

Health evidence base

Introduction

This appendix summarises a literature review of publicly available research and evidence relating to the health determinants considered in the health and wellbeing assessment of the Proposed Development. It has been used to inform the assessment of impacts on health determinants arising from the Proposed Development and the potential significant effects on population health as a result.

Access to healthcare services and other and social infrastructure

Access to services and community facilities can affect health and wellbeing directly, through access to treatment and care, or access to fresh food retailers, and indirectly through issues such as access to social networks. It has been found that access to public services and social infrastructure such as health, education and community facilities has a direct positive effect on human health¹.

Recent evidence² has stated that the accessibility of local shops, community services and healthcare facilities may be affected by:

- effects on the capacity of existing services;
- physical accessibility (i.e. distances travelled and transport connections);
- social and/or cultural access (i.e. communication issues); and
- separation imposed by a new piece of physical infrastructure.

Research has suggested that ‘access to local shops, post offices, places of entertainment and community activity all contribute to well-being’³. It has been estimated that 5% of adults in Great Britain reported feeling a sense of isolation due to difficulties accessing local shops and services⁴. Furthermore, the same research also reported that over a fifth of adults reported that they knew someone who felt a sense of isolation due to difficulties accessing local shops and services.

Access to healthcare services is affected by the accessibility of transport modes, availability of financial support for those on low incomes and the location of healthcare services⁴. Groups impacted by disability and of certain ages can also experience even greater barriers to health and social care services⁵. Access to healthcare is important for communities as healthcare offers information, screening, prevention and treatments. Restricted access to healthcare prevents patients gaining necessary treatments and information.

Access to social infrastructure including leisure and cultural facilities is a determinant of health and wellbeing. According to research ‘leisure activities can have a positive effect on people’s physical, social, emotional and cognitive health through prevention, coping (adjustment, remediation, diversion), and transcendence’⁶. People participate in cultural activities for a number of reasons including personal growth and development, to learn new skills, enjoyment and entertainment and as a ‘means of creative expression’, or ‘to meet new people’ and to ‘pass on cultural traditions’⁷.

1 HUDU (2013). HUDU Planning for Health. Rapid Health Impact Assessment Tool. (NHS) London Healthy Urban Development Unit

2 Quigley, R. and Thornley, L., 2011, Literature Review on Community Cohesion and Community Severance: Definitions and Indicators for Transport Planning and Monitoring, Report to New Zealand Transport Agency, Quigley and Watts Ltd

3 Harding, T., 1997, A Life Worth Living: the Independence and Inclusion of Older People, London: Help the Aged, cited in Randall, C., 2012, Measuring National Well-being – Where we Live, 2012, Office for National Statistics

4 Randall, C., 2012, Measuring National Well-being - Where we Live – 2012, Office for National Statistics

5 Hamer, L., 2004, Improving patient access to health services: a national review and case studies of current approaches, Health Development Agency

6 Caldwell, L.L. (2005) Leisure and health: Why is leisure therapeutic?

7 New Zealand Government, 2007, Social Report: Leisure and Recreation, Ministry of Social Development, New Zealand Government

Access to open space and nature

Numerous studies have found links between health and wellbeing and access to green space. A systematic review of observational evidence has shown an association between long-term exposure to green space and cognition (intellect and cognisance) over the life course⁸. The association is seen cross-sectionally in both adults and children.

A review of the literature examining the association between access to green space and the mental wellbeing of children concluded that access to green spaces promoted attention and memory, fostered supportive social groups and self-discipline and improved symptoms of ADHD⁹.

A review by O'Brien et al. (2010) for the Forestry Commission¹⁰ found that the proximity, size and amount of green space available to people in urban environments influenced physical and mental health outcomes. The review identified the key health benefits of green space as:

- 'Long and short term physical benefits associated with obesity, life expectancy, heart rate and blood pressure;
- Attention and cognitive benefits associated with restoration, mood and self-esteem;
- Physical activity benefits associated with the use of greenspace;
- Self-reported benefits in terms of health and life satisfaction; and
- Community cohesion benefits through social contact fostered by greenspace.'

The review suggests various mechanisms for the beneficial effects of green space including 'providing a space that promotes social interaction and inclusion, reducing social annoyances and crime' and 'reducing stress and restoring cognitive function and capacity to function with the demands of life'.

An evidence review by Natural England¹¹ showed that access to natural environments promotes physical activity including walking, gardening and children's play. The review shows evidence that people with poorer health tend to benefit more from physical activity in natural environments. In addition, a systematic review of physical activity and green spaces concluded that, compared with indoor activities, physical activity in natural environments is associated with greater feelings of revitalisation, increased energy and positive engagement, and decreases in tension, confusion, anger and depression.¹²

Research conducted by Maas et al. in 2006¹³ has suggested that there is a positive association between the proportion of green space in a residential area and the perceived general health of residents, and that this relationship is strongest for lower socio-economic groups.

A literature review by Croucher et al. in 2007 for Greenspace Scotland¹⁴ found a positive relationship between green space and general health, and also identified that 'the attractiveness or quality of greenspace is an important determination of green space use'. The review also identified links to mental health, stating that 'studies consistently show a relationship between levels of stress and access to urban green spaces'

⁸ Keijezer, C et al (2016), *Long-term Green Space Exposure and Cognition Across the Life Course: A Systematic Review*. *Current Environmental Health Reports* Vol 3(4): 468-477

⁹ McCormick, R. (2017) *Does Access to Green Space Impact the Mental Well-being of Children: A Systematic Review*. Vol 37 pages 3-7

¹⁰ O'Brien, L., Williams, K. and Stewart, A. (2010), *Urban health and health inequalities and the role of urban forestry in Britain: A review*, The Research Agency of the Forest Commission

¹¹ Natural England Access to Evidence Information Note EIN019. (2016) Links between natural environments and physical activity: evidence briefing.

¹² Thompson Coon J., et al (2011) Does participating in physical activity in outdoor natural environments have a greater effect on physical and mental wellbeing than physical activity indoors? A Systematic Review. *Environmental Science & Technology* 45: 1761

¹³ Maas, J., Verheij, R., Groenewegen, P., de Vries, S. and Spreeuwenberg, P. (2006), *Green space, urbanity and health: how strong is the relation?* *Journal of epidemiology and community health*

¹⁴ Croucher, K., Myers, L., and Bretherton, J. (2007), *The links between greenspace and health: a critical literature review*, Greenspace Scotland

and identified ‘activity and exercise, natural daylight, stimulation of the senses and aesthetic experience’ as potential factors in reducing stress. Similarly, Wood et al (2017) found that there was a positive relationship between access to green spaces and mental wellbeing, including in places with a nature focus and spaces designed for recreational and sporting activity¹⁵.

A systematic review of the impact of green space on biodiversity and health found that, while reported effects of green space were overwhelmingly positive, 22% of the papers examined identified either no effect or negative effects¹⁶.

A UK study by Houlden et al.¹⁷ in 2019 was undertaken to test whether the amount of greenspace within a radius of individuals’ homes was associated with mental wellbeing, testing the UK government guideline that greenspace should be available within 300m of homes. Findings showed that an increase in one hectare of greenspace within 300m of residents was associated with a statistically significant increase in life satisfaction, worth and happiness.

Research into the effects of the visual and aesthetic environment on wellbeing is mainly focused on the psychological effects of ‘natural’ versus ‘man-made’ or urban views. In general, evidence shows a preference for views of natural over man-made scenes. These links are often tied in with other, related issues such as opportunities for exercise and contact with nature.

Air quality, noise and neighbourhood quality

Landscape and visual

There is evidence of links between health outcomes and the physical characteristics of neighbourhoods. In 2013, a Position Statement by the Landscape Institute¹⁸ looked at evidence linking the quality of places with health and wellbeing across a range of environmental, social and lifestyle determinants. This document cites evidence to suggest that health and wellbeing are influenced positively by factors such as the attractiveness, noise and other pollution, and the perceived safety of the environment. Similarly, a report by Cubbin et al. 2008 for the Commission to Build a Healthier America¹⁹ identified links between health outcomes and the physical characteristics of neighbourhoods, including issues such as air quality, safety and traffic, alongside a range of social and neighbourhood service characteristics.

A literature review of over 120 studies²⁰ identified a set of pathways that link landscape and health. The study found that: ‘Landscapes have the potential to promote mental well-being through attention restoration, stress reduction, and the evocation of positive emotions; physical well-being through the promotion of physical activity in daily life as well as leisure time and through walkable environments; and social well-being through social integration, social engagement and participation, and through social support and security.’

¹⁵ Wood. L et al (2017), Public green spaces and positive mental health – investigating the relationship between access, quantity and types of parks and mental wellbeing. *Health and Place* 48:63-71

¹⁶ Lai, H., et al. (2019) The impact of green space and biodiversity on health. *The ecological society of America* 17:7, doi: <https://doi.org/10.1002/fee.2077>

¹⁷ Houlden V. et al (2019) A spatial analysis of proximate greenspace and mental wellbeing in London. *Applied Geography* 109:102036

¹⁸ Landscape Institute (2013), *Public Health and Landscape – Creating healthy places*, https://www.landscapeinstitute.org/PDF/Contribute/PublicHealthandLandscape_CreatingHealthyPlaces_FINAL.pdf.

¹⁹ Cubbin, C., Pedregon, V., Egerter, S. and Braveman, P. (2008), *Where we live matters for our health: Neighbourhoods and health*, Commission to build a Healthier America

²⁰ Abraham, A., Sommerhalder, K. and Abel, T. (2010), *Landscape and well-being: a scoping study on the health-promoting impact of outdoor environments*, *International Journal of Public Health*

Another study by Seresinhe *et al.* in 2015²¹ sought to quantify the relationship between environmental aesthetics and human health by comparing geographic data against self-rated health. This found that *'inhabitants of more scenic environments report better health, across urban, suburban and rural areas, even when taking core socioeconomic indicators of deprivation into account, such as income, employment and access to services.'*

Air quality

The WHO recognises outdoor air pollution as a major environmental health problem for all countries, including high-income countries.²² There is a wealth of evidence showing the association of nitrogen dioxide and particulate matter on poor health outcomes. Epidemiological studies have shown that long-term exposure to air pollution (over years or a lifetime) reduces life expectancy, due to cardiovascular and respiratory diseases and lung cancer. Short-term exposure (over hours or days) to increased levels of air pollution can also have a range of health effects, including effects on lung function, asthma, as well as increases in respiratory and cardiovascular hospital admissions, and mortality²³. Additionally, outdoor air pollution can influence productivity and contribute to social costs such as increasing days off work and school due to restricted health.²⁴

A Public Health England review²⁵ of interventions to improve outdoor air quality and public health found clear evidence that air pollution is the largest environmental risk to the health of the public in the UK. The review found that:

- It is estimated that between 28,000 and 36,000 deaths each year are attributed to humanmade air pollution
- There is a close association with cardiovascular and respiratory disease, including lung cancer
- There is emerging evidence that other organs may also be affected, with possible effects on dementia, low birth weight and diabetes.
- It concluded that the most impactful interventions would be those that reduce emissions of air pollution at source.

Evidence on the links between road traffic emissions and health is well established, based on numerous research studies. A WHO report in 2000 suggested that about 36,000–129,000 adult deaths a year are brought forward due to long-term exposure to air pollution generated by traffic in European cities. The main health damaging pollutants released as emissions from road traffic are Particulate Matter (PM10/26) and nitrogen dioxide (NO₂).

PM10, which is an important pollutant with regard to health effects, comprises atmospheric particles that are less than 10µm in diameter. Road transport is a major source of PM10, which is emitted from the combustion of vehicle fuels. There is growing evidence that smaller respirable particulate matter may be more relevant to health than larger particles. Recent studies²⁷ have found that ultra-fine particles (less than

²¹ Seresinhe, C., Preis, T. and Moat, H. (2015), *Quantifying the Impact of Scenic Environments on Health*, Scientific Reports

²² WHO Topic Sheet. (2018) Ambient (outdoor) air quality and health. [https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health)

²³ Public Health England (2018). Guidance: Health Matters: air pollution.

<https://www.gov.uk/government/publications/health-matters-air-pollution/health-matters-air-pollution>

²⁴ IOM Working for a Healthier Future. Scotland's Environment (2015) Air Quality, Health, Wellbeing and Behaviour, <https://www.environment.gov.scot/media/1133/iom-seweb-aq-health-behaviour-review.pdf>

²⁵ Public Health England (2019), Review of interventions to improve outdoor air quality and public health. Available from:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/795185/Review_of_interventions_to_improve_air_quality.pdf

²⁶ Particulate Matter up to 10 micrometers in size

²⁷ World Health Organization. (2000) Transport, environment and health. WHO Regional Publications, European Series. No.89

0.1 µm) have been associated with stronger effects on the lung function and symptoms in asthmatics than either PM10 or PM2.5.

According to the Lancet Commission on pollution and health²⁸ children are at high risk of pollution related disease and even extremely low-dose exposures to pollutants during windows of vulnerability in utero and in early infancy can result in disease, disability, and death in childhood and across their lifespan. Research has shown that exposure to PM affects children's lung development, including reversible deficits in lung function as well as chronically reduced lung growth rate and a deficit in long-term lung function.

Whilst there is no clear evidence of a safe level of exposure below which there is no risk of adverse health effects, there is sufficient evidence available to demonstrate that the adverse effects of air pollution on health outcomes is widely accepted. There is consensus that lowering levels of NO₂ and particulate matter will bring additional health benefits. Therefore, the evidence is judged to be strong.

Defra commissioned a study in 2006 to review recent research evidence on links between air quality and social deprivation in the UK²⁹. The analysis for England showed that there is a tendency for higher relative mean annual concentrations of nitrogen dioxide (NO₂) and particulate matter (PM10) in the most deprived areas of the country. This distribution can largely be explained by the high urban concentrations driven by road transport sources, and the higher proportion of deprived communities in urban areas. If exceedences of National Air Quality Standards are considered, the correlation between poor air quality and deprivation is stronger, showing that when the most polluted areas are considered, the greatest burden is on the most deprived communities, and very little on the least deprived.

Noise environment

According to the WHO³⁰, 'excessive noise seriously harms human health and interferes with people's daily activities at school, at work, at home and during leisure time. It can disturb sleep, cause cardiovascular and psychophysiological effects, reduce performance and provoke annoyance responses and changes in social behaviour'.

A literature review by van Kamp and Davies in 2013³¹ looked at 62 papers published from April 2006 to April 2011, which included the impact of environmental noise on the health of vulnerable people, including primary school children, young adolescents, preschool children, the elderly, and children with autism, asthma and attention deficit hyperactivity disorder. This found that, while vulnerable groups of people may be more at risk from exposure to environmental noise than healthy adults, there is comparatively little research focusing on the adverse health effects of noise on vulnerable people.

A European Commission publication in 2015³² cited evidence that 'living in a quiet area has a positive impact on health. A study assessed quality of life for people living in quiet and noisy locations and found that those who lived in quiet locations – particularly in rural areas – had a better quality of life'.

The recently published 2018 WHO guidelines on Environmental Noise for the European Region³³ undertook a series of systematic reviews synthesising exposure and associated impacts on health in order to develop a set of guidelines on how to protect human health. Recommendations were formulated based on the strength of evidence from various noise sources which are road traffic noise, railway noise, aircraft

²⁸ Landrigan, P.J., et al (2018), The Lancet Commission on pollution and health, The Lancet 391:462-512

²⁹ Defra, Netcen, Department for Communities and Local Government, National Statistics. Air Quality and Social Deprivation in the UK: an environmental inequalities analysis - Final Report to Department of Environment, Food and Rural Affairs AEAT/ENV/R/2170, June 2006

³⁰ World Health Organization (2017), Noise, <http://www.euro.who.int/en/health-topics/environment-and-health/noise>.

³¹ van Kamp, I. and Davies, H. (2013), *Noise and health in vulnerable groups: A review*, Noise and Health

³² European Commission, Science for Environment Policy, Thematic issues: Noise impacts on health (2015), <http://ec.europa.eu/environment/integration/research/newsalert/pdf/47si.pdf>.

³³ World Health Organisation Regional Office for Europe (2018) Environmental Noise Guidelines for the European Region. http://www.euro.who.int/_data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf

noise, wind turbine noise and leisure noise. The systematic reviews concluded that there was evidence for an association of railway noise and road traffic noise on cardiovascular disease (CVD), sleep disturbance, annoyance, and cognitive impairment, with suggestive but weaker evidence (often due to lack of studies) for effects on mental health and birth weight.

Based on the evidence reviews, the 2018 WHO guidelines set a recommended level for railway noise exposure to protect health of 54dB Lden and 44dB Lnight; for road noise the recommended levels are 53dB Lden and 45dB Lnight. However, the WHO states that recommended levels are not LOAEL (Lowest Observed Adverse Effect Level) values and there is currently no policy requirement to implement these values in the UK.

Accessibility and active travel

There is a large body of evidence linking physical activity with improved physical and mental health. The WHO³⁴ defines physical activity as ‘any bodily movement produced by skeletal muscles that requires energy expenditure’ and states that ‘physical activity has significant health benefits and contributes to prevent non-communicable diseases’.

These benefits are identified as reduced risk of hypertension, coronary heart disease, stroke, diabetes, breast and colon cancer, depression and the risk of falls, improved bone and functional health, and weight control. The WHO also states that ‘beyond exercise, any other physical activity that is done during leisure time, for transport to get to and from places, or as part of a person’s work, has a health benefit. Further, both moderate- and vigorous-intensity physical activity improve health.’

The positive effects of physical activity on physical health was summarised in a recent Department of Health report³⁵ which suggests that *‘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.’*

It has been shown that *‘physical activity improves health throughout the life course – from childhood through to older age’*³⁶. The health benefits of physical exercise occur across virtually the full range of diseases, and when this is combined with the prevalence of inactivity among the public, it *‘makes physical activity one of the main contemporary public health issues’*.

Positive mental health effects associated with physical exercise have been highlighted in evidence reviews by Cave et al³⁷, Sport England³⁸ and AEA Technology³⁹. Mental health effects cited include improvements in people with generalised anxiety disorders including phobias, panic attacks, and stress disorders.

A 2013 literature review focused on the health benefits of active travel by Saunders et al. determined that, although there is no clear evidence in the effectiveness of active travel in reducing obesity, there has been a rise in the prevalence of obesity which has occurred in parallel with a decline in active travel in the past 30-40 years. Data from a report by the National Obesity Observatory in 2011 suggests a number of factors

³⁴ World Health Organization, Physical activity (2017), <http://www.who.int/mediacentre/factsheets/fs385/en/>.

³⁵ CMO (2011) Start Active, Stay Active: A report on physical activity from the four home countries’ Chief Medical Officers, Department of Health, Physical Activity, Health Improvement and Protection

³⁶ Harding, T., (1997), A Life Worth Living: the Independence and Inclusion of Older People, London: Help the Aged, cited in Beaumont, J., 2011, Measuring National Well-being, Discussion paper on domains and measures, Faculty of Public Health, Office for National Statistics

³⁷ Cave, B, Curtis, S, Aviles, M, and Coutts, A, (2001). ‘Health Impact Assessment for Regeneration Projects. Volume II Selected evidence base’. East London and City Health Action Zone.

³⁸ Sport England. (2007). ‘Active Design. Promoting opportunities for sport and physical activity through good design’. Supported by CABE, DH and DCMS. Sport England.

³⁹ AEA Technology, (2000). ‘Informing transport health impact assessment in London’. Commissioned by NHS Executive, London.

impact active travel including access to fitness facilities, distance to destinations, land use, urban walkability scores, safety, availability of equipment and the provision of footpaths.

A study undertaken in 2017 by the University of the West of England⁴⁰, examined the impacts of commuting on the wellbeing of over 26,000 employed people in England between 2009/10 and 2014/15 as part of 'The Commuting and Wellbeing Study'. The study found that for every extra minute of commute time, job satisfaction and leisure time reduced and stress was increased.

Vernon et al. in 2014⁴¹ suggest that road safety inventions can also help to encourage physical activity by creating a safer physical road environment and reducing the level of danger posed to vulnerable road users. Vernon et al also noted that that 'road safety has a much wider impact on health than just preventing injuries. This is because some forms of travel (i.e., walking and cycling), and the provision for them, bring more health benefits for individuals and society than others. However, the way that people travel is influenced by concerns about actual or perceived safety; effective intervention to reduce road danger can encourage more people to travel by these active, health-promoting modes.'

More recent research⁴² found that people living in walkable neighbourhoods tend to be more physically active and less likely to be obese.

Accessibility and the provision of public services such as health, education and community facilities have been found to have a direct positive effect on human health⁴³. Accessibility for local residents to community facilities can play a significant role in promoting or discouraging physical activity. The key influential characteristics of an accessible community noted by Dannenberg et al⁴⁴ included proximity of recreation facilities, housing density, street design and accommodation for safe pedestrian, bicycle, and wheelchair use.

Crime reduction and community safety

A literature review by Lorenc et al. BMC literature review⁴⁵ included 40 studies to review and synthesize qualitative evidence from the UK on fear of crime and the environment. The review found that, while environmental factors may influence fear of crime, including visibility and signs of neglect, factors in the local social environment appear to be more important as drivers of fear of crime.

The Department for Communities and Local Government's 2008 Place Survey⁴⁶ showed that personal safety and low levels of crime are highly valued; respondents were asked to identify up to 5 priorities for a good place to live, and 61% identified low levels of crime as a priority. A study by Stafford et al. in 2007 in the American Journal of Public Health⁴⁷ found evidence to suggest that fear of crime was a contributory factor in some adverse health outcomes. The study suggested that fear of crime can impact mental health

⁴⁰ Chatterjee, K., Clark, B., Martin, A. & Davis, A. (2017). *The Commuting and Wellbeing Study: Understanding the Impact of Commuting on People's Lives*. UWE Bristol, UK.

<https://travelbehaviour.files.wordpress.com/2017/10/caw-summaryreport-onlineedition.pdf>

⁴¹ Vernon, D. (2014), *Road Safety and Public Health*, Royal Society for the Prevention of Accidents (RoSPA)

⁴² Booth GL, Creatore MI, Luo J, et al. Neighbourhood walkability and the incidence of diabetes: an inverse probability of treatment weighting analysis. *J Epidemiol Community Health* Published Online First: 29 January 2019

⁴³ HUDU (2013). HUDU Planning for Health. Rapid Health Impact Assessment Tool. (NHS) London Healthy Urban Development Unit

⁴⁴ Dannenberg A.L, Jackson R.J, Frumkin H, Schieber R.A, Pratt M, Kochitzky C and Tildon H. N (2003) The Impact of Community Design and Land-Use Choices on Public Health: A Scientific Research agenda. *American Journal of Public Health* 93

⁴⁵ Lorenc, T., Petticrew, M., Whitehead, M., Neary, D., Clayton, S., Wright, K., Thomson, H., Cummins, S., Sowden, A. and Renton, A. (2013), *Fear of crime and the environment: systematic review of UK qualitative evidence*, BMC Public Health

⁴⁶ Department for Communities and Local Government, Place Survey (2008),

<http://webarchive.nationalarchives.gov.uk/20120919132719/http://www.communities.gov.uk/documents/statistics/pdf/1326142.pdf>.

⁴⁷ Stafford, M., Chandola, T. and Marmot, M. (2007), *Association Between Fear of Crime and Mental Health and Physical Functioning*, American Journal of Public Health

by increasing anxiety and decreasing trust and community participation, and has been linked to reducing people's willingness to participate in physical activity⁴⁸.

In 2012, Lorenc et al.⁴⁹ highlighted that crime and fear of crime have a substantial impact on health but the pathways are often indirect and mediated by environmental factors. For example, the built environment may affect wellbeing by increasing fear of crime due to poor design or quality.

A US literature review of studies of older people's health outcomes in relation to neighbourhood safety identified 32 studies on health status and health behaviours in relation to crime and safety.⁵⁰ A systematic review of 22 longitudinal cohort studies of childhood obesity and physical activity⁵¹, found that children were less likely to undertake physical activity if living in an unsafe environment.

Access to work and training

There is a large body of evidence linking employment and income levels with health. The World Health Organization (WHO) identifies a list of health determinants⁵² that combine to affect the health of individuals and communities. Included in this list is: *'income and social status - higher income and social status are linked to better health. The greater the gap between the richest and poorest people, the greater the differences in health'*.

The Marmot Review, published in 2010⁵³, was commissioned by the Department of Health to investigate health inequalities in England and focused on correlations between health and wellbeing and the socio-economic status of communities. The report identified six evidence-based policy objectives to reduce health inequalities, one of which was to create fair employment and good work for all. The Review stated that *'being in good employment is protective of health. Conversely, unemployment contributes to poor health'*. This study also identifies links between educational attainment and physical and mental health.

Much of the literature relating to unemployment and health outcomes is focused on the increased likelihood of poor health in low income groups, often referred to as the social gradient in health. For example, a large-scale study by Wapner in 2015⁵⁴ showed that disadvantaged adolescents reported lower levels of physical activity and higher levels of bodily aches and pains, sleeplessness and emotional difficulties, such as nervousness and irritability, than more advantaged teenagers. In addition, a Spanish study undertaken in 2015⁵⁵ found that the impact of unemployment, particularly long-term unemployment, had a negative impact on self-reported health and mental health.

A study by Clark and Lepinteur⁵⁶ in 2019 explored the causes and consequences of early-adult unemployment. Findings showed that past unemployment can negatively impact on life satisfaction later in

⁴⁸ Jackson, J. and Stafford, M. (2009), *Public health and fear of crime*, British Journal of Criminology Advance

⁴⁹ Lorenc, T., Clayton, S., Neary, D., Whitehead, M., Petticrew, M., Thomson, H., Cummins, S., Sowden, A. and Renton, A. (2012), *Crime, fear of crime, environment, and mental health and wellbeing: mapping review of theories and causal pathways*, Health Place

⁵⁰ J. Won et al (2016) *Neighbourhood safety factors associated with older adults' health-related outcomes: A systematic literature review*. Social Science and Medicine 165: 177-186

⁵¹ R. An et al (2017) *Influence of Neighbourhood Safety on Childhood Obesity: A Systematic Review and Meta-analysis of Longitudinal Studies*. Obesity Reviews. Nov;18(11):1289-1309

⁵² World Health Organization (2017), *Health Impact Assessment - The determinants of health*, <http://www.who.int/hia/evidence/doh/en/>.

⁵³ Marmot, M., Allen, J., Goldblatt, P., Boyce, T., McNeish D., Grady, M. and Geddes, I. (2010), *Fair society, healthy lives: Strategic review of health inequalities in England post-2010*, The Marmot Review

⁵⁴ Wapner, J. (2015), *Money is driving a wedge in teen health*, Scientific American

⁵⁵ R.M. Urbanos-Garrido and B.G.Lopez-Valcarcel (2015) *The influence of economic crisis on the association between unemployment and health: an empirical analysis for Spain*. The European Journal of Health Economics. Vol 16(2) 175-184.

⁵⁶ Clark, AE and Lepinteur, A (2019), *The Causes and Consequences of Early-Adult Unemployment: Evidence from Cohort Data*, Paris School of Economics, Working Paper 2019:29

life. A Policy Brief for the LEAD Centre⁵⁷ presented evidence to suggest a positive correlation between employment and health for working age people with disabilities.

A review of longitudinal study literature by Reche et al.⁵⁸ in 2019 suggested that the direct association between income and self-rated health is small. Most studies of this topic have used cross-sectional data and only considered self-rated health as the decisive factor. Moreover, the study was unable to find a statistically significant link between income and morbidity.

A wide range of mechanisms for the health benefits of employment, as well as the negative effects of unemployment, have been suggested. For example, a study by Olesen *et al.* in 2013⁵⁹ cites numerous references indicating that the health benefits of employment '*are believed to reflect a combination of material (e.g., income and the resulting access to resources) and psychological outcomes, such as social role and status, access to social networks and support, and a sense of purpose/achievement*' and that '*in contrast, excluded individuals experience a set of multiple, and often entrenched, disadvantages including limited social support and networks, inadequate financial resources, and poor employment and health*'. A literature review by Kim *et al.* in 2015⁶⁰ identified higher incidence of poor self-rated health, mental illness, physical complaints such as coronary heart disease, and higher all-cause mortality in unemployed people compared with those in employment.

There is a large body of evidence linking education, employment and income levels with health. The WHO identifies a list of health determinants⁶¹ that combine to affect the health of individuals and communities. Included in this list is: '*education – low education levels are linked with poor health, more stress and lower self-confidence*'.

The majority of evidence linking education with health outcomes looks at educational attainment in the context of broader socio-demographic status. An evidence review by the Joseph Rowntree Foundation⁶² states that improved qualifications can lead to better wages and employment, providing greater access to the health benefits associated with good and secure employment. A University of London report by Feinstein *et al.* in 2008⁶³ on the social and personal benefits of learning states that '*people with better qualifications are more likely to have healthy lifestyles, to be fitter and slimmer – and such health advantages can be transferred to the next generation at the earliest age*'.

An evidence review by the Economic and Social Research Council⁶⁴ suggests that the level of education a person has correlates with positive life outcomes including health and wellbeing.

⁵⁷ N. Goodman (2015). *The Impact of Employment on the Health Status and Health Care Costs of Working-age People with Disabilities. Lead Centre Policy Brief.*
http://www.leadcenter.org/system/files/resource/downloadable_version/impact_of_employment_health_status_health_care_costs_0.pdf

⁵⁸ Reche E., Konig, H-H., and Hajek, A. *Income, Self-Rated Health, and Morbidity: A Systematic Review of Longitudinal Studies.* International Journal of Environmental Research and Public Health. Vol 16:2884; doi:10.3390/ijerph16162884.

⁵⁹ Olesen, S., Butterworth, P., Leach, L., Kelaher, M. & Pirkis, J. (2013), *Mental health affects future employment- as job loss affects mental health: findings from a longitudinal population study*, BMC Public Health

⁶⁰ Kim, T. and Knesbeck, O. (2015), *Is an insecure job better for health than no job at all? A systematic review of studies investigating the health-related risks of both job insecurity and unemployment*, BMC Public Health

⁶¹ World Health Organization (2017), *Health Impact Assessment- The determinants of health*, <http://www.who.int/hia/evidence/doh/en/>.

⁶² Rowntree, J. (2014), *Reducing Poverty in the UK: A collection of evidence reviews*, Joseph Rowntree Foundation

⁶³ Vorhaus, J., Duckworth, K., Budge, D. and Feinstein, L. (2008), *The Social and personal benefits of learning: A summary of key research findings*, Centre for Research on the Wider Benefits of Learning, Institute of Education, University of London, London

⁶⁴ Economic and Social Research Council. Evidence Briefing: The wellbeing effect of education. July 2014. <https://esrc.ukri.org/files/news-events-and-publications/evidence-briefings/the-wellbeing-effect-of-education/>

Social cohesion and social capital

A 2014 Office for National Statistics (ONS) paper, *Measuring Social Capital*⁶⁵, provides the following definition of social capital: ‘In general terms, social capital represents social connections and all the benefits they generate. The benefits for people having these social connections can occur either at an individual level (for example, through family support) or at a wider collective level (for example, through volunteering). Social capital is also associated with values such as tolerance, solidarity or trust. These are beneficial to society and are important for people to be able to cooperate.’

The ONS has looked at social capital as part of its Measuring National Well-being (MNW) programme. This programme identifies four aspects of social capital, based on work undertaken by Scrivens et al. in 2013 for the Organisation for Economic Co-operation and Development (OECD)⁶⁶. These aspects are:

- personal relationships;
- social network support;
- civic engagement and trust; and
- cooperative norms.

The 2014 ONS paper includes a review of academic studies on social capital and its effects on health. The evidence suggests that social capital makes a positive contribution to a range of well-being aspects such as personal well-being, health and crime rates, and that these benefits occur at individual, community, regional and national level. In the same paper, the ONS cites evidence to suggest that *‘people with a good range and frequency of social contact report higher levels of life satisfaction and happiness, but also better mental health. However, people with poorer health, particularly mental health, have been reported to have significantly smaller social networks. Personal relationships are important for individual well-being but can also have positive outcomes for firms and organisations, and at a community level’*. The evidence also suggests that *‘more socially isolated people are more at risk of risky behaviours such as smoking, drinking, physical inactivity and poor diet’*.

Social capital can also be defined as benefits that emerge from social networks, where individuals have good access to information, services and support⁶⁷. The same study suggests that cultural and socioeconomic aspects can act as a barrier to social capital. For example, some types of social capital may only be beneficial to those who have access to them through sufficient economic capital, such as expensive sports clubs.

A systematic review of systematic reviews⁶⁸ on social capital and multiple health outcomes carried out in 2019 showed that there is good evidence to suggest a positive correlation between social capital and mental and physical health, and that social capital contributes to lower mortality. On the other hand, the review also found numerous non-significant or negative relationships between social capital and health. The review also analysed social capital interventions and found that their efficacy remained unclear. The analysis showed that it is difficult to assess whether an increase in health outcome is due to an increase in social capital, which limits the ability to understand whether and how social capital interventions can improve health.

A study by Nieminen et al. in 2013 published in *BMC Public Health*⁶⁹ identified associations between health behaviours and social capital. For example, in Sweden lower trust in communities and families led

⁶⁵ Siegler, V. and Office for National Statistics (2014), *Measuring Social Capital*, Office for National Statistics

⁶⁶ Scrivens, K. and Smith, C. (2013), *Four interpretations of social capital: an agenda for measurement*, OEDC

⁶⁷ Uphoff, E., Pickett, K., Cabieses, B., Small, N. and Wright, J. (2013), *A systematic review of the relationships between social capital and socioeconomic inequalities in health: a contribution to understanding the psychosocial pathway of health inequalities*, *International Journal for Equity in Health*

⁶⁸ Ehsan, A., et al. (2019), *Social capital and health: A systematic review of systematic reviews*, *SSM Population Health*, doi:10.1016/j.ssmph.2019.100425

⁶⁹ Nieminen, T., Prattala, R., Martelin, T., Harkanen, T., Hyypä, M., Alanen, E. and Koskinen, S. (2013), *Social capital, health behaviours and health: a population-based associational study*, *BMC Public Health*

to increased alcohol consumption; in England strong social support networks were associated with increased healthy eating; and in Finland those with higher social participation and networks exhibited healthier behaviours. A study by McPherson et al. in 2014 published in BMC Psychology⁷⁰ found that ‘social capital can affect the norms and attitudes that influence health behaviours. It can be generated at a family and community level and can influence mental health and behaviour from a young age’.

⁷⁰ McPherson, K., Kerr, S., McGee, E., Morgan, A., Cheater, F., McLean, J. and Egan, J. (2014), *The association between social capital and mental health and behavioural problems in children and adolescents: an integrative systematic review*, BMC Psychology