Nature-based solutions
as inclusive spaces
Links to people’s health, wellbeing
and quality of life

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The research centre for inclusive
access to outdoor environments
Theories on landscape preference


The Biophilia hypothesis (Kellert and Wilson 1993) suggests that people’s desire for contact with nature has an underlying cause based on genetic fitness and competitive advantage: the natural environment is a resource vital to human wellbeing, physical and mental.

What might this mean for an urbanised society?
Across the globe, our society is becoming more urban (75% in Europe)
• In UK, 11 million people aged 65+, 3 million people aged 80+
• 36% of people in the UK aged over 65 live alone; 70% F
• by 2086, c. one in three UK people will be 60+

Source: Age UK Factsheet *Later Life in the United Kingdom*, Oct 2014
Not only are we suffering increasing levels of obesity, type II diabetes and poor cardiovascular health…

…but, in terms of mental health and wellbeing, we are also not very well.

27% of the EU adult population experienced at least one ‘mental disorder’ in the past year: c. 83m people
Ecological approach – everything matters!

The artificial conditions of the town produce “a harmful effect, first on (a man’s) entire mental and nervous system and ultimately on his entire constitutional organisation” – the antidote is pleasing, rural scenery. *F L Olmsted, designer with Calvert Vaux of New York City’s Central Park, 1886*
Evidence suggests GDP growth and ‘green city’ growth are correlated.
If successful cities offer an attractive and sustainable living environment, how does access to green space make a difference to health and quality of life for urban populations? The evidence…
How does access to green space make a difference to health, wellbeing and quality of life for urban populations?

some evidence...
A clear association between access to green space and health in England (similar pattern in Wales but not in Scotland or New Zealand)

Cardiovascular mortality rate

Increasingly green


In the Netherlands, researchers have shown significant relationships between the amount of green space near home and a number of self-reported and objectively measured indicators of physical and mental health – they call this effect ‘Vitamin G’. The relationship is particularly strong for children and lower socioeconomic groups. (Maas et al., 2008; 2009)

Green space appears to be ‘equigenic’ – reducing the difference in health observed between those with most socio-economic deprivation and the rest of the population.
Populations which have more green space in their neighbourhood tend also to have a smaller health gap between richer and poorer residents (Mitchell et al. 2015).
An example of green space benefits for deprived communities

“I find it’s quiet, it gets you away from everyday life. You just go away and be in a world of your own sometimes… if you’re angry at anything, just go away and get yourself all calmed down.”

Unemployed men and women from deprived urban areas in Central Scotland
Access to green space can support gross and fine motor skills, cognitive, emotional, social and physical development in children (Natural England, 2010; Amoly et al., 2014; Dadvand et al., 2015) – All likely to lead to better health and better ability to maintain healthy lifestyles in adulthood (Ward Thompson et al. 2008)
In Israel, UK and Lithuania, positive associations found between surrounding greenness or close access to city parks and babies’ birth weight/development (Dadvand et al., 2014; Agay-Shay et al, 2014; )
Older adults

Living near more green space is associated with better general health (de Vries et al., 2003), more physical activity (Broekhuizen et al., 2013) and better social ties and sense of community (Kweon et al., 1998), as well as longevity (Takano et al., 2002).
It’s important for older people

“It's a psychological thing about escaping the flat ... a load comes off my mind when I go out”.

“I enjoy the seasons and elements of change. I like trees, wildlife and the atmosphere – it’s all stimulating for thought”
Green space and activity levels

UK study - better levels of green space around the home clearly associated with higher reported recreational walking (Lachowycz and Jones’s 2014). Green space may also encourage people to maintain higher levels of walking over time (Sugiyama et al 2013).

Greener areas may also encourage people to be less sedentary and get outdoors – any activity is better than none

The benefits of green space nearby may be as much about mental health benefits when exercising in green space – ‘green exercise’ as physical activity (Barton & Pretty 2010)
Where you exercise may affect benefits to mental health.

Using natural environments for physical activity at least once a week was associated with about half the risk of poor mental health among those who don’t visit.

Each additional use of *any* natural environment per week was associated with about a 6% lower risk of poor mental health.

Does closeness of green/blue space make a difference for older people?

Do you live within 10 minutes’ walk of a local open space?

In a British study, older people (65+) who lived within 10 minutes’ walk of a local open space were **twice as likely to achieve the recommended levels of healthy walking** (2.5 hours/week) compared with those whose local open space is further away.

Older people (65+) living within 10 minutes’ walk of a local open space were **more than twice as likely to be satisfied with life** compared with those whose local open space is further away.

Green space and social wellbeing

Streetscape greenery is associated with perceived social cohesion in the neighbourhood (de Vries et al. 2013).

A shortage of green space in the environment is associated with feelings of loneliness and lack of social support (Maas et al., 2009) which in turn predicts stress (Ward Thompson, in prepn).
In some deprived communities, growing your own food (or just gardening) seems to be an important factor in mitigating stress (van den Berg & Custers, 2011; Ward Thompson, in prepn)
Green space mitigates the urban heat island

Excessive heat can have very damaging consequences for human health. Shade and reduced demand for air conditioning is particularly important for low-income groups, especially children and older people (Hajat et al. 2006; Jenerette et al., 2011).
Chronic stress leads to ‘wear and tear’ on the body; if green space reduces or buffers this allostatic load, it will influence physical as well as mental health.

In a UK study, chronic stress in deprived urban population (measured via cortisol) was predicted by % green space.
A study of relationships between green space and health and wellbeing for residents of deprived urban areas, aged 35-55, not in work

A study for the Scottish Government

Green space measured using Census Area Statistics Wards - includes parks, woodlands, scrub and other natural environments, but not private gardens.
Measuring stress using salivary cortisol

Cortisol – vital for orchestrating healthy body functioning around the 24 hour cycle

Its diurnal pattern reflects functioning of the hypothalamic pituitary adrenal (HPA) axis

- Non-invasive method
- Cortisol plays a key role in responding to acute stress
- A biomarker responding to everyday life of participants in their usual surroundings
Relationship of cortisol slope to % green space (n=88)


Differences between men’s and women’s cortisol slope in relation to % green space

Men and women have similar patterns and levels of cortisol in high green space (green line) but different in low green space (black line): men are classically stressed, females are more exhausted.

Results from a larger household questionnaire and more detailed green space measures (n=305)
More green space is associated with less stress for both men and women (but only significant for men).

Variables controlled for in the analysis: age, income, and deprivation.
How much green space makes a difference?

CHAID AnswerTree showing what % green space best predicts a difference in stress.

Significant split on 60% green space.
Current study: what is the impact of urban woodland improvements on deprived communities’ mental health and wellbeing (incl. health economics)?

A longitudinal study (a ‘natural experiment’) with three woodland intervention sites and three matched ‘controls’

1. Physical woodland improvements
2. Promotion of woodland use in the local community

In summary, a city of well-connected green spaces appears to be resilient.

Offers opportunities for all sectors of society, for active commuting and high energy sports as well as for relaxation and social contact.

Resilient to extreme and unpredictable events.

Citizens whose behaviour and self-efficacy is healthy and resilient means reduces demands on health services and contributes to a healthy economy.