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REVIEW

# Population-level Interventions Based on Walking and Cycling as a Means to Increase Physical Activity

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Physical activity can assist in decreasing the risk of such non-communicable diseases as coronary heart disease, stroke and type 2 diabetes by up to 50% and can also promote mental wellbeing. Recently, the guidance for adults has been amended to recommend 30 minutes, 5 times per week of moderate to vigorous-intensity. The objective of this study was to report physical activity among UK populations via walking and cycling. This study analysed data from The Health Survey for England (HSE), Department of Health and Social Care, The Association for the Study of Obesity, The National Institute for Health and Care Excellence (NICE), and Department for Transport. The recommended level of physical activity for man decrease significantly with increasing age, from 53% at age 16–24 to 16% at 65 plus. The proportion of women in physical activity is substantially lower, particularly once they reach the age of 65, with approximately 12% of women aged over 65 reaching the recommended levels versus 28–36% of younger women. In children, 72% of boys and 63% of girls aged between 2–15, are physically active for a duration of 60 minutes or more per week, which declines for girls after the age of 10. According to reports, walking is the most common, while cycling is the fourth most popular recreational and physical activity among the adults in the UK. An increase in the physically active population could influence health, the environment and the economy.

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**Keywords:** Physical Activity; Exercise; Walking; Cycling; Obesity; Chronic Diseases

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## 1. Introduction

Physical activity can be defined as any bodily activity that improves physical fitness and overall health and wellness, and which requires energy expenditure (Waxman & World, 2004; Bouchard et al., 2012). Physical exercise plays a vital role in enhancing and maintaining health and wellbeing and there is a wide range of research studying the health benefits of exercise (Hancock, 2011). It has many benefits for human organs, such as the heart, bones, blood (e.g cholesterol levels), skeletal muscles, the immune system and the nervous system (Mathers et al., 2009; Hancock, 2011; Axelsen et al., 2012). Furthermore, regular exercise reduces the risk factors of Non-communicable diseases (NCDs) such as cardiovascular disease, some cancers and type 2 diabetes, as well as controlling body weight and reducing symptoms of depression (Mathers et al., 2009). Due to the significant advantages associated with fitness training, a recent study has shown that reaching national recommended minimum levels of physical activity leads to a reduction of 19% in all-cause mortality compared with no activity, and this could increase to 24% by adding an hour per day of physical activity (Woodcock et al., 2011). This indicates that a greater amount and intensity of activity is associated with lower risk of morbidity and mortality (positive dose-response). In contrast, physical inactivity has been found to be the 4th most important risk factor for various causes of death and is responsible for 6% of global mortality and around 3.2 million deaths globally (Hancock, 2011; World Health Organization, 2010; Mathers et al., 2009). Additionally, it is estimated that a lack of physical activity is accounting for approximately 21–25% of breast and colon cancers, 27% of diabetes and 30% of ischaemic heart disease (IHD) (Alvarez-Alvarez et al., 2018).

Physical activity can occur across various domains, such as work, transport, domestic duties and during leisure. It is known that the majority of activity in high-income countries occurs during leisure time, while in low-income countries during work, chores or transport (Mathers et al., 2009). ASO (2012) and DH's report (2011) shows that many adults and children in the UK do not achieve the current recommendation for physical activity (150 min per week). In England 34% of adults met the previous guidelines, in comparison to 37.5% in Scotland 30.5% in Northern Ireland and 29.5% in Wales; the rate of men in all of them was much higher than women and they were more active (Jakicic & Davis, 2011; Department of Health, 2011). There is little information available regarding the level of physical activity among people with disabilities, but it seems to be less than for those with limited mobility (Reinhardt-Rutland, 2011).

Interventions to support decreased vehicle use and substitute dynamic travel options are persuaded by concerns to improve wellbeing, essentially through expanded physical activity through walking and cycling, and to improve the climate, both locally and internationally (De Nazelle et al., 2011). Walking and cycling are supported as an approach to consolidate active work into ordinary ways of life (Norwood et al., 2014). There is an overall development to advocate for seriously walking and cycling in the world (WHO, 2018). In addition, the United Kingdom government has a desire to increase the rate of cycling in Britain twofold in 2013 and 2025 (Department for Transport, 2016). Thus, the purpose of this review is to provide an overview regarding physical activity (walking and cycling) among UK population.

## 2. Methods

The study conducted via searching in multiple relevant websites such as; The Health Survey for England (HSE) (<https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england>), Department of Health and Social Care (<https://www.gov.uk/government/organisations/department-of-health-and-social-care>), Statistics on Obesity, Physical Activity and Diet – England (<https://www.gov.uk/government/statistics/statistics-on-obesity-physical-activity-and-diet-england-2018>), The Association for the Study of Obesity (<http://www.aso.org.uk>), The National Institute for Health and Care Excellence (NICE) (<https://www.nice.org.uk>), Department for Transport (<https://www.gov.uk/government/organisations/department-for-transport>). The word and terms were searched for including; insufficient physical activity, physical activity, physical inactivity, walking, cycling, exercise, obesity, overweight, physical fitness, interventions, recreational and sporting activity. The target group were women, men, children, adults, elderly.

## 3. Overweight and obesity (high body mass index)

*Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health.* Body mass index (BMI) is a measure commonly used to determine overweight and obesity of the human body. *It is calculated by dividing a person's weight measurement (in kilograms) by the square of their height (in metres).* In adults, a BMI of 25 to 29.9 is considered overweight, and a BMI of 30 or above is considered to be obese; for children, the British 1990 growth reference charts are used to define weight status (Wang et al., 2004; Rothman, 2008).

Overweight and obesity are ranked as the fifth leading risk factors for mortality. At least 2.8 million adults die per year due to being overweight or obese. Furthermore, 44% of the diabetes burden, 23% of the ischaemic heart disease burden and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity (Wang et al., 2004). It is estimated that in 2008, 35% of adults (20 and older) were overweight, and 11% were obese. In 2011, over 40 million children aged under five were overweight Worldwide (Wang et al., 2004). Similarly, the prevalence of obesity in England has doubled over the past twenty years. The Health Survey for England 2011(HSE) has shown that in 2011, 62% of adults (16 and over) were overweight or obese (of whom 24% of men and 26% of women were obese, and 41% of men and 33% of women were overweight) (NOO Data Factsheet, 2013; NHS Information Centre, 2019; Quality and Outcomes Framework, 2011/12). The Quality and Outcomes Framework (QOF) data for 2011/12 showed the prevalence of obesity in England (Quality and Outcomes Framework, 2011/12) (see **Table 1**).

The rate of overweight and obesity is increasing all over the world as a result of changes in diet and decreases in physical activity. This recent increase has been observed in almost all countries, but in the UK it is much higher (Mathers et al., 2009). According to a statistics report (NHS Information Centre, 2012) in England, (24.8%, 61.7%), Scotland (27.7%, 64.3%) and Wales (22.1%, 57.3%), of adults were classified as being obese and overweight respectively. The rate of overweight and obesity among children also varies. As shown in **Table 2**, the prevalence of childhood obesity in Wales and Northern Ireland is higher than in England and Scotland (UK prevalence).

The rate of obesity for adults also changes according to age group, deprived areas and ethnicity in the UK. The National Obesity Observatory 2013 (NOO, 2013) shows that the prevalence of obesity and overweight in older age is much higher than in the 16–24 age groups in both genders. The prevalence of obesity for

**Table 1:** Obesity prevalence rates for each area in England 2011/12.

SHA	Obesity prevalence (%)
North East	13.5%
North West	11.7%
Yorkshire and The Humber	11.6%
East Midlands	11.1%
West Midlands	12.0%
East of England	10.6%
London	9.4%
South East Coast	9.1%
South Central	9.4%
South West	10.4%

**Table 2:** The rate of children obese and overweight around the UK (Reinhardt-Rutland, 2011).

Country	Year	Age	Obese %		Overweight%		Data source
			Boys	Girls	Boys	Girls	
England	2011	2–15	16.6	15.9	31.4	28.5	Health Survey for England, 2011
Scotland	2011	2–15	17.5	13.7	34.5	28.5	Scottish Health Survey, 2011
Wales	2011	2–15	20.7	17.8	36.2	34.3	Welsh Health Survey, 2011
Northern Ireland	2005	2–15	20	15	39	31	Northern Ireland Health and well-being survey 2005

women who live in more deprived areas is higher than in the least deprived areas, with no clear pattern for men. Black African Women groups seem to have the highest prevalence of obesity, while men from Chinese and Bangladeshi groups the lowest.

## 4. Walking and Cycling

Interventions are essential to prevent future chronic disease in the population. Population-level initiatives can be used to reduce risk factors and improve public health and well-being. Community-based interventions can be utilised as a means of encouraging changing lifestyles by affecting health behaviours such as physical inactivity, smoking, alcohol overuse and poor diet, leading in turn to improvement. These initiatives aim to change knowledge, attitudes or beliefs of particular groups of the population in local communities (Wandersman and Florin, 2003). Physical activity can include many forms such as walking, cycling, dancing, gardening and playing.

Walking and cycling are an effective way to increase the population's physical activity levels and can be applied to different segments of the population (Hammami et al., 2020). There is a range of factors which motivate people to become involved in these actions, for instance recreation and transport purposes or improving health. The amount of walking and cycling necessary will vary according to whether residence or work in urban or rural areas, local traffic conditions and perceptions of safety (Reinhardt-Rutland, 2011).

### 4.1 Potential benefits of walking and cycling for health

Increasing activity levels by walking or cycling will bring substantial benefits for overall health and prevent or reduce the risk of chronic diseases. However, despite the fact that the level of physiological intensity associated with cycling is usually higher than that of walking, they are addressed together in most studies as a form of transportation (Bouchard et al., 2012). Therefore, it may not be reasonable to extract the health benefits of cycling. There is strong evidence for health benefits, including (Bouchard et al., 2012; Reinhardt-Rutland, 2011; Oja et al., 2011; Goodman et al., 2014; Gao et al., 2017):

- Reducing the risk of coronary heart disease, colon and breast cancer, obesity, stroke and type 2 diabetes.
- Lower risk of early death, high blood pressure, adverse blood lipid profiles, metabolic syndrome.

- Maintaining a healthy musculoskeletal system.
- Promoting mental wellbeing.
- Regular walking has been associated with a lower risk of hip fracture in women.
- Prevention of falls, reducing depression.
- Improves general health and leads to fewer days of ill health each year.
- Decreases the rate of premature mortality.

#### **4.2 An increase in walking or cycling can also help environment**

- Decreases car travel, resulting in prevention of air pollution, carbon dioxide emissions and travel congestion, thereby tackling climate change.
- Decreases greenhouse gas emissions.
- Decreases road risk and noise.
- Helps people to come out from different age groups and interact with each other to build strong relationships and use public spaces.
- In congested areas, cyclists and pedestrians breathe in less fumes from cars.
- Often saves time to get around in towns and cities more easily.
- Fewer cars on the road and more cyclists and pedestrians mean safer roads.
- Provides an opportunity for everyone to take part in and enjoy the outdoor environment, particularly for people with disabilities (Reinhardt-Rutland, 2011).

#### **4.3 Economics benefits of cycling and walking**

- Reducing the number of trips made by car, thereby reducing congestion and freeing up road space for essential motor vehicle trips.
- Reducing costs for construction and maintenance of roads.
- Reducing costs for provision of parking facilities (Bouchard et al., 2012).

#### **4.4 Potential negative aspects of cycling and walking**

There are substantial benefits derived from cycling and walking, but they may also have some negative aspects, especially cycling. Walking for exercise carries a particularly low risk of injury, even for the elderly (Bouchard et al., 2012). The most common risks from cycling are injuries and the consequences of exposure to air pollution. A recent study showed that the greatest risk of travelling by bicycle is a higher incidence of fatality than travelling by car, and this increases according to the distance of the trip. In the USA, the reported fatality and injury rates per bike trip were about 2.3, 1.8 times higher respectively than those for car trips. Although cycling has been shown to reduce air pollution, there is evidence that cyclists may face exposure to air pollution if they travel on busy routes due to uptake of fine and ultrafine particulate matter (Teschke et al., 2012). Furthermore, another study showed that the rate of death caused by collisions among cyclists of all ages except 15–30 old is much higher than that of car drivers (de Hartog et al., 2010).

### **5. Facilitators and barriers to promoting cycling and walking for recreational purposes**

According to SchHARR 46 studies were selected out of 47 papers, including a wide range of design for inclusion in the review. Evidence for organising interventions was only available for facilitators and barriers to implementing walking interventions. Personal benefits of walking, and a sense of helping others, could lead to encouraging the organisation of walking groups. However, some problems should be taken into account, such as time for designing programmes, related collaborative issues and the engagement of staff at the planning stage. This collaboration needs someone to co-ordinate between different stakeholders to facilitate implementation. The burden of responsibility and recruitment is another factor; during marketing, training for the work plan, and walking, the safety of others might be lessened by taking on other walking group members (Johnson et al., 2012).

#### **5.1 Facilitators**

Although the substantial benefits of walking were mentioned, this was not adequate to motivate people to walk outside of a group. Social interaction and participation in walking groups were an especially important side of walking interventions for older adults, women and families. Family based interventions play a vital role in encouraging the enjoyment of walking in children and families (Johnson et al., 2012). Organized walking routes can also be motivating. The use of self-monitoring and pedometers may be motivating in terms of the element of competition in some individuals or groups (Johnson et al., 2012).

Support from peers and family, or using incentives, could also maintain interest in walking. There is a special requirement to discover ways of merging walking into daily life, especially for younger groups that have family and work commitments. Other barriers involve physical and psychological limitations. Overcoming barriers can include reconsidering time management and engaging the family, in addition to having a positive attitude to the activity (Johnson et al., 2012).

Providing sufficient facilities such as safe storage, showers, and changing services at schools and workplaces could facilitate in the engagement in cycling interventions. This is more important because cycling often involves many journeys for some distance. For young people a fun aspect is needed, as well as a social element and overcoming image concerns (Johnson et al., 2012).

## **5.2 Barriers**

Outside of organised interventions, lack of time and lack of belief in walking as a form of exercise, for younger people and men, often deter walking for travel or for leisure. For larger adults, safety issues, concerns associated with external environment, and post-retirement as part of the social aspect of walking are also essential. These can be achieved by indoor walking as a safe way for walking. People who live in deprived areas are more likely to be de-motivated from walking as a result of neglected local environments. Therefore, individuals perhaps get out of the habit of walking; thus, stimulators are essential to change this situation. However, women in these areas are often compelled to walk with small children for long distances (Johnson et al., 2012).

For schoolchildren and their parents, walking or cycling to school could be positive, which means that this is perceived to have health and social benefits. At the same time, this could be negative due to the possibility of an collision on a busy road, as well as dangers from older children and strangers. The distance required to travel, as well as the absence of convenience when children need to attend school at the same time, can also hinder active travel. Fear of stolen bicycles, and having to carry heavy bags are also barriers. School based strategies could fix barriers by encouraging and developing awareness as well as supporting active travel (Johnson et al., 2012).

Shared trails for walking and cycling are valuable for urging individuals to walk and cycle in a traffic free area. However, the concerns of walkers should be taken into account where cyclists in these environments cycle for sport. Moreover, there are perceived risks of crime and attack when trails are quiet and some may feel threatened.

There have also been reported health benefits of cycling to work for both individuals and the environment in terms of reduced traffic problems. Despite this, many people who have cycles do not use them due to lack of confidence, especially with barriers such as hilly terrain and/or absence of suitable cycle lanes. This is also due partly to the negative views of cyclists, that they are competing for space against vehicles and are often marginalised. Cyclists also want to store their bicycles securely and have a place to take showers and change clothes at work. Women and ethnic groups are less likely to be cycling commuters, although this is beginning in order to be more common among some female groups (Johnson et al., 2012).

The majority of studies were conducted within the UK. Walking and cycling facilities differ according to geographical locations and may be restricted by terrain. Furthermore, deprived areas may be less likely to negotiate and on foot or by cycle. The target population is also important to consider in interventions. Results indicate that barriers to walking and cycling vary across age, gender and ethnicity (Johnson et al., 2012).

## **6. Public health**

### **6.1 Public health policy in the UK and obesity prevention**

In England, the trend of overweight or obesity has increased over the past decades, with 63% of adults and 30% of children aged between 2 and 15 obese or overweight. Although there are few signs of decline, the UK ranks as one of the most obese areas in Europe. The consequence of this issue is associated with serious diseases and threats to health and wellbeing. People who are obese have a greater risk of type 2 diabetes, heart disease and certain cancers, as well as difficulties with finding a job, self-esteem and mental health. Additionally, tackling obesity costs the NHS more than £5bn each year and has a negative influence on economic development (Lives, 2011). Therefore, this calls for action on obesity in the UK. The National Institute for Health and Clinical Excellence (NICE) has published the first national guidance on obesity in adults and children, in order to reduce the prevalence of obesity and related diseases, increase the interventions to prevent overweight and obesity, and improve primary care to adults and children with obesity. As NICE mentioned, it is unlikely that preventing and managing overweight and obesity can be addressed via only primary care. Even though there is no simple action to tackle it, sharing similar approaches

could be the most effective strategies for preventing obesity (NICE, 2006). To tackle weight gain properly, a life course approach should be adopted – from pre-conception through pregnancy, infancy, early years, childhood, adolescence and teenage years, and through to adulthood and preparing for older age. Indeed, there are opportunities and challenges at every stage of life that need appropriate action to avoid leading to excess weight and to ensuring that health inequalities are addressed. The government has set out two national ambitions to achieve in *Healthy Lives, Healthy People: A call to action on obesity in England in 2011*: based on The Foresight report, published in 2007, The essential steps need to be undertaken by the Government and partners and may result in reducing the levels of obesity and overweight in children and adults by 2020 (Lives, 2011). The management of overweight and obesity should be a priority for all, due to the substantial benefits of maintaining a healthy weight.

Managers and health professionals in all primary care settings should ensure that preventing and managing obesity is a priority, at both strategic and delivery levels. Dedicated resources should be allocated for action (NICE, 2006).

### **6.2 Local authorities and partners**

Local authorities and local partners should work together in preparing voluntary organisations to ensure security and safety for those who work in and plan physical activity, addressing concerns about safety, crime and inclusion, by (NICE, 2006).

- providing facilities such as cycling and walking routes, cycle parking, safe play areas and area maps;
- Making streets safer and cleaner via traffic calming, pedestrian crossings, lighting, walking schemes and cycle routes; and
- Ensuring buildings and spaces are designed to encourage people to be more physically active.

### **6.3 Early years settings**

Nurseries and childcare facilities should:

- reduce sedentary activities and provide regular opportunities for enjoyable active play and physical activity sessions; and
- provide guidance on food procurement and healthy catering (NICE, 2006).

### **6.4 School**

The head of school and governors, in collaboration with parents and pupils, should be aware of the school environment, and to what extent school policies assist children and young people to be a healthy weight, eat a healthy diet and be physically active, in accordance with existing guidance. This includes policies for building recreational spaces, catering, school travel plans and provision for cycling, as well as policies relating to the National Healthy Schools Programme and extended schools (NICE, 2006). Obesity policy is 'weighed down' by its complexity and the existence of many theories about the causes and drivers, which are grounded in a number of disciplines including physiology, economics, psychology and sociology. Each of these theories presents different options for action by policy makers and leads to confusion, caution and, possibly, inaction. (see **Table 3**) Adapted from (Musingarimi, 2009).

## **7. Conclusion**

Physical activity through walking and cycling has the capability of enormously improving the physical, mental, and social soundness of both gender, all ages, and all salary levels. Not at all like proper exercise projects, strolling and cycling can be coordinated into day by day schedules and are moderate for all intents and purposes everybody. The endeavours to expand strolling and cycling in the UK have not been adequate, in this way substantially more should be done to improve strolling and cycling conditions in order to achieve population-level increments in physical activity from day by day travel by residents. The tremendous general medical advantages produced by physical movement legitimize the interest in foundation and projects required to altogether raise populace level paces of walking and cycling. To encourage more prominent value and social equity among financial gatherings, measures to expand dynamic travel should target kids, youths, and more seasoned grown-ups, whose paces of strolling and cycling are either lower than normal or declining. Exceptional endeavours should likewise be made to guarantee safe and comfortable walking and cycling conditions for low-salary and other distraught communities, which have been deficiently served in numerous urban areas.

**Table 3:** The policy implications of some key obesity theories.

Theory Core argument	Implied solutions
Changing in lifestyle is linked to the development of a post-industrial consumerist society Once adequately wealthy, people will be able to tackle obesity as consumers, choosing or not, as they wish. Partly, fiscal measures such as 'fat taxes' could be considered	Technological
Obesity is a normal physiological response to an abnormal or inappropriate environment	Change the physical and dietary environments to allow normal physiological balance to (re)emerge
The predisposition to store fat is an evolutionary legacy	Genomics, nutrigenomics and gene mapping. Functional foods might help play a role in tailoring diets to individual predispositions
Marketing and advertising instils new cultural norms about what and how to eat, and how much to eat	Social marketing can emulate 'business' marketing
Psychosocial Food choice is intensely personal and expresses identity. Obesity suggests a schism within identity well-being. Family change. Counselling. This is required both individually and on a mass scale	Obesogenic
Oil is replacing food as a source of energy	Build in more physical energy use into daily life. Design technology to help keep balance between intake and expenditure.

## Competing Interests

The authors have no competing interests to declare.

## Author Contribution

The author contributed to the design, writing, and editing of the review article.

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