

Appendix 17.1: 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 HIF Infrastructure Works. 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 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 course¹. 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 ADHD².

A review by O'Brien et al. (2010) for the Forestry Commission³ 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 England⁴ 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.⁵

¹ Keijzer, 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

² McCormick, R. (2017) *Does Access to Green Space Impact the Mental Well-being of Children: A Systematic Review*. Vol 37 pages 3-7

³ 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

⁴ Natural England Access to Evidence Information Note EIN019. (2016) Links between natural environments and physical activity: evidence briefing.

⁵ 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

Research conducted by Maas et al. in 2006⁶ 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 Scotland⁷ 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’ 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 activity⁸.

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 effects⁹.

A UK study by Houlden et al.¹⁰ 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.

Vulnerable groups

A Public Health Wales review¹¹ found that access to good quality green space can reduce health inequities, but spaces in deprived areas are often of poor quality. Therefore, to increase use of space by vulnerable groups, it is recommended that green space is improved by removing graffiti, providing toilets, seating and other amenities.

A Public Health England report¹² notes that “*disadvantaged groups appear to gain a larger health benefit and have reduced socioeconomic-related inequalities in health when living in greener communities*”. This is consistent with Mitchell & Popham (2008) who found that living in areas with green spaces is associated with significantly less income-related health inequality, weakening the effect of deprivation on health¹³. They found that in greener areas, all-cause mortality rates are only 43% higher for deprived groups, compared to 93% higher in less green areas. In conclusion, vulnerable groups accrue greater benefit from

⁶ 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

⁷ Croucher, K., Myers, L., and Bretherton, J. (2007), *The links between greenspace and health: a critical literature review*, Greenspace Scotland

⁸ 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

⁹ 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>

¹⁰ Houlden V. et al (2019) A spatial analysis of proximate greenspace and mental wellbeing in London. Applied Geography 109:102036

¹¹ Public Health Wales (2012). Green space, reduction of health inequities and cost effectiveness of interventions.

¹² Public Health England (2020). Improving access to greenspace. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/904439/Improving_access_to_greenspace_2020_review.pdf

¹³ Mitchell R, Popham F (2008). ‘Effect of exposure to natural environment on health inequalities: an observational population study’. The Lancet, vol 372, no 9650, pp 1655–6

living in greener communities and open space should be used as a tool to narrow the health inequalities in populations.

Access to education, training and employment opportunities

There is a large body of evidence linking employment and income levels with health. The World Health Organization (WHO) identifies a list of health determinants¹⁴ 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 2010¹⁵, 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 2015¹⁶ 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 2015¹⁷ 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 Lepinteur¹⁸ in 2019 explored the causes and consequences of early-adult unemployment. Findings showed that past unemployment can negatively impact on life satisfaction later in life. A Policy Brief for the LEAD Centre¹⁹ 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.²⁰ 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 2013²¹ 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*

¹⁴ World Health Organization (2017), *Health Impact Assessment - The determinants of health*, <http://www.who.int/hia/evidence/doh/en/>.

¹⁵ 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

¹⁶ Wapner, J. (2015), *Money is driving a wedge in teen health*, Scientific American

¹⁷ 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.

¹⁸ 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

¹⁹ 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

²⁰ 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.

²¹ 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

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 2015²² 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 determinants²³ 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 Foundation²⁴ 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 2008²⁵ 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 Council²⁶ suggests that the level of education a person has correlates with positive life outcomes including health and wellbeing.

Vulnerable groups

A scoping study²⁷ investigating the impact of unemployment and precarious employment on the health of young people demonstrated that there is evidence that young people are especially vulnerable to health problems when unemployed or working in precarious conditions.

Furthermore, supporting these findings, a recently published systematic review²⁸ commissioned by the Public Health Agency of Sweden found an association between unemployment among young people and poor mental health.

These findings are indicative that young people are particularly vulnerable to the negative health effects resulting from unemployment. As training and education are directly linked to employment, young people are also likely to be more vulnerable to change in educational opportunities. However, where retraining is required, this would be relevant to all age groups.

²² 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

²³ World Health Organization (2017), *Health Impact Assessment- The determinants of health*, <http://www.who.int/hia/evidence/doh/en/>.

²⁴ Rowntree, J. (2014), *Reducing Poverty in the UK: A collection of evidence reviews*, Joseph Rowntree Foundation

²⁵ 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

²⁶ 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/>

²⁷ Vancea, M., Utzet, M. (2017) How unemployment and precarious employment affect the health of young people: a scoping study on social determinants.

²⁸ Bartelink, V, H, M., Guldbrandsson, K, K., Bremberg. (2019) Unemployment among young people and mental health: a systematic review.

Air quality

The WHO recognises outdoor air pollution as a major environmental health problem for all countries, including high-income countries.²⁹ 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 mortality³⁰. Additionally, outdoor air pollution can influence productivity and contribute to social costs such as increasing days off work and school due to restricted health.³¹

A Public Health England review³² 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) 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 studies³⁴ have found that ultra-fine particles (less than 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 health³⁵ 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.

²⁹ 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)

³⁰ Public Health England (2018). Guidance: Health Matters: air pollution. <https://www.gov.uk/government/publications/health-matters-air-pollution/health-matters-air-pollution>

³¹ 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>

³² 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

³³ Particulate Matter up to 10 micrometers in size

³⁴ World Health Organization. (2000) Transport, environment and health. WHO Regional Publications, European Series. No.89

³⁵ Landrigan, P.J., et al (2018), The Lancet Commission on pollution and health, The Lancet 391:462-512

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 UK³⁶. 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.

Vulnerable groups

Based on the evidence set out above, children, young people, older people and those with respiratory disease are the most vulnerable to changes in air quality.

Noise environment

According to the WHO³⁷, ‘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 2013³⁸ 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 2015³⁹ 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 Region⁴⁰ 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 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.

³⁶ 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

³⁷ World Health Organization (2017), Noise, <http://www.euro.who.int/en/health-topics/environment-and-health/noise>.

³⁸ van Kamp, I. and Davies, H. (2013), *Noise and health in vulnerable groups: A review*, Noise and Health

³⁹ European Commission, Science for Environment Policy, Thematic issues: Noise impacts on health (2015), <http://ec.europa.eu/environment/integration/research/newsalert/pdf/47si.pdf>.

⁴⁰ 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

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.

Vulnerable Groups

All people living within an area affected by changes in noise are vulnerable to the effects, however, children are particularly susceptible, particularly when in their educational setting.

Neighbourhood amenity

A study in 2015⁴¹ 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.'*

A Position Statement published by the Landscape Institute in 2013⁴² looked at evidence linking the quality of places with health and wellbeing across a range of environmental, social and lifestyle determinants. This document cited evidence to suggest that health and wellbeing are influenced positively by a variety of factors including the perceived attractiveness of the environment.

Vulnerable groups

A 2020 literature review⁴³ assessed the association between neighbourhood aesthetics and childhood obesity, physical activity and active transport to school in individuals aged <18 years from 25 studies. Two thirds (75%) of studies reported non-significant associations between neighbourhood aesthetics and physical activity and weight whereas half (50%) of studies showed that neighbourhood aesthetics is associated with active transport to schools. This suggests that the findings are mixed, and more research is needed to understand the epidemiological relationship.

A literature review⁴⁴ assessing the association between the built environment and physical activity in the elderly found that aesthetically pleasing scenery such as greenery is positively associated with physical activity in the individuals over 65 years of age.

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.

⁴¹ Seresinhe, C., Preis, T. and Moat, H. (2015). *Quantifying the Impact of Scenic Environments on Health*, Scientific Reports.

⁴² Landscape Institute (2013). *Public Health and Landscape – Creating healthy places*.

⁴³ Qu, P, Luo, M, Wu, Y, et al. (2020). Association between neighborhood aesthetics and childhood obesity. *Obesity Reviews*. 1– 19. <https://doi.org/10.1111/obr.13079>

⁴⁴ Bonaccorsi G, Manzi F, Del Riccio M, Setola N, Naldi E, Milani C, Giorgetti D, Dellisanti C, Lorini C. (2020). *Impact of the Built Environment and the Neighborhood in Promoting the Physical Activity and the Healthy Aging in Older People: An Umbrella Review*. International Journal of Environmental Research and Public Health. 17(17):6127. <https://doi.org/10.3390/ijerph17176127>

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

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 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.

Vulnerable groups

Social inequalities are particularly marked in urban environments, with different population subgroups experiencing impacts to different degrees. For example, the National Survey for Wales (2018-19)⁵² found that people who were in material deprivation were found to be less likely to feel safe in their local area, compared with those who were not in material deprivation. Further, older people are identified as being particularly likely to suffer as a result of fear of crime.

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

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 Welsh Government (2020) What factors are linked to people feeling safe in their local area?