivity and favourable alterations in glucose and fat metabolism occur for up to 24–48 hours following activity. Given these acute or ‘last bout’ effects, adults looking for health benefits should aim to be active every day. Consistent with previous guidelines is the notion that physical activity should be at least moderate intensity.

Performing 30 minutes of moderate intensity physical activity on 5 days of the week,¹⁷ for example, is one well-accepted way of meeting the 150-minute target and being active on most days of the week.

Accumulated short sessions of physical activity (≥ 10 minutes in duration) can provide similar health benefits to the same volume of exercise performed in longer continuous sessions.^{35–38}

Higher volumes of activity (i.e. greater than 150 minutes per week) are associated with additional health benefits. There is insufficient evidence to determine whether there are health benefits from undertaking volumes of activity greater than 300 minutes per week.

Alternatively, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or a combination of moderate and vigorous intensity activity.

There is substantial evidence that vigorous intensity physical activity improves fitness and provides health benefits that are comparable with, and in some cases greater than, those observed for moderate intensity activity.^{36, 37} The recommended dose of vigorous physical activity – 75 minutes over the course of a week – is consistent with the guideline for moderate activity in terms of the overall volume of activity recommended to attain substantial health benefits.

Adults should also undertake physical activity to improve muscle strength on at least two days a week.

There is strong evidence for the health benefits of muscle strengthening activities in adults, and especially older adults, reflecting significant recent advancements in this field of study.^{36, 37} This includes the benefits of enhancing muscle strength and muscle power and the consequent improvements or maintenance of functional ability, stimulation of bone formation and reduction in bone loss. Evidence also supports a beneficial effect of resistance training on glucose metabolism and blood pressure and its role in maintenance of healthy weight.³⁹ Although more research is required to define the optimum dose of muscle strengthening activity, performing 8–12 repetitions of muscle strengthening activities involving all major muscle groups on two or more days per week will be of significant benefit in most cases.

All adults should minimise the amount of time spent being sedentary (sitting) for extended periods.

Many adults are largely sedentary, spending large proportions of the day sitting or lying, with very low energy expenditure.⁴⁰ Sedentary behaviours occur in numerous settings, including at work, at home, during transport and in leisure time. Common sedentary behaviours include TV viewing, computer use, motorised transport and sitting to read, talk or listen to music. Many adults spend in excess of seven hours per day sedentary, and this typically increases with age.^{6, 40} Evidence is emerging that various indicators of sedentary behaviour – for example, time spent watching TV, total sitting time and objectively measured accumulated sedentary time – are adversely and independently associated with overweight and obesity, insulin resistance, type 2 diabetes, some cancers, and cardiovascular and all-cause mortality.^{6, 26}

While there is accumulating evidence suggesting that sedentary time predicts a number of adverse health outcomes in adults, the available data are not sufficient to suggest a specific quantitative recommendation on daily sedentary time for health, or for maintaining a healthy body weight and the prevention of obesity. It is likely that some reductions in sedentary behaviour may result in a direct transfer to moderate to vigorous intensity physical activity, while some will result in a transfer to low intensity activity, such as standing or gentle walking. Based on the current evidence, reducing total sedentary time and breaking up extended periods of sitting is strongly recommended.

Understanding the guidelines for adults

Why do we need new guidelines for adults?

These new guidelines for adults are consistent across the UK and update previous recommendations in the light of emerging scientific evidence. The recommendation about combining moderate and vigorous intensity activity provides people with flexibility to achieve the required amount of physical activity.

What are the needs of this age group?

This is a large and diverse age group. Many key life events that can impact on activity – such as getting a job or retiring, moving house, starting or ending a relationship, becoming a parent, gaining or losing weight or being diagnosed with illness – can happen in these years.⁴¹ Longitudinal studies

have shown that becoming a mother often leads to a decline in physical activity for women. Serious illness, impairment and disability in childhood and early adulthood impact upon physical activity participation; however, the onset of chronic disease in older family members can help to highlight to adults the health benefits of physical activity.

Younger adults can see physical activity as an opportunity to participate in team or individual sports for pleasure and social benefit, to create new social networks and to maintain a healthy body weight. For adults with families, physical activity offers the chance for relaxation, to re-energise and feel less tired, and to maintain a healthy weight. As people approach older adulthood, physical activity is seen as something that helps with weight maintenance and weight loss, and with other lifestyle changes (such as stopping smoking) and provides a chance to be active with friends and family.

How can individuals meet the guidelines for general health benefit?

Doing at least 30 minutes of at least moderate intensity physical activity on five or more days of the week has been a common recommendation, and has been included in national campaigns. However, the overall volume of physical activity is more important than frequency or duration. These guidelines therefore offer choices for adults in how they make up their weekly volume of activity.

For most people, the easiest and most acceptable forms of physical activity are those that can be incorporated into everyday life. Examples include walking or cycling instead of travelling by car. However, for those people who want to be more active, a larger quantity of activity at higher intensity can bring further benefits.

For adults, it is recommended to take 150 minutes of physical activity over a week through a variety of moderate intensity, aerobic physical activities. It is important that these are spread across the week to optimise the short-term benefits of aerobic physical activity. Sport and recreational activity included alongside everyday physical activity can provide important social benefits that help to sustain participation.

Rohan (37 years old)

Rohan works in HR at a large company. He would like to be more active, particularly as he's noticed that he is getting less fit and is starting to put on weight. He often works long hours so finds it hard to commit to anything formal such as a local sports club. Instead he has bought a bike and enjoys getting out for bike rides at the weekend. He has also started taking the stairs at work instead of the lift and tries to get outside for a walk during his lunch break. Once a week, Rohan uses weights machines in the company gym. As his job is desk based, he tries to use his email less and deliver messages to colleagues in person where possible. He also walks 15 minutes from his flat to the train station in the morning and evening – Rohan has discovered that the evening walk also gives him time to unwind after a busy and stressful day.

Someone undertaking vigorous intensity physical activity will usually be breathing very hard, be short of breath, have a rapid heartbeat and be unable to carry on a conversation.

The recommended levels of activity can be achieved through a combination of moderate and vigorous intensity activity. This allows individuals to meet the target in a way which suits their personal circumstances, including their current level of fitness and health, the time available to them and their activity preferences. For example, a daily walk to work may be combined with a swim, gym-based workout and a weekend cycle ride to add up to the target weekly amount of physical activity.

People who are currently inactive will often need to build up slowly, particularly if they aspire to vigorous intensity physical activity. Shorter sessions of physical activity offer an easier starting point for people who have been inactive for some time, or who have busy lifestyles and find it hard to make activity a priority.

What intensity of activity is required for health benefits?

Activity needs to be of at least moderate intensity to benefit health. **A person who is doing moderate intensity activity will usually experience an increase in breathing rate and an increase in heart rate, will feel warmer and may sweat on hot or humid days.**

The amount of activity someone needs to do for their activity to qualify as moderate intensity varies from one individual to another. A person who is unfit or overweight may only have to walk up a slope, whereas a very fit athlete may be able to run quite fast before reaching this level. In an activity like walking, people should focus on their perception of the effort they need to make, rather than their speed.

Vigorous intensity activity can bring health benefits over and above that of moderate intensity activity. Including vigorous intensity activity in the guidelines acknowledges that, for those adults who are capable of and enjoy vigorous intensity activity, this may be the most efficient way of meeting recommended activity levels.

What about muscle strengthening activity?

Muscle strengthening activities should be undertaken in addition to the 150 minutes of aerobic activity (moderate or vigorous intensity) on at least two days a week. They need to involve all the major muscle groups of the body: the legs, hips, chest, abdomen, shoulders and arms.

No specific amount of time is recommended for muscle strengthening, but exercises should be performed to the point at which it would be difficult to do another repetition without help. Although more research is required to define the optimum dose of muscle strengthening activity, performing 8–12 repetitions of muscle strengthening activities involving all major muscle groups twice per week will provide substantial benefits.

Some vigorous intensity physical activities may provide 75 minutes of aerobic activity and sufficient muscle strengthening activity, for example circuit training or participation in recreational sports such as basketball or volleyball.

Paula (22 years old)

Paula has recently graduated from university and has moved to a new town, where she is waiting to start her training as a police officer. At university, she was keen on athletics but, since she graduated, she hasn't kept up her levels of activity. However, Paula is conscious of the need to be active and although she frequently drives to the shops she deliberately parks 10 minutes away and walks. Three evenings a week, she goes for a run or brisk walk. She has recently started circuit training once a week at the local leisure centre, which helps her to achieve the strength recommendations, and she goes for a swim on a Saturday morning with a friend. Paula also makes the most of small opportunities to be active, such as taking the stairs.

What type of activity qualifies?

All activities qualify as long as they are of sufficient intensity and duration, including occupational activities and active travel (brisk walking or biking to work).

Table 8. Types of activity

Type of activity	Examples
Moderate intensity	Brisk walking, bike riding, dancing, swimming, active travel
Vigorous intensity	Running, playing sport, taking part in aerobic exercise classes, using cardiovascular gym equipment
Muscle strengthening	Weight training, working with resistance bands, carrying heavy loads, heavy gardening, push ups, sit ups

What about sedentary behaviour?

The guidelines also contain a new recommendation encouraging adults to minimise the time they spend being sedentary (sitting) each day. This is included because there is now evidence that sedentary time is an independent risk factor for poor health.

Any substitution of sedentary time for physical activity, even if it just results in low intensity activity, will increase energy expenditure. If sedentary time is swapped for moderate or vigorous intensity activity of 10 minutes or more, this will also contribute to achieving the weekly physical activity targets.

Sedentary behaviour can be reduced throughout the day, including at work, when travelling and at home. Examples include:

- replacing motorised travel with active travel such as cycling and walking
- taking regular breaks from extended periods of sedentary behaviour
- reducing total screen time.

John (27 years old)

John suffered a spinal cord injury five years ago and now relies on a wheelchair. Before his injury, he was not particularly physically active and had no interest in playing sport. Last year, he had a serious pressure sore. Around this time, he met another disabled man who talked to him about the physical, psychological and social benefits of being physically active. John decided to try to be active regularly. At first this was not easy as he had little information to help him. He had not been told about physical activity while he was rehabilitating as his GP and gym instructor did not know how much activity he should do or where he could be active safely. He was beaten up two years ago and now worries about his safety. His other barriers are accessibility, lack of equipment, cost and the weather. However, John spoke to a disability charity which connected him with other disabled people on the internet and he was eventually able to put together his own activity plan. With their help, he found a suitable gym. He now exercises there, completing two 40-minute sessions per week. Twice a week, he also lifts weights and he uses an elastic resistance band while at home. He has started wheeling to the shops on the weekend, rather than using his car. John is now thinking about playing sitting volleyball or wheelchair tennis. He is not interested in playing competitively, but sees it as an opportunity to have fun and meet new friends.

What is the role of these guidelines in weight management?

For adults who currently have low physical activity levels, doing 150 minutes of moderate intensity activity each week will substantially increase their energy expenditure and bring health benefits.

For those who are overweight or obese, achieving a healthy weight is likely to require a greater level of activity than the 150 minutes recommended here, and should be accompanied by dietary changes to reduce calorie intake.

People who are overweight or obese should first aim to gradually build up to 150 minutes of moderate intensity activity per week. This will provide substantial health benefits even in the absence of reductions in body weight.

Why are the guidelines for adults less than what we recommend for children?

The guidelines for adults recommend 150 minutes of moderate intensity physical activity per week, less than half the volume of activity recommended for children and young people. The difference between the recommendations for children and young people and adults reflects the nature of the evidence used in their construction. In general, differences in health outcomes have been observed at around 60 minutes per day in children and young people, whereas such differences have been observed at a level of approximately 30 minutes per day in adults. The best available evidence has been used in determining the level of activity required to benefit health in each specific age group, resulting in some abrupt increases at the points of transition between age categories.

Older adults (65+ years)

Introduction

This set of guidelines applies to adults aged 65 years and over. Older age is characterised by increasing risk and incidence of coronary heart disease, stroke, type 2 diabetes, cancer and obesity. In addition, retaining physical and cognitive function becomes a major challenge, as well as the avoidance of debilitating mental illnesses such as depression and dementia. Older adults are also at greatly increased risk of falling and resultant fractures and disability. The high incidence of these conditions, coupled with increased longevity and continuing growth in the proportion of the population aged over 65, highlights a critical public health issue regarding human welfare, and social and health care. This population covers a wide range of ages and physical function from the athletic to the frail and immobile. Age alone is not a good marker of physical function or capacity. Nonetheless, these guidelines represent an important development from those published previously because they provide for the first time in the UK a set of specific recommendations for improving and maintaining health for older adults.

Drawing from recent systematic reviews of the literature, encompassing both experimental and observational research, the evidence is strong that physically active adults aged 65 years and over have higher levels of cardio-respiratory fitness and physical function, improved disease risk factor profiles and lower incidence of numerous chronic non-communicable diseases than those who are inactive. Engaging in physical activity carries very low health and safety risks for most older adults. In contrast, the risks of poor health as a result of inactivity are very high.

These guidelines are generally relevant to all adults aged 65 years and over, irrespective of gender, race or socio-economic status, but should be interpreted with consideration of individual physical and mental capabilities. There is substantially less research on the health benefits of physical activity for disabled people. Based on the evidence, the guidelines **can be applied to disabled older adults emphasising that they need to be adjusted for each individual based on that person's exercise capacity and any special health or risk issues.**

The guidelines describe the amount of activity required to achieve health benefits. Regular participation in physical activity at a level greater than that outlined in these guidelines will provide additional health benefits. However, the majority of UK older adults have low levels of activity and so it is important to emphasise that those who are currently inactive can achieve some health benefits from increasing their activity even if it is below the recommendation. In such cases, a gradual increase in the frequency, duration and intensity of activity to achieve the target is recommended.

Those who are overweight or obese can gain health benefits from meeting the guidelines for physical activity, even in the absence of reductions in body weight. To reach a healthy weight, additional physical activity and a reduction in calorie intake through dietary restriction may be required. Maintaining a healthy weight will also help older adults retain physical function and mobility.

Guidelines for older adults

1. Older adults who participate in any amount of physical activity gain some health benefits, including maintenance of good physical and cognitive function. Some physical activity is better than none, and more physical activity provides greater health benefits.
2. Older adults should aim to be active daily. Over a week, activity should add up to at least 150 minutes (2½ hours) of moderate intensity activity in bouts of 10 minutes or more – one way to approach this is to do 30 minutes on at least 5 days a week.
3. For those who are already regularly active at moderate intensity, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or a combination of moderate and vigorous activity.
4. Older adults should also undertake physical activity to improve muscle strength on at least two days a week.
5. Older adults at risk of falls should incorporate physical activity to improve balance and co-ordination on at least two days a week.
6. All older adults should minimise the amount of time spent being sedentary (sitting) for extended periods.

Summary of supporting scientific evidence

For older adults, the major challenges to their health and well-being are a greater risk of cardiovascular and metabolic disease; loss of physical function; loss of cognitive function; increased risk of depression, dementia and Alzheimer's disease; and increased risk of injury due to falling.

These guidelines draw upon an evidence base of prospective cohort studies and experimental research that is growing in volume, quality and consistency. Randomised controlled trials have demonstrated that increasing physical activity improves cardiovascular fitness, strength and physical function; reduces aspects of cognitive decline and susceptibility to falls; and can improve aspects of mental well-being such as self-esteem and mood.

Older adults who participate in any amount of physical activity gain some health benefits, including maintenance of good physical and cognitive function. Some physical activity is better than none, and more physical activity provides greater health benefits.

Regular physical activity has an inverse dose–response association with coronary heart disease, stroke, type 2 diabetes and some types of cancer.^{34–36, 42} A clear relationship exists between physical activity and reduced risk of depression and dementia but a dose–response association is not established. In studies involving participants aged 65 or older, evidence indicates that there is an inverse relationship between physical activity and cardiovascular disease risk that is similar in magnitude to that observed for younger individuals.⁴⁵

For some older adults, achieving the level of activity recommended may not be immediately attainable, due to low levels of fitness or functional capacity, or existing disease or disability. Recent accelerometer data from the UK indicates that, although many older adults achieve a total of 30 minutes of moderate intensity activity per day, they do not manage to sustain sessions that last 10 minutes.⁴³ Most of the activity of older adults takes place as part of daily routines such as shopping or visiting friends, and this is interspersed with breaks. As with young children, we may need to acknowledge that activity patterns of older adults are qualitatively different to those of young adults. For these people, engaging in a small amount of activity, even at a level below the quantity recommended, will provide some health benefits relative to being totally inactive. Therefore, it is recommended that older adults engage in some physical activity every day.

We recommend a gradual increase in the duration, frequency and intensity of activity, working towards a goal of 150 minutes per week of moderate intensity physical activity. The dose–response relationship for physical activity and health also indicates that 'more is better' in terms of the benefit to health that is achieved through regular physical activity. Thus, older adults who are currently meeting the guidelines for physical activity can gain additional health benefits from increasing and sustaining higher levels of activity.

Older adults should aim to be active daily. Over a week, activity should add up to at least 150 minutes (2½ hours) of moderate intensity activity in bouts of 10 minutes or more – one way to approach this is to do 30 minutes on at least 5 days a week.

A series of recent systematic reviews consistently identified 150 minutes of moderate intensity physical activity per week as providing substantial benefits for the prevention of numerous chronic diseases, including coronary heart disease, stroke, type 2 diabetes, depression, dementia and loss of physical function.^{34–37, 42} As previous guidelines have advised, one way of attaining the recommended level of activity would be to undertake 30 minutes of moderate intensity physical activity on five days of the week. However, the evidence suggests that it is the overall volume of activity that is key to the beneficial effects of physical activity rather than specific types of activity or combinations of intensity or frequency. Accordingly, older adults should aim to achieve the recommended amount of activity in a manner that is most convenient and comfortable for them.

In addition to the longer-term benefits of physical activity, some of the health gains are relatively acute and occur for up to 24–48 hours following activity. These include the management of glucose tolerance and insulin sensitivity, maintenance of physical and cognitive function, mobility and possible benefits to mental well-being.

Sessions of as little as 10 minutes can provide health benefits that are comparable with those attained from longer sessions. For people who currently have low levels of physical activity, or who do not have time to be active for longer, numerous shorter (≥ 10 minutes) sessions may be a more achievable way to meet these guidelines.

For those who are already regularly active at moderate intensity, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or a combination of moderate and vigorous activity.

A small percentage of older adults continue with higher intensity physical activity through regular running, swimming, cycling or competitive sports. Vigorous intensity physical activity provides health benefits that are comparable with, and in some cases greater than, those obtained through moderate activity. The available evidence indicates that substantial health benefits can be achieved through participation in 75 minutes of vigorous

activity spread across the week.^{34–37, 42} It is important to build up activity gradually to reach recommended levels. When older adults have achieved the recommended levels for several weeks (or for some people, several months), then more vigorous activities might be considered.

The risk of activity-related injury is related to a person's usual amount of activity and the increase in volume or intensity of the activity performed.^{35, 37} Small, gradual increases in the volume or intensity of activity will allow for adaptation with a low risk of injury.

Older adults should also undertake physical activity to improve muscle strength on at least two days a week.

For older adults, there is strong evidence for the additional health benefits of muscle strengthening activities. These include the maintenance of functional ability and the reduction in bone and muscle loss associated with ageing.^{34–37, 42} The benefits are evident for the performance of simple activities such as walking, climbing steps or standing up from a chair. There is also a reduction in the incidence of falls. Muscle strengthening activity is therefore recommended in addition to the 150 minutes of moderate intensity activity described in other guidelines. Although more research is required to define the optimum dose of muscle strengthening activity, performing 8–12 repetitions of muscle strengthening activities involving all major muscle groups twice per week will provide substantial benefits for older adults.

Older adults at risk of falls should incorporate physical activity to improve balance and co-ordination on at least two days a week.

Approximately 30% of adults over the age of 65 fall each year, rising to 50% in those aged 80 and over.⁴⁴ Falls are a major source of injury for older adults, and the treatment and rehabilitation associated with falls entail substantial healthcare costs. Evidence accumulated in recent years has identified several risk factors for falls in older people, including balance impairment.⁴⁵ There is good evidence that physical activity programmes which emphasise balance training, limb co-ordination and muscle strengthening activity are safe and effective in reducing the risk of falls.^{34, 35, 45}

All older adults should minimise the amount of time spent being sedentary (sitting) for extended periods.

Sedentary behaviours – such as reading, watching TV or travelling by car, bus or train – have very low levels of energy expenditure. Sedentary behaviour increases with age and observational evidence using self-reporting and accelerometry indicates that sedentary time rises sharply from age 70 onwards.⁴⁰ Various indicators of sedentary behaviour, for example time spent watching TV or total time spent sitting, are adversely associated with chronic non-communicable disease risk factors and cardiovascular and all-cause mortality.⁶ We do not yet know the implications for metabolic and circulatory problems of older adults sitting for long periods. There is sufficient evidence to support a recommendation to reduce sedentary behaviour in older adults, but it is not currently possible to suggest a specific time limit.

Understanding the guidelines for older adults

For the first time, we now have physical activity guidelines dedicated specifically to adults aged 65 and over.

Although there are many parallels with the guidelines for 19–64 year olds, there are also important differences and emphases. In particular, their interpretation and application need to be carefully grounded in the reality of the lives of older adults.

What are the specific needs of older adults?

The older population is rapidly increasing as we are living longer. Older adults tell us that they want to stay healthy and fit enough to continue doing the things that are really important to them. The priorities for older adults are to stay pain free, maintain the capacity to get out and about, and retain independence. Older adults also want to stay engaged with their community and make useful contributions to family, neighbours and society. Preventing diseases such as type 2 diabetes, cancer, heart disease and stroke remain crucial as their onset is often a trigger for a downward spiral of decline and loss of independence. At the later stages of life, many older adults struggle to retain a high level of physical and cognitive function and independent mobility. Simple things such as being able to play with grandchildren, walk to the shops, enjoy recreation and maintain a rewarding social life make an important difference to their quality of life.

Because of the current low levels of physical activity of older adults in the UK, there is great scope for improved physical function, and a higher level of energy, vitality, social engagement and well-being, with subsequent reductions in health and social care costs.

It is never too late to adopt, and benefit from, a more physically active lifestyle since there is good evidence that the benefits of physical activity apply across the age range, even in older adults who have previously been inactive.

The challenges of diversity in older adults

People aged over 65 are not a singular or homogeneous population. We can see examples of athletic older men and women still competing in sports, running marathons, doing exhibition dancing or covering hundreds of miles as coastal path walkers. However, many older adults have poor levels of physical function and/or are overweight or obese. Many have medical conditions such as high blood pressure, arthritis, type 2 diabetes, cardiovascular disease or dementia, or are frail, have very little strength and are fearful of falls. Consequently, many older adults spend most of their time sitting down.

Because of this range of ages and physical function, this population has sometimes been separated into the 'younger old', 'old' and 'older old'. However, chronological age has quite limited value when describing differences in health, physical function and disease status. Many people in their late 80s do as well as those in their late 60s while some in their early 70s have functional status more expected of a 90 year old.

For the sake of simplification, we can describe three groups of older adults with differing functional status and activity needs:

1. Those who are already active, either through daily walking, an active job and/or engaging in regular recreational or sporting activity. This group may benefit from increasing their general activity or introducing an additional activity to improve particular aspects of fitness or function, as well as sustaining their current activity levels.
2. Those whose function is declining due to low levels of activity and too much sedentary time; who may have lost muscle strength; and/or are overweight but otherwise remain reasonably

healthy. National data indicate that this makes up the larger proportion of older adults and that they have a great deal to gain in terms of reversing loss of function and preventing disease.

3. Those who are frail or have very low physical or cognitive function, perhaps as a result of chronic disease such as arthritis, dementia or very old age itself. This group requires a therapeutic approach (e.g. falls prevention programmes) as many will be in residential care.

What do these guidelines mean for older adults?

This wide range in physical and cognitive ability requires flexibility and insight when interpreting and applying generic physical activity guidelines. It is critical to consider the level of physical and cognitive function, recent physical activity levels and health status, as well as age itself.

Our first guideline implies that, for the majority, moving **towards** the recommendation provides a starting point and that even small increases in activity will produce some benefits in terms of physical function and possibly mental health. Getting started in this way is a pre-requisite to moving towards more demanding activity and the greater health benefits it provides. For those who are limited by disease or impairment, there is value in even small increments, which can also help slow or prevent further decline.

However, for maximum cardiovascular and metabolic benefits, the current evidence indicates that older adults need to achieve similar amounts of moderate intensity activity to younger adults (150 minutes, spread across the week). (For further information about intensity, see Chapter 5.) This is probably best achieved by regular brisk walking, either as leisure walking or as part of shopping and social routines, and perhaps combined with recreational activity such as dance, gardening, swimming, cycling, moderate intensity sport or exercise classes tailored for older adults.

As with younger adults, it is possible to substitute vigorous intensity activity to achieve even greater fitness and health benefits in a shorter time. However, vigorous activity should be attempted only by those older people who have been very active for some time and who have a high level of fitness.

Loss of muscle strength and power are a particular feature of ageing. The process is accelerated by

general lack of physical activity, including sitting down too much, but it can also be reversed by strengthening activities. The evidence suggests that muscle strengthening activities twice a week can produce benefits. Muscle strengthening activities that load each of the main muscle groups provide the greatest benefits. However, activities that require hard muscle work such as gardening, badminton, tennis, stair climbing, hill walking, cycling and dance can also help maintain or even improve strength.

Physical activity to improve leg strength, balance and co-ordination can help older people avoid falls. The evidence is largely derived from research with older adults who are at risk of falling, including those who have already had a fall or who have a low level of physical function. Programmes designed to reduce falls have been in existence for some time, typically involving a range of strengthening, co-ordination and balance exercises such as tai chi and dance movements.

Older adults, particularly those who are inactive, are susceptible to a loss of muscle mass and a reduction in bone density as well as increased body fat. Loss of muscle strength accompanied by carrying large amounts of excess fat will contribute to decreased function and mobility, making it more difficult to achieve simple tasks such as getting out of chairs and walking up stairs and slopes. Loss of muscle strength and being underweight can also impair an individual's ability to undertake daily tasks. Older adults therefore need to build physical activity into their lives and, if they are overweight or obese, reduce energy intake through careful dietary habits. An important positive message from the evidence base is that they will still gain health benefits from meeting activity guidelines, even in the absence of reductions in body weight.

Many older adults spend 10 hours or more each day sitting or lying down, making them the most sedentary population group. This may be partly due to loss of physical function or diseases such as arthritis, but long periods of sitting will also cause further loss of function. Research is in its early stages so we do not yet fully understand the consequences of long uninterrupted periods of sitting in terms of cardiovascular and metabolic health or overweight and obesity. However, more time spent sitting limits the amount of time being active and this will contribute to low daily energy expenditure. The evidence does show that sedentary time is an independent risk factor for poor health. Therefore, the guidelines recommend

that, where possible, older adults should aim to minimise the time they spend in extended periods of sedentary behaviour each day.

Finally, being active (whether walking more frequently to the shops, dancing, playing bowls, taking part in led health walks, working on allotments or volunteering for work in the community) can be an important way for older adults to maintain independence and social engagement. This in turn can contribute to higher levels of mental well-being. Physical activity can therefore help to contribute to a higher quality of life, regardless of level of intensity.⁴⁷

Jim (70 years old)*

Jim is a married man who retired at 51. He takes part in many activities, both active and sedentary. His burning passion is basketball refereeing, which he's done for 56 years. A game involves two hours' continuous activity, much of which is running. To keep up his activity levels during the summer, he has also found a summer league which he is now involved in. During the summer, he occupies much of his time doing some part-time garden maintenance work for neighbours and he helps out at his daughter's allotment. He also hosts a couple of holiday tours a year, which involve either walking or leading visits to gardens. He can spend long periods of time sitting at his computer and in front of the TV watching sport but he breaks this up by doing light tasks around the house. Jim's wife also ensures that they get out for regular walks to visit their friends.

How can older adults do all of this activity?

There are many different ways for older adults to be more active. The activities an older adult chooses will depend on factors such as past and recent experiences of activity, current preferences, current level of activity and physical function. What activities their friends do and what is on offer in the local community also play an important role. However, the following represent the main categories of activity that can make a difference for most older adults:

- daily walking or cycling

* Modified from an interview with a participant in Project OPAL, funded by the National Prevention Research Initiative.

- active leisure pursuits, such as gardening, dancing, bowls or walking
- engagement in work-related activity such as a delivery round
- group exercise classes
- community or gym-based activities, either alone or in groups
- swimming
- breaking up time spent sitting with regular short periods of standing or walking.

Shirley (81 years old)*

Shirley is a widow who lives alone and doesn't drive. She kept working until the age of 76 and has been determined to keep busy and independent ever since. She has built up strong friendships and local support networks, particularly since she lost her husband. She finds purpose in helping others: during the week, she has a string of neighbours visiting her, to chat and have coffee or lunch. She gets out and about through visiting a friend in a nursing home, by belonging to the local pensioners' group and walking to weekly bingo. She regularly takes the bus with a friend to the shops, and always chooses to take the stairs instead of the lift. Shirley does as much of her own housework as she can. Although her brother-in-law drives her to do a main weekly food shop, she pops out on foot to top up locally. When a local, chair-based exercise class closed because of poor attendance, she sought out a led walk. She has progressed from the 'slow' to the 'fast' stream, and she's managed to get four friends to join. In her own words: 'I say take advantage, because I might not be like that next year!'

Physical activity, overweight and obesity

A high proportion of older adults are overweight or obese. Achieving the recommended weekly volume of activity will provide substantial health benefits, even in the absence of reductions in body weight. Retaining physical function is difficult for older adults because of loss of muscle mass, strength and bone density. Excess weight further reduces

* Modified from an interview with a participant in Project OPAL, funded by the National Prevention Research Initiative.

mobility, especially among obese people. As a key component of daily energy expenditure, physical activity has an important role to play in maintenance of a healthy weight. Weight status, however, is a result of the individual balance between energy intake and energy expenditure, hindering any attempt to determine the amount of activity required for maintenance of a healthy weight at a population level. For older adults who currently have low physical activity levels, reaching the recommended 150 minutes of moderate intensity activity each week will substantially increase their energy expenditure. For older adults who are overweight or obese, achieving a healthy weight is likely to require a greater level of activity, and this will need to be accompanied by dietary changes to reduce calorie intake. Overweight and obese older adults should therefore develop a weight loss programme combining reduction in calorie intake and increase in physical activity. This will produce greatest benefit for fat loss, retention of muscle mass, physical function and health.⁴⁶

Further considerations for facilitating activity for older adults

Many strategies for promoting physical activity have been tried already. They range from leisure centre-based, structured programmes specifically designed for older adults to whole community approaches designed to encourage and increase opportunities for safe and attractive walking. Some common factors have been identified that increase chances of success.

Consideration of older adults' needs

Older adults may need convincing of the importance of physical activity. Many worked in physically demanding jobs and they may feel that retirement is the time to take it easy. However, there are ways to persuade older people that physical activity can play a valuable part in their lives, such as by showing them that it can help them feel competent and capable, in charge of their life, able to make a worthwhile contribution and feel part of family, groups and community. Physical activity programmes can be very useful in helping older adults experience greater physical competence through improved function and reduction in limitations. This in turn may help them retain independence. Activity in groups builds friendships and helps people feel that they belong. Programmes can be developed that build people's sense of ownership and encourage emotional investment, for example by helping to spread the word, recruit and volunteer. Leaders who have empathy and understanding of the needs of older people are needed to produce an enjoyable and non-threatening environment. Physical activity programmes that take account of these broader considerations may produce greater levels of programme recruitment and sustainability.

Consideration of environmental support

Most older adults' activity currently involves getting out and about in the community; therefore, localities and neighbourhoods need to be well designed and supportive of physical activity. For example, older adults need to feel secure and safe from traffic and other threats, and should have access to well maintained walkways and pleasant green spaces. To encourage walking, they need to be within 5–10 minutes' walking distance of local shops and amenities, but an effective local public transport system may also be important to allow access to the city centre, facilities and events.

Taking action

Introduction

This report has underlined the urgent need for concerted action on physical activity across the UK. In Chapter 1 we showed that physical activity levels remain low among adults and children in the UK. British women are less active than men and participation in activity declines sharply with age in both men and women, emphasising the need to address inequalities and increase activity across the lifecourse. Action needs to be taken at a population level to reap the benefits to public health, drawing upon other areas, such as a cleaner environment and more connected communities. There is now strong evidence to show that physical activity benefits many aspects of health. In particular, regular activity can reduce the risk of diseases including coronary heart disease, stroke, cancer, type 2 diabetes and obesity, and can improve mental health and well-being.

These guidelines are the start of a new approach to physical activity promotion. We have built on the solid foundations from previous documents, including *At least five a week* in England, *Creating an Active Wales*, *Let's Make Scotland More Active* and Northern Ireland's *Fit Futures: Focus on Food, Activity and Young People*.^{17, 48–50} This report builds on that combined knowledge and, for the first time, demonstrates a consensus across the UK on a common set of guidelines. These reflect international guidelines, drawing on reviews and guidelines from the World Health Organization as well as country-specific reports, including those from Canada, the US and Australia. These guidelines have been adapted to be specific to the UK situation and to reflect the views of UK experts and practitioners. This ensures that they can be put into action by a wide variety of partners engaged in improving public health through physical activity.

These guidelines have areas that are consistent with previous guidelines while also introducing new elements and allowing additional flexibility to help people find more ways to fit activity into their lives. They provide clear information on how much activity British children and adults should aim to achieve and the benefits of being active every day. They also encourage people to think of different ways to accumulate activity throughout the week.

What is new in this report?

This report has a number of features that will help those engaged in the promotion of physical activity across the UK.

A lifecourse approach

Previous reports focused on either adults or children, with limited connections between the two. The new guidelines cover the role of physical activity throughout our lives, including new guidelines for the early years, updated guidelines for children and young people as well as adults, and new, tailored guidelines for older adults. This helps to ensure consistency and establish the principle that physical activity is something that should be a natural part of everyday life. The guidelines stress the importance of adapting physical activity to the needs of people at different life stages. During the early years and for children, there is an emphasis on physical and emotional development; for young people, there is a need to avoid a decrease in participation; for adults, the key issue is maintaining activity levels particularly through key life transitions such as marriage, parenthood and retirement; and for older people, physical activity is seen as a way to maintain independence and enjoy a healthy and sociable later life.

Although the report presents different guidelines for different ages, the overall messages are simple: people need to be active throughout life. Active children can become active adults and, in turn, enjoy an active later life. Importantly, it is never too late to adopt, and benefit from, a more physically active lifestyle. Even older adults who have previously been inactive can achieve some health benefits from increasing their activity, even if it is at lower levels than recommended.

A stronger recognition of the role of vigorous intensity activity

In the late 1990s, we worked hard to reflect international research evidence that supported the role of moderate intensity physical activity in reducing the risk of chronic disease. This led to national programmes and campaigns that helped to establish the importance of moderate intensity physical activity such as walking. They also communicated that people did not need to be sporty or participate in planned, deliberate exercise to reap the health benefits of an active lifestyle. However, this emphasis on activities such as walking and cycling may have led some people to assume that sports and other vigorous intensity activities do not benefit health, and that vigorous exercise did not have a place in national guidelines. This is not the case. These new guidelines have a clear and consistent message on the importance of vigorous physical activity that will have a particular resonance with people who enjoy more vigorous sport and exercise.

The flexibility to combine moderate and vigorous intensity activity

The guidelines recognise that both moderate and vigorous intensity physical activity have benefits, so people can combine different amounts and types of activity according to their lifestyle and preferences. However, they do not dismiss the previous adult recommendations: people who are active at a moderate intensity for 30 minutes or more on five or more days of the week will still achieve the new guidelines. What has changed is that people can choose to swap some of these sessions of moderate intensity activity for shorter sessions of vigorous intensity activity.

Weekly target; daily activity

For adults and older adults, the new recommendation is to achieve 150 minutes of moderate intensity activity (or 75 minutes of vigorous intensity activity). However, across all age groups, the report recommends that people are active in some way every day. By being active daily, individuals will gain some health benefits which result from acute responses that occur for up to 24–48 hours following activity. Being active daily may also help to develop more sustainable, lifelong activity habits.

New recommendations on sedentary behaviour

Evidence is mounting in support of the importance of tackling sedentary behaviour, alongside the promotion of physical activity. Across each age group, evidence shows that it is possible for people to achieve recommended levels of physical activity but still put their health at risk if they spend the rest of the time sitting or lying down. This report establishes new guidelines highlighting the need to limit sedentary behaviour, and demonstrates that action to limit sedentary behaviour is quite different from action to promote physical activity. Helping people to implement these guidelines on sedentary behaviour will again require action to be taken across the lifecourse, from limiting the time infants spend restrained in buggies and car seats, through to encouraging older adults to stand up and move frequently. There will be important roles for the workplace, schools and childcare settings in helping to address this new agenda.

The key issue here is that some activity is better than none.

How can the guidelines be used?

Guidelines themselves do not change behaviour: we do not expect many people to read this report and immediately change their lifestyle. However, this report does set out clearly what people need to do to benefit their health, and can help them to understand the options for action that fit their own lives. There now needs to be careful and planned translation of these guidelines into appropriate messages for the public, which relate to different life situations. However, communication alone is not enough: this has to be matched with concerted and committed action to create environments and conditions that make it easier for people to be more active and less sedentary.

Action at multiple levels

Creating an active society requires action at all levels. How active people are is influenced by a wide range of factors, from the advice or encouragement of friends, through programmes at work or in local communities, to the influence of the built and natural environment and general socio-economic conditions. People may be encouraged to exercise by a healthcare professional or a friend, but may find that childcare or work responsibilities get in the way, or they cannot find anywhere nearby to be active. People living closer to green spaces, for example, have been found to be more physically active and were less likely to be overweight or obese.⁵¹

These guidelines apply across the population, irrespective of gender, race or socio-economic status. However, barriers related to safety, culture and access, for example, can have a disproportionate effect upon the ability of individuals to respond to the guidelines; therefore, interventions to promote physical activity must consider this. Fear of traffic or strangers can often dissuade parents from allowing children to walk to school or play outdoors. Similarly, perceptions of violence in the community can restrict people's movement outside their house or car. These guidelines seek to support a more balanced assessment of risk compared with the important health benefits of physical activity.

This means that action on physical activity needs to tackle these barriers to being active at all levels, from the personal through to the environmental – particularly the challenges relating to safety, whether actual or perceived. This is a big challenge, but is made easier by the new flexibility in the guidelines. Recognising that action is needed at multiple levels provides opportunities for a wide range of partners to get involved. For example, promoting physical activity is as much the role of the transport planner and town planner (to ensure that there is good provision for safe walking and cycling possibilities) as it is for those providing facilities for people to be active (to ensure that programmes are available for people who are currently inactive). Similarly, in schools and colleges, there is potential to develop safe routes to schools and active playgrounds, alongside ensuring the provision of good physical and health education through the formal and informal curriculum.

Examples of effective action

Alongside the evidence for the benefits of physical activity, there is a growing evidence base for interventions to encourage and help individuals to achieve healthy, active lifestyles.⁵² This includes the following areas.

Environmental action: Creating towns and cities for cycling

Many cities in mainland Europe have demonstrated that, by investing in infrastructure for cycling and adopting strong pro-bike policies, levels of cycling can be increased so that over four out of 10 journeys are made by bike. Encouraging starts have been made in the UK too: programmes in England (Cycling Demonstration Towns), in Wales (Sustainable Travel Towns) and Scotland (Smarter Choices, Smarter Places) have all demonstrated that, working in partnership with willing local authorities, investment in cycling infrastructure and promotional programmes would lead to an increase in levels of cycling across towns. Central to this is the need for cycling to be prioritised as part of local authority transport plans.

Organisational action: Promoting activity in the workplace

Workplaces are major influences on behaviour, and employers' health promotion policies can help people to be more active and less sedentary as part of their working lives. This is not just about providing gyms at the office, but it is also about enabling employees to be active in different ways by providing showers for cyclists and walkers, prioritising stairs over lifts and encouraging active commuting. Employers should invest in the health of their employees to reap the potential benefits of a fitter, more active workforce, including decreasing sickness absence and potentially increasing productivity.

Community action: Community-level activity programmes

Local communities can have a strong influence on people's behaviour. Whole-community approaches where people live, work and play have the opportunity to mobilise large numbers of people. Investments in community-level programmes such as parks, playgrounds, conservation schemes, walking clubs and support for local sports clubs can help to influence social norms around health and activity, and help to improve facilities and environments to enable people to become more active.

Interpersonal action: The role of primary care

There is strong evidence that primary care professionals can have an important influence on increasing physical activity and there is a growth in the specialism of sport and exercise medicine in the UK. Healthcare systems should include physical activity as an explicit element of regular behavioural risk factor screening, patient education and referral. Primary care professionals and/or other allied staff can conduct simple and quick patient assessment of their level of physical activity using tools such as the GP Physical Activity Questionnaire (GPPAQ) and provide advice and guidance on the amount and type of activity and where to get further support. Developing and maintaining strong links between primary care settings and local community-based opportunities for activity, recreation and sports can be very effective. Across the UK, there are many examples of this kind of approach and Let's Get Moving is one example.

New opportunities for action

In the UK, there are already many excellent programmes, such as those promoting walking and cycling, which have a continuing role in helping people to be more physically active. However, the new aspects of the guidelines provide fresh opportunities for action. These include:

- programmes specifically aimed at reducing sedentary behaviour (such as leisure-time screen use)
- activities to promote movement in children in the early years (such as interventions with nursery professionals)
- programmes to stimulate play in young people (such as low-cost play schemes open to all)
- active living programmes for older adults (including walking and other appropriately targeted activities)
- 'mix and match' approaches to combining vigorous and moderate intensity activity (so that people can participate at the most appropriate level for them)
- programmes that incorporate muscle strength and flexibility in addition to or alongside programmes aimed at improving cardiovascular health
- provision of suitable opportunities for young people, adults and older adults.

Challenges

This new approach to physical activity promotion brings some challenges. There is a danger that if physical activity is seen as 'everybody's business' then no one will take the lead. This must not happen; physical activity is a 'win-win' intervention which can help to achieve multiple objectives across public health, transport, the environment, education, healthy ageing, childcare and social care.

There may also be training needs, to ensure that there is sufficient knowledge and skills to respond to these challenges and implement the new guidelines. For example, the links between urban design, healthy ageing, growth and development in early years and physical activity are not new, but there may be a need for training and professional development to enable the workforce to respond to this agenda. Efforts will be needed to increase training and understanding of how to integrate the promotion of active living and physical activity into different sectors. Our challenge to other professionals is to consider the implications of this report and assess how your sector can contribute to the creation of a more active society.

We also face significant challenges in the urban environment. As there is increasing pressure on open space, it becomes more important to protect parks and green spaces, and ensure that the environment encourages walking and cycling – especially for short urban journeys.

Finally, these new guidelines may require some changes to the way we monitor and report on physical activity. Greater flexibility in the guidelines may mean that new or modified measurement techniques are needed. We will need to assess the capacity of current surveillance techniques to capture a broader range of types and combinations of activities.

Conclusion

We know enough now to act on physical activity. The evidence for action is extremely strong, and we have reached a unique UK-wide consensus on the amount and type of physical activity that is needed to benefit health. This new approach opens the door to new and exciting partnerships and will help to create a more active society.

Process and methodology

Here we describe the process undertaken to review the current physical activity guidelines in the UK. In late 2008 and early 2009 the need to review and potentially update the UK physical activity guidelines across the lifecourse was under discussion.

Guidelines for children and young people existed across the UK and although there was a great deal of similarity between countries, there were a number of differences in the wording and detail given for each population group.

Publication of new, revised physical activity guidelines in other developed countries (the US and Canada) and guidelines released by the World Health Organization, and an opportunity to capitalise on the recent scientific review work were key drivers for the development of the UK physical activity guidelines. In particular, the US Government reported on a comprehensive two-year review of the health benefits of physical activity and similar and complementary work was undertaken in Canada.

Given these recent large-scale reviews, it was deemed unnecessary to undertake another full review of the primary literature. Instead, a set of key documents were identified as the primary sources of evidence and used to underpin the UK work. The key sources were:

- *Physical Activity Guidelines Advisory Committee Report* (2008) from the Physical Activity Guidelines Advisory Committee formed by the US Department of Health and Human Services
- scientific reviews undertaken as part of the Canadian Physical Activity Guidelines review process
- review papers undertaken as part of the British Association of Sport and Exercise Sciences (BASES) consensus process
- where needed, individual high quality review papers or individual study papers reporting on relevant issues not covered in the US, Canadian or BASES review process.

Expert advisory working groups were formed comprising leading international and national experts in the field of physical activity, with a particular focus on expertise covering the epidemiological evidence on the health benefits of physical activity.

The scope of work for each working group included undertaking a review of the existing physical activity guidelines in the UK and the development of a draft set of revisions based on the latest available scientific evidence. The focus was on developing recommendations for new physical activity guidelines for the prevention of disease and excluded consideration of the role of physical activity in the treatment of those with pre-existing conditions. The groups worked to a set of key questions which formed the structure of each working group paper.

These papers were presented at a 2 Day Scientific Meeting held at Marlow, England, in October 2009. The meeting was convened to allow for wider input from the scientific community and to communicate more widely the process that was under way. The working papers were reviewed and updated following the meeting and we then undertook a national web-based consultation.

Feedback from the web-based consultation was reviewed and the working papers and initial recommendations were updated. A final

technical report covering children and young people, adults and older adults, which included final recommendations on updating the physical activity guidelines across the UK, was completed in May 2010.

In parallel to the work outlined above, the Department of Health's obesity team recognised the need to review evidence for physical activity in young children and for sedentary behaviour and obesity in order to produce guidelines on these subjects. This work was commissioned in 2009.

The Early Years and Sedentary Behaviour Expert Working Groups had a different starting point in that UK guidelines did not exist.

The Sedentary Behaviour Expert Working Group invited its members to lead on the investigation of a key topic. For each topic the lead expert conducted a review of the literature and presented the findings for discussion and agreement by the whole group. These recommendations, and the evidence on which they are based, were issued for wider consultation online and in a one-day stakeholder meeting. The final report was then submitted.

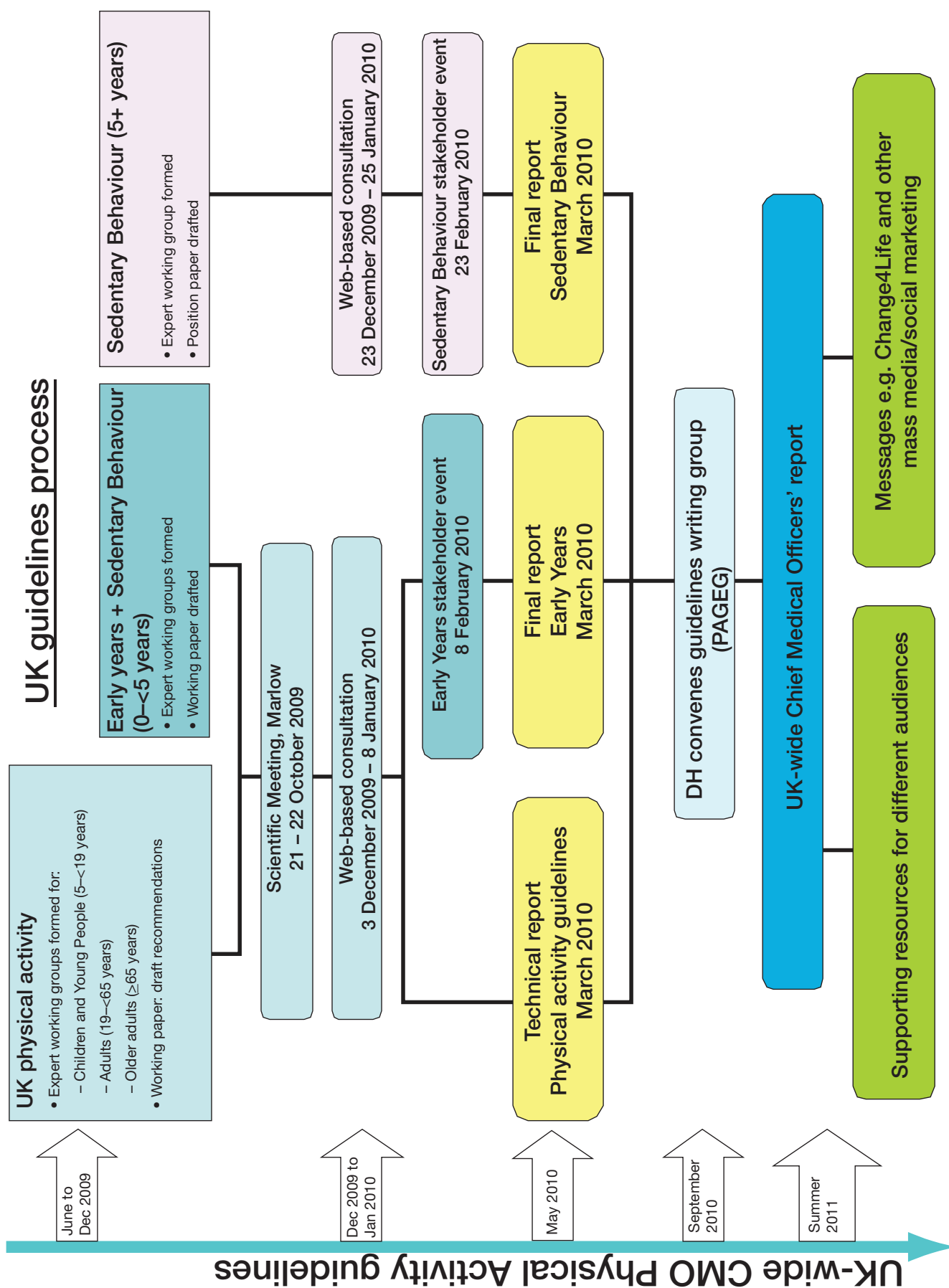
The Early Years Expert Working Group based its work and recommendations on the Australian systematic review from 2008 and the subsequent 2009 Australian Department of Health and Ageing guidance as well as other relevant systematic reviews published after February 2008, where available.

The Early Years Expert Working Group presented its initial thinking at the 2 Day Scientific Meeting at Marlow on 21–22 October 2009, incorporated feedback from that event and prepared recommendations for the wider online consultation. Responses were then considered and incorporated into the final report submitted in early 2010.

The next step was to set up the Physical Activity Guidelines Editorial Group (PAGEG). The PAGEG incorporated a range of academic, behavioural, communications and policy experts whose role was to translate the scientific recommendations encompassing early years, children and young people, adults, older adults and sedentary behaviour into the Chief Medical Officers' guidelines for physical activity.

The PAGEG held a two-day writing meeting in London and followed this with numerous teleconferences. The final guidelines for CMO approval were drafted over a six-month period. These approved guidelines are presented in this report, which was written by PAGEG members.

A schematic of this process follows.



Glossary

Accumulate

The concept of meeting a specific physical activity dose or goal by performing activity in short sessions, then adding together the time spent during each of these sessions. For example, a goal of 30 minutes could be met by performing 3 sessions of 10 minutes throughout the day.

Aerobic activity

Activity in which the body's large muscles move in a rhythmic manner for a sustained period of time. Aerobic activity, also called endurance activity, improves cardiorespiratory fitness. Examples include walking, running, swimming and bicycling.

Bone strengthening activity

Physical activity primarily designed to increase the strength of the skeletal system. Bone strengthening activities produce an impact or tension force on the bones, promoting bone growth and strength. Running, jumping rope and lifting weights are examples of bone strengthening activities.

Children of pre-school age

Those children able to walk unaided and who have not yet started school (i.e. toddlers and pre-schoolers).

Chronic diseases

Diseases of long duration and generally slow progression, such as heart disease, stroke, cancer, respiratory diseases and diabetes. These are by far the leading cause of mortality in the world.

Dose–response relationship

The relationship between the dose of physical activity and its health or fitness outcome. In the field of physical activity, 'dose' refers to the amount of physical activity performed by the subject or participants. The total dose, or amount, is determined by the three components of activity – frequency, duration and intensity.

Duration

The length of time in which an activity or exercise is performed. Duration is generally expressed in minutes.

Frequency

The number of bouts of physical activity over a fixed period.

Intensity

The rate of energy expenditure that an activity demands – in other words, how hard a person is working. For any given physical task, the absolute rate of energy expenditure (the number of calories burned) is broadly similar for individuals of equal weight. Heavier people will expend more energy performing the task because they have more weight to move. The rate of energy expenditure is the '**absolute intensity**' of the activity and is usually measured in either kcals per kg per minute or in METs (metabolic equivalents).

Metabolic equivalents (METs)

A person's metabolic rate (rate of energy expenditure) when at rest is 1 MET. MET values are assigned to activities to denote their intensity and are given in multiples of the resting metabolic rate. For example, walking elicits an intensity of 3–6 METs, depending on how brisk the walk is.

Moderate intensity

A moderate intensity physical activity requires an amount of effort and noticeably accelerates the heart rate, e.g. brisk walking, housework and domestic chores. On an absolute scale, moderate intensity is defined as physical activity that is between 3 and 6 METs.

Muscle strengthening activity

Physical activity that increases skeletal muscle strength, power, endurance and mass.

Physical activity

Any bodily movement produced by skeletal muscles that requires energy expenditure.

Sedentary behaviour

Activities that do not increase energy expenditure much above resting levels. There is a difference between sedentary and light physical activities. Activities considered sedentary include sitting, lying down and sleeping because they do not require any muscle recruitment. Associated activities, such as watching TV and reading, are also in the sedentary category.

Vigorous intensity

An activity that requires a large amount of effort, causes rapid breathing and a substantial increase in heart rate, e.g. running and climbing briskly up a hill. On an absolute scale, vigorous intensity is defined as physical activity that is above 6 METs.

Volume

The total amount of physical activity performed over a fixed period. It is a combination of the frequency, time and intensity of all sessions during that period.

Expert working groups

Early Years Expert Working Group Membership

Professor John Reilly	Division of Developmental Medicine, University of Glasgow, UK
Associate Professor Anthony Okely	University of Wollongong, Australia
Dr Len Almond	BHF National Centre for Physical Activity and Health, Loughborough University, UK
Professor Greet Cardon	University of Ghent, Belgium
Liz Prosser	Cross-Government Obesity Unit, Department of Health, UK
John Hubbard	Cross-Government Obesity Unit, Department of Health, UK

Children and Young People Expert Working Group Membership

Professor Mark Tremblay	Healthy Active Living and Obesity Research Group, Department of Pediatrics, University of Ottawa, Canada
Professor Stuart Biddle	School of Sport, Exercise and Health Sciences, Loughborough University, UK
Professor Chris Riddoch	Department for Health, University of Bath, UK
Professor John Reilly	Division of Developmental Medicine, University of Glasgow, UK
Professor Gareth Stratton	School of Sport and Exercise Science, Liverpool John Moores University, UK
Professor Fiona Bull	School of Sport, Exercise and Health Sciences, Loughborough University, UK

Adults Expert Working Group Membership

Professor William Haskell	Stanford Prevention Research Center, Stanford University School of Medicine, US
Professor Nanette Mutrie	School of Psychological Sciences and Health, University of Strathclyde, UK
Professor Marie Murphy	School of Sports Studies, University of Ulster, Northern Ireland, UK
Professor Nick Wareham	MRC Epidemiology Unit, Institute of Metabolic Science, University of Cambridge, UK

Dr Charlie Foster	BHF Health Promotion Research Group, University of Oxford, UK
Professor Fiona Bull	School of Sport, Exercise and Health Sciences, Loughborough University, UK

Older Adults Expert Working Group Membership

Professor David Buchner	Department of Kinesiology and Community Health, University of Illinois at Urbana-Champaign, US
Professor Ken Fox	Centre for Exercise, Nutrition and Health Sciences, University of Bristol, UK
Dr Dawn Skelton	School of Health, Glasgow Caledonian University, UK
Dr Richard Ferguson	School of Sport, Exercise and Health Sciences, Loughborough University, UK
Professor Jonathan Doust	Faculty of Education and Sport, University of Brighton, UK
Professor Fiona Bull	School of Sport, Exercise and Health Sciences, Loughborough University, UK

Sedentary Behaviour Expert Working Group Membership

Professor Stuart Biddle	School of Sport, Exercise and Health Sciences, Loughborough University, UK
Dr Nick Cavill	Cavill Associates and BHF Health Promotion Research Group, University of Oxford, UK
Dr Ulf Ekelund	MRC Epidemiology Unit, Institute of Metabolic Science, University of Cambridge, UK
Dr Trish Gorely	School of Sport, Exercise and Health Sciences, Loughborough University, UK
Professor Mark Griffiths	School of Social Sciences, Nottingham Trent University, UK
Dr Russ Jago	Centre for Exercise, Nutrition and Health Sciences, University of Bristol, UK
Professor Jean-Michel Oppert	Department of Nutrition, Pitié-Salpêtrière Hospital, Paris, France
Dr Monique Raats	Department of Psychology, University of Surrey, UK
Professor Jo Salmon	School of Exercise and Nutrition Sciences, Deakin University, Victoria, Australia
Professor Gareth Stratton	School of Sport and Exercise Science, Liverpool John Moores University, UK
Dr Germán Vicente-Rodríguez	Faculty of Health and Sport Sciences, University of Zaragoza, Spain
Dr Bryony Butland	Cross-Government Obesity Unit, Department of Health, UK
Liz Prosser	Cross-Government Obesity Unit, Department of Health, UK
Debra Richardson	Cross-Government Obesity Unit, Department of Health, UK

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