



Making the case for physical activity

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This document provides an overview of the best available evidence on health and wellbeing outcomes that are directly affected by physical activity. Its primary purpose is to provide a reference point for physical activity practitioners, commissioners and policy makers who are looking for evidenced based facts to demonstrate the importance of including physical activity programmes and policies in their work.

Introduction

Physical inactivity is known to be the fourth leading cause of global mortality. Many of the leading causes of ill health in today's society, such as coronary heart disease, cancer and type 2 diabetes, could be prevented if more inactive people were to become active ⁽¹⁾. In the UK, the incidence of non-communicable disease which can be attributed to physical inactivity includes:

- 10.5% of coronary heart disease cases
- 18.7% of colon cancer cases
- 17.9% of breast cancer cases
- 13.0% of type 2 diabetes cases
- 16.9% of premature all-cause mortality ⁽²⁾.

In addition to reducing premature death and the incidence of disease, participating in physical activity also has benefits for mental health, quality of life and wellbeing and maintaining independent living in older age. It can also play a key role in reducing health and social inequalities ⁽³⁾. As a result of this wide-reaching impact, physical activity has been described as the 'best buy in public health' ⁽⁴⁾.

Physical inactivity also has a significant burden on healthcare costs and the economy. In 2006/2007, £900 million was spent in the UK on ill health related to physical inactivity ⁽⁵⁾. The cost owing to physical inactivity for different diseases was:

- £117 million (stroke)
- £542 million (heart disease)
- £65 million (colorectal cancer)
- £54 million (breast cancer)
- £158 million (type 2 diabetes) ⁽⁵⁾.

Key term - Physical activity

Physical activity is described as any body movement produced by the skeletal muscles that results in a substantial increase over resting energy expenditure ⁽⁹⁾. Examples of physical activity include play, lifestyle activities such as walking and cycling (active transport), sport and recreational activities, household chores and gardening.

Key term - Physical inactivity

Physical inactivity is described as doing no or very little physical activity at work, at home, for transport or during discretionary time and not reaching physical activity guidelines deemed necessary to benefit public health ⁽¹⁰⁾.



Key Term - non-communicable disease

A non-communicable disease is a medical condition or disease which is not contagious and is non-transmissible among people.

Furthermore, ill-health of working age individuals (aged 16-64 years) can cost the government between £62 and £72 billion pounds and have a total economic impact of £103 to £129 billion each year (2007 data) ⁽⁶⁾.

In July 2011 the Chief Medical Officers (CMOs) from England, Northern Ireland, Scotland and Wales launched *Start active, stay active*, a joint report on physical activity which included guidelines for participation in physical activity across the life course ⁽⁷⁾. These guidelines provide recommendations on levels of physical activity which best support population level changes in health. Despite the well reported health and economic benefits of physical activity, levels of participation in the UK are currently very low in both children and adults; for example, fewer than 40% of men and fewer than 30% of women meeting the recommended guidelines across England, Scotland, Wales and Northern Ireland ⁽⁸⁾. Action and investment is urgently needed to increase population levels of physical activity in the UK in order to reap the wide reaching health, social and economic benefits.



Preventing ill health and reducing the number of people dying prematurely

The benefits of participating in physical activity for preventing premature death from all causes and reducing the incidence of non-communicable diseases such as cardiovascular disease, hypertension, type 2 diabetes, obesity, cancer, liver disease and osteoporosis have been well reported. It is important to note the impact of physical activity is not exclusively linked to a specific condition or disease but can positively impact on a variety of conditions/risk factors simultaneously. Key facts relating to increased physical activity participation and the potential reduction in population incidence or risk of developing these diseases are summarised below.

Cardiovascular disease

- Cardiovascular disease (CVD) includes the diseases of the heart and circulation including coronary heart disease (CHD) and stroke.
- Being physically active can decrease the risk of CVD by 33% ⁽¹¹⁾.

Stroke

- In the UK, if all inactive people were to become active, 12% of stroke cases could potentially be prevented ⁽⁵⁾.
- Being physically active can decrease the risk of stroke by 31% ⁽¹¹⁾.
- Higher levels of leisure-time physical activity promote a greater reduction in the risk of stroke in both men (29%) and women (22%) compared to low levels of leisure-time physical activity ⁽¹²⁾.

Coronary heart disease

- With the removal of physical inactivity from the population an estimated 121,000 deaths from CHD could have been averted in Europe in 2008 ⁽²⁾.

- 6% of the burden of CHD worldwide could be eliminated if all inactive people became active ⁽²⁾.
- In the UK, if all inactive people were to become active, 10.5% of CHD cases could potentially be prevented ⁽²⁾.
- Evidence indicates even small amounts of physical activity are associated with lower CVD-related mortality. For example, participation in:
 - 150 minutes of moderate physical activity a week decreases the risk of CHD by 14% ⁽¹³⁾
 - 300 minutes of moderate physical activity a week decreases the risk of CHD by 20% ⁽¹³⁾.
- Higher levels of leisure-time physical activity promote a greater reduction in risk of CHD in both men (21%) and women (29%) compared to low levels of leisure-time physical activity ⁽¹²⁾.

High blood pressure (hypertension)

- Adults who are physically inactive have a 30% higher risk of hypertension than active adults ⁽¹¹⁾.
- It has been estimated that even a 2mmHg decrease in systolic blood pressure within a population would decrease mortality from:
 - stroke by 6%
 - CHD by 5%
 - all causes by 3% ⁽¹⁴⁾.
- In adults, evidence demonstrates that aerobic exercise may lower resting blood pressure by:
 - 6.9/4.9mmHg (systolic/diastolic) in high blood pressure groups
 - 1.9/1.6mmHg (systolic/diastolic) in normal blood pressure groups ⁽¹⁴⁾.
- Evidence suggests resistance training may lower diastolic blood pressure by 3.5mmHg, but no significant changes have been noted in changes in systolic blood pressure ⁽¹⁴⁾.

Type 2 diabetes

- Physical inactivity is estimated to be the main cause of 27% of recorded cases of type 2 diabetes worldwide ⁽¹⁾.
- 7% of the worldwide burden of type 2 diabetes could be eliminated if all inactive people became active ⁽²⁾.
- In the UK, if all inactive people were to become active, 13% of type 2 diabetes cases could potentially be prevented ⁽²⁾.
- In adults already diagnosed with type 2 diabetes, physical activity can help maintain glycaemic control which may reduce the risk of diabetes complications ⁽¹⁵⁾.

Obesity

- Beginning at a young age, physical activity is an essential component for energy balance and weight control ⁽¹⁶⁾.
- In children aged 0-5 years, lower levels of physical activity are associated with increased levels of obesity ⁽¹⁷⁾.
- Evidence suggests overweight or obese children tend to be less active, have less developed fundamental movement skills, have lower health-related fitness and have an increased risk of cardiovascular and metabolic diseases, eg, diabetes, than their normal weight counterparts ⁽¹⁸⁾. However, it is difficult to determine a cause and effect relationship between obesity and physical activity in children.
- Men and women who are more physically active tend to have lower BMIs and smaller waist circumferences ^(19, 20).
- Severely obese individuals (35+ body mass index - BMI) who do no leisure time physical activity may lose 7.2 years of life compared to a normal weight individual (18.5 to 24.9 BMI) who meet the physical activity recommendations ⁽²¹⁾.



Cancer prevention and management

- Physical inactivity is estimated to be the main cause of 21-25% of cases of breast and colon cancer ⁽²²⁾.
- 10% of the worldwide burden of both breast and colon cancers could be eliminated if all inactive people became active ⁽²⁾.
- In the UK, if all inactive people were to become active, 18.7% of all colon cancer cases and 17.9% of all breast cancer cases could potentially be prevented ⁽²⁾.
- Those who are physically active have a lower risk of developing certain types of cancer than their inactive counterparts:
 - 20-30% lower risk of developing colon cancer ^(11, 23)
 - 27% lower risk of developing endometrial cancer ⁽²⁴⁾
 - 20-40% lower risk of developing breast cancer ⁽¹¹⁾.
- Evidence suggests cancer survivors who participate in regular physical activity can help reduce their risk of cancer specific mortality and reoccurrence by:
 - 50% in those surviving colorectal cancer
 - 30% in those surviving prostate cancer
 - 40% in those surviving breast cancer ⁽²⁵⁾.
- Individuals with higher levels of physical activity have a 30% risk reduction for developing lung cancer than those with lower levels of physical activity. Similarly those with moderate levels of physical activity have a 21% risk reduction compared to those with lower physical activity levels ⁽²⁶⁾.
- Emerging evidence suggests being physically active throughout cancer treatment and during remission has positive effects on health and wellbeing including:
 - improvements in physical function
 - lower feelings of fatigue
 - improvements in quality of life scores
 - reduction in body fat
 - preservation of bone mineral density ⁽²⁵⁾.



Liver disease

- Emerging evidence suggests physical activity and exercise can play a valuable part in reducing liver fat and in managing patients with fatty liver disorder ^(27, 28).
- There is modest evidence that the effects of physical activity on liver fat are independent of weight loss ^(27, 28).

Osteoporosis

- Habitually inactive individuals are 1.59 times more likely than active individuals to develop osteoporosis ⁽¹¹⁾.
- Weight bearing activities in the early stages of puberty allow for peak bone mineral density accrual which may help protect against fractures in later life ⁽²⁹⁾.

- In pre-menopausal women, high impact exercise, such as hopping, has the potential to bring about a 3.6% to 6.4% decrease in the risk of hip fracture ⁽³⁰⁾.
- There is evidence that post-menopausal women who are active are likely to have 0.85% to 3.2% less spinal bone loss and 1.03% bone loss at the hip than those who are inactive ⁽³¹⁾.

Reducing risk of premature all-cause mortality

- In the UK, if all inactive people were to become active, 16.9% of premature deaths from all causes could potentially be prevented ⁽²⁾.
- If physical inactivity were to be eliminated from the UK population, the median life expectancy would increase by 1.07 years (ranging from 0.85 to 1.29 years) ⁽²⁾.
- Regardless of BMI or weight, activity levels have the potential to impact on life expectancy. For example:
 - Individuals classified as active but overweight (25 to 29.9 BMI) have the same life expectancy as active and normal weight individuals.
 - Normal weight but inactive individuals may have 3.1 fewer years of life compared to obese (30 to 34.9 BMI) but active individuals ⁽²¹⁾.



Enhancing mental health, quality of life and self-reported wellbeing

Health-related quality of life refers specifically to an individual's perception of their health and wellbeing. It incorporates measures of an individual's physical, mental, functional, social and emotional status. Physical activity can play an important role in helping to enhance multiple indicators within this quality of life measure.

Children and adolescents

- Participation in physical activity has been shown to be effective for reducing:
 - depression
 - anxiety
 - psychological distress
 - emotional disturbance ⁽¹⁹⁾.
- Physical activity participation can significantly enhance self-esteem ⁽³²⁾ and self-concept ⁽³³⁾.

Adults

- On average, active adults have a 30% lower chance of feeling distressed or a 30% higher chance of enhanced wellbeing than inactive adults ⁽¹⁹⁾.
- Physically active adults have a 20-30% lower risk of depression, distress and dementia ⁽¹⁹⁾.
- There is some evidence that physical activity improves sleep ⁽¹⁹⁾.

Older adults

- Being physically active in later life can help enhance quality of life by improving:
 - mental wellbeing
 - cognitive and emotional functioning
 - psychological wellbeing
 - satisfaction with life (and decreasing loneliness)
 - mood
 - physical functioning ⁽³⁴⁾.

- Levels of physical activity are inversely associated with levels of depression in both healthy older adults and those already diagnosed with clinical depression ⁽³⁴⁾.
- Physically fit older adults have better cognitive functioning than those who are unfit ⁽³⁴⁾.
- In older adults without dementia, exercise significantly improves memory, attention and processing speed ⁽³⁵⁾.
- Older adults who participate in high levels of physical activity have a 38% reduced risk of cognitive decline and those with low-to-moderate levels of physical activity have a 35% reduced risk of cognitive decline compared to sedentary individuals ⁽³⁶⁾.

Special populations

- In those with osteoarthritis, physical activity can provide significant improvements in pain, physical function and mental health ⁽¹⁹⁾.
- In cancer survivors physical activity, particularly walking, is linked with improved quality of life both during and after treatment ⁽¹⁹⁾.
- In those with mental health conditions, physical activity may not only reduce the onset or progression of these conditions but may also reduce the negative impact of these conditions on quality of life, self-esteem and feelings of fatigue ⁽¹⁹⁾.

Delaying the need for care in older adults (age 65+)

Worldwide, the number of adults in the population aged 65 and older is growing rapidly. In the UK, the fastest growing age group in the entire population is those aged 85 years and over, ie, the 'oldest old'. With continual growth over the last 25 years, this population group reached 1.3 million in 2007, meaning that today those aged 85 and over represents 2.1% of the total population of the UK ⁽³⁷⁾. Due to the rising cost of care and the impact the loss of autonomy can have on mental wellbeing, it is important to ensure older adults stay independent for as long as possible.

Reducing falls and falls related injuries

- By being physically active on a regular basis, older adults have a 30-50% lower risk of developing functional limitations ^(19, 38).
- There is a dose-response relationship between physical activity and hip fracture risk, meaning the more physical activity people do the less their risk of suffering a hip fracture. Individuals doing the greatest amounts of moderate physical activity may experience a 36-68% reduction in the risk of a hip fracture ⁽¹⁹⁾.

Supporting independent living

- Decline in functional status is a contributing factor to admissions to residential and nursing care homes ⁽³⁹⁾.
- Risk factors for decline in functional status include:
 - depression
 - cognitive impairment
 - functional limitations, eg, falls, reduced extremity performance
 - low levels of social activity
 - social contact ⁽³⁹⁾.
- Physical activity can reduce the decline in functional status by enabling older adults to continue performing tasks of daily living, delaying the decline in cognitive function and providing a medium for social interaction ⁽³⁴⁾.



Dementia

- Physical activity can help delay the onset of cognitive decline experienced with old age and delay the development of dementia ⁽¹⁹⁾.
- In individuals who have already experienced mental decline, physical activity can help improve aspects of cognitive function and reduce symptoms of dementia ⁽¹⁹⁾.
- Exercise has demonstrated significant cognitive benefits even in those with mild cognitive impairment or dementia ⁽³⁵⁾.
- There is currently insufficient evidence on the benefits of physical activity on quality of life and depression in older adults with dementia ⁽⁴⁰⁾.
- Physical activity has been found to have a positive effect on basic activities of daily living and physical functioning in older adults with all stages of dementia ⁽⁴¹⁾.

Reducing health inequalities and improving wider factors of health and wellbeing

The Marmot Review (2010) highlighted current health and social inequalities across England and recommended policy objectives, such as healthy standard of living, fair work for all and giving children the best start in life, to help reduce inequalities across the life course ⁽⁴²⁾. The role physical activity can play in reducing some of these health inequalities is summarised below.

Social inequalities

There is known to be a social gradient associated with healthy lifestyles, including levels of physical activity, with those in higher socio-economic groups experiencing healthier and longer lives than those in more deprived areas. If health inequalities were reduced:

- 285 million years of healthy life could be gained if everyone experienced the same rates of illness, disability and death seen in the 10% of the least deprived areas ⁽⁴²⁾.
- 2.3 million years of life could be saved and 67,000 fewer deaths experienced in the working age group (age 30 to 59) if the mortality rates from other classes were the same as that of the 'higher managerial and professional' class ⁽⁴²⁾.

Giving children the best start in life and maximising their potential

- During infancy, physical activity can have a positive impact on motor skills and cognitive development ⁽⁴³⁾.
- In pre-schoolers, physical activity is associated with improved measures of psychosocial health and motor skills development ⁽⁴³⁾.
- While there is limited evidence about how well physical activity levels during childhood relates to physical activity levels during adulthood, it is still important to promote healthy behaviours throughout the early years, childhood and adolescences ^(44, 45).





Providing adults with opportunities for improving health at work

- Workplace physical activity programmes can reduce absenteeism due to sickness, increase work attendance, reduce job stress and decrease use of the healthcare system ⁽⁴⁶⁾.
- Programmes which include both a physical activity and nutrition element have been found to be effective at reducing body weight, cholesterol levels and CVD risk ⁽⁴⁷⁾.

Healthy communities

- Participation in sporting activities as a youth is linked with increased involvement in the community at all stages of adulthood ⁽⁴⁸⁾.
- Grassroots sports have been shown to forge community spirit during social hardships ⁽⁴⁹⁾.
- Aside from the social benefits of physical activity, access to community spaces, eg, green space, has a positive effect on health related outcomes such as CVD risk factors, type 2 diabetes and premature mortality ⁽⁵⁰⁾.
- People who live closer to parks and have a variety of green space options close by tend to participate in more physical activity ⁽⁵⁰⁾.
- In older adults, positive social benefits have been reported from exercise interventions including increases in satisfaction with life and a reduction in loneliness ⁽³⁴⁾.
- In older adults, natural spaces for social contact, eg, parks and green spaces and urban designs which encourage people to walk more, also provides ‘eyes on the street’ and reduces fear of crime and actual crime. Mixed land use, public spaces, residential density and interesting places to go increases social connectivity such as knowing and trusting others/neighbours ⁽⁵¹⁾.

For more information relating to physical activity and health, visit www.bhfactive.org.uk

References

1. World Health Organization. Global recommendations on physical activity for health. Geneva, Switzerland: WHO Press; 2010.
2. Lee I, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT, for the Lancet Physical Activity Series Working Group. Effect of physical inactivity on major non-communicable diseases worldwide: An analysis of burden of disease and life expectancy. *The Lancet*. 2012;380(9838):219-229.
3. Marmont M. Social determinants of health inequalities. *The Lancet*. 2005;365(9464):1099-1104.
4. Morris JN. Exercise in the prevention of coronary heart disease: Today's best buy in public health. *Med Sci Sports Exerc*. 1994;26(7):807-14.
5. Scarborough P, Bhatnagar P, Wickramasinghe KK, Allender S, Foster C, Rayner M. The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: An update to 2006-2007 NHS costs. *Journal of Public Health*. 2011;33(4):527-535.
6. Black C. Working for a healthier tomorrow - Dame Carol Black's review of the health of Britain's working age population. London, England: Crown Copyright; 2008.
7. The Department of Health. Start active, stay active: A report on physical activity for health from the four home countries' chief medical officers. London, England: The Department of Health; 2011.
8. Townsend N, Bhatnagar P, Wickramasinghe K, Scarborough P, Foster C, Rayner M. Physical activity statistics 2012. London, England: British Heart Foundation and Oxford, England: University of Oxford; 2012.
9. Bouchard C, Shephard RJ. Physical activity, fitness, and health: The model and key concepts. In: Bouchard C, Shephard RJ, Stephens T, editors. *Physical activity, fitness and health: International proceedings and consensus statement*. Champaign, Ill: Human Kinetics; 1994. p. 77-88.
10. Bull FC, Armstrong TP, Dixon T, Ham S, Neiman A, Pratt M. Chapter 10 Physical inactivity. In: Ezzati M, Lopez AD, Rodgers A, Murray CJL, editors. *Comparative quantification of health risks: Global and regional burden of disease attributable to selected major risk factors*. Volume 1. Switzerland: WHO Press; 2004. p. 729-881.
11. Warburton DE, Charlesworth S, Ivey A, Nettlefold L, Bredin SS. A systematic review of the evidence for Canada's physical activity guidelines for adults. *Int J Behav Nutr Phys Act*. 2010;7(39).
12. Li J, Siegrist J. Physical activity and risk of cardiovascular disease - a meta-analysis of prospective cohort studies. *Int J Environ Res Health*. 2012;9(2):391-407.
13. Sattelmair J, Pertman J, Ding EL, Kohl HWI, Haskell W, Lee IM. Dose response between physical activity and risk of coronary heart disease: A meta-analysis. *Circulation*. 2011;124:789-95.
14. Fagart RH. Exercise is good for your blood pressure: Effects of endurance training and resistance training. *Clin Exp Pharmacol Physiol*. 2006;33(9):853-6.
15. Miller YD, Dunstan DW. The effectiveness of physical activity interventions for the treatment of overweight and obesity and type 2 diabetes. *J Sci Med Sport*. 2004;7(1):Supplement:52-59.
16. Chaput J, Klingenberg L, Rosenkilde M, Gilbert J, Tremblay A, Sjodin A. Physical activity plays an important role in body weight regulation. *J Obes*. 2011;2011(360257).
17. Monasta L, Batty GD, Cattaneo A, Lutje V, Ronfani L, van Lenthe FJ, et al. Early-life determinants of overweight and obesity: A review of systematic reviews. *Obes Rev*. 2010;11(10):695-708.
18. Hills AP, Andersen LB, Byrne NM. Physical activity and obesity in children. *Br J Sports Med*. 2011;45(11):866-870.
19. Physical Activity Guidelines Advisory Committee. Physical activity guidelines advisory committee report, 2008. Washington, DC: U.S. Department of Health and Human Services; 2008.
20. Besson H, Ekelund U, Luan J, May AM, Sharp S, Travier N, et al. A cross-sectional analysis of physical activity and obesity indicators in European participants of the EPIC-PANACEA study. *Int J Obes (Lond)*. 2009;33(4):497-506.
21. Moore SC, Patel AV, Matthews CE, Berrington de Gonzalez A, Park Y, Katki HA, et al. Leisure time physical activity of moderate to vigorous intensity and mortality: A large pooled cohort analysis. *PLoS Med*. 2012;9(11):e1001335.

22. World Health Organization. Global health risks: Mortality and burden of disease attributable to selected major risks. Geneva, Switzerland: WHO Press; 2009.
23. Wolin KY, Yan Y, Colditz GA. Physical activity and risk of colon adenoma: A meta-analysis. *Br J Cancer*. 2011;104(5):882-885.
24. Moore SC, Gierach GL, Schatzkin A, Matthews CE. Physical activity, sedentary behaviours, and the prevention of endometrial cancer. *Br J Cancer*. 2010;103(7):933-938.
25. Macmillan Cancer Support. The importance of physical activity for people living with and beyond cancer: A concise evidence review. England: Macmillan Cancer Support; 2011.
26. Tardon A, Lee WJ, Delgado-Rodriguez M, Dosemeci M, Albanes D, Hoover R, et al. Leisure-time physical activity and lung cancer: A meta-analysis. *Cancer Causes Control*. 2005;16(4):389-97.
27. Johnson NA, Keating SE, George J. Exercise and the liver: Implications for therapy in fatty liver disorders. *Semin Liver Dis*. 2012;32(1):65-79.
28. Thoma C, Day CP, Trenell MI. Lifestyle interventions for the treatment of non-alcoholic fatty liver disease in adults: A systematic review. *J Hepatol*. 2012;56(1):255-66.
29. MacKelvie KJ, Khan KM, McKay HA. Is there a critical period for bone response to weight-bearing exercise in children and adolescents? A systematic review. *Br J Sports Med*. 2002;36(4):250-7.
30. Babatunde OO, Forsyth JJ, Gidlow CJ. A meta-analysis of brief high-impact exercises for enhancing bone health in premenopausal women. *Osteoporos Int*. 2012;23(1):109-19.
31. Howe TE, Shea B, Dawson LJ, Downie F, Murray A, Ross C, Harbour RT, Caldwell LM, Creed G. Exercise for prevention and treating osteoporosis in postmenopausal women. *Cochrane Database of Systematic Reviews*. 2011(7):Art. No.: CD000333. DOI: 10.1002/14651858.CD000333.pub2.
32. Ekland E, Heian F, Hagen KB, Abbot JM, Nordheim L. Exercise to improve self-esteem in children and young people. *Cochrane Database of Systematic Reviews*. 2004(1):Art. No.: CD003683. DOI: 10.1002/14651858.CD003683.pub2.
33. Ahn S, Fedewa AL. A meta-analysis of the relationship between children's physical activity and mental health. *J Pediatr Psychol*. 2011;36(4):385-397.
34. Taylor AH, Cable NT, Faulkner G, Hillsdon M, Narici M, Van Der Bij AK. Physical activity and older adults: A review of health benefits and the effectiveness of interventions. *J Sport Sci*. 2004;22(8):703-725.
35. Ahlskog JE. Does vigorous exercise have a neuroprotective effect in Parkinson disease. *Neurology*. 2011;77(3):288-294.
36. Sofi F, Valecchi D, Bacci D, Abbate R, Gensini GF, Casini A, Macchi C. Physical activity and risk of cognitive decline: A meta-analysis of prospective studies. *J Intern Med*. 2010;269(1):107-117.
37. Falkingham J, Evandrou M, McGowan T, Bell D, Bowes A. Demographic issues, projections and trends: Older people with high support needs in the UK. Report for the Joseph Rowntree Foundation. ESRC Centre for Population Change, University of Southampton and University of Stirling and Joseph Rowntree Foundation; 2010.
38. Paterson DH, Warburton DE. Physical activity and functional limitations in older adults: A systematic review related to Canada's physical activity guidelines. *Int J Behav Nutr Phys Act*. 2010;7(38).
39. Stuck AE, Walther JM, Nikolaus T, Bula CJ, Hojmann C, Beck J, C. Risk factors for functional status decline in community living elderly people: A systematic literature review. *Soc Sci Med*. 1999;48(4):445-469.
40. Potter R, Ellard D, Rees K, Thorogood M. A systematic review of the effects of physical activity on physical functioning, quality of life and depression in older people with dementia. *Int J Geriatr Psychiatry*. 2011;26(10):1000-1011.
41. Blankevoort CG, van Heuvelen MJG, Boersma F, Luning H, de Jong J, Scherder EJA. Review of effects of physical activity on strength, balance, mobility and ADL performance in elderly subjects with dementia. *Dement Geriatr Cogn Disord*. 2010;30(5):392-402.
42. Marmot M. Fair society, healthy lives: The Marmot review: Strategic review of health inequalities in England post-2010. England; The Marmot Review; 2010.

43. Timmons BW, LeBlanc AG, Carson V, Gorber SC, Dilman C, Janssen I, et al. Systematic review of physical activity and health in early years (aged 0-4 years). *Appl Physiol Nutr Metab*. 2012;37(4):773-92.
44. Telama R. Tracking of physical activity from childhood to adulthood: A review. *Obes Facts*. 2009;2(3):187-195.
45. Craigie AM, Lake AA, Kelly SA, Adamson AJ, Mathers JC. Tracking of obesity-related behaviours from childhood to adulthood: A systematic review. *Maturitas*. 2011;70(3):266-284.
46. Conn VS, Hafdahl AR, Cooper PS, Brown LM, Luck SL. Meta-analysis of workplace physical activity interventions. *Am J Prev Med*. 2009;37(4):330-339.
47. van Dongen JM, Proper KI, van Wier MF, van der Beek AJ, Bongers PM, van Mechelen W, et al. A systematic review of the cost-effectiveness of worksite physical activity and/or nutrition programs. *Scan J Work Environ Health*. 2012;38(5):393-408.
48. Perks T. Does sport foster social capital? The contribution of sport to a lifestyle of community participation. *Sociology of Sport Journal*. 2007;24(4):378-401.
49. Skinner J, Zakus DH, Cowell J. Development through sport: Building social capital in disadvantaged communities. *Sport Management Review*. 2008;11(3):253-275.
50. Lachowycz K, Jones AP. Greenspace and obesity: A systematic review of the evidence. *Obes Rev*. 2011;12(5):e183-189.
51. de Nazell A, Nieuwenhuijsen MJ, Anto JM, Brauer M, Briggs D, Braun-Fehrlander C et al. Improving health through policies that promote active travel: A review of evidence to support integrated health impact assessment. *Environ Int*. 2011;37(4):766-77.

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