Urban green/blue space, resilience and health

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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 in an ageing and unequal society?
Our societies are not so healthy ...

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.

Source: WHO Europe
Ecological approach – everything matters!

Green space is associated with living longer

Urban studies from Japan, England and Canada show that having green space near where you live is associated with reduced mortality rates, especially from circulatory diseases, even when income level is taken into account.
Cardiovascular health is associated with more access to green space

Supporting evidence from UK, Lithuania, and from Australia, USA, Canada - living near green space is associated with a reduction in: cardiovascular risk, stroke mortality, respiratory disease mortality.

GS benefit is strongest for the poorest people

**Fig. 3.** Rate ratios of premature circulatory deaths: By quartile of deprivation and relative to the group with the poorest access to greenspace (group 1). Test for trend: *p < 0.05, **p < 0.01.

Lachowycz and Jones SSM(2014)

Those with the highest socio-economic deprivation benefit most from the association between green space access and mortality rates (a UK study)
A study of 34 European countries shows green space associated with reducing the difference in health observed between richer and poorer people (by up to 40%).
Many people walk when in natural landscapes – physical activity has positive effects on physical health, mood and stress.
Potential mechanisms linking landscape and health: Social Engagement

Social contact when in natural environments – relieves social isolation (a health risk) and may enhance activity or mood
Potential mechanisms linking landscape and health: Attention Restoration

Psychological response to perceiving natural environments
Attention Restoration Theory (Kaplan & Kaplan)
Independent physiological response: psychoneuroendocrine mechanisms (Ulrich et al., Hartig et al, Ottoson & Grahn, Park et al)
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 UK 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) cf. those with more distant local open space.

Such older people were also more than twice as likely to be satisfied with life.

(Ward Thompson & Aspinall, 2011)
‘Green exercise’ may be better for mental health

In a UK study, 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 c. 6% lower risk of poor mental health (Mitchell, 2013)
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 et al, 2016)
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 et al, 2016)
Dense planting helps noise reduction - sharp tones especially may be softened (perhaps a psychological as much as physiological effect) (Yang, Bao & Zhu, 2011)
Green space and reduced air pollution

Gases and particulate matter can be filtered by vegetation: living in greener areas can lower exposure to air pollution (Dadvand et al, 2012)
Green space mitigates urban heat island

Excessive heat can be very damaging, even lethal, for health.

Green space offers shade and helps reduce the demand for air conditioning, all particularly important for low-income groups, especially children and older people (Jenerette et al, 2011).
The importance of biological pathways

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 …
Research on relationships between green space and health for residents of deprived urban areas, using objective measures of green space and of health

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 – a steep slope soon after awakening is a healthy sign

- Cortisol plays a key role in responding to acute stress
- A biomarker responding to the everyday life of participants in their usual surroundings
% green space in neighbourhood predicts a healthier cortisol slope (n=88)

Cortisol (nmol/l)

Hours post awakening

High green space (>43%)
Low green space (<43%)


Higher % green space > healthier cortisol pattern in men and women, but low green space > different patterns of stress

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.

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 urban areas in Central Scotland

Open Space and Social Inclusion: Local Woodland Use in Central Scotland, Edinburgh: Forestry Commission, 2004
Other possible mechanisms: green space encourages outdoor activities ➔ more Vitamin D and better circadian rhythms

Vitamin D – enhanced by outdoor activities – is essential for healthy bones, important for pregnant and breastfeeding women, babies, young children and older people.
Green space benefits for sub-populations: children and adolescents

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)
Pregnant women and perinatal outcomes

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)
Evaluating a government pilot study on children, looking at:
• obesity;
• unintentional injuries;
• asthma;
• mental health and wellbeing.

4.0 OUR VISION

A Scotland where

Homes are warm and dry with good quality space for children to play indoors and outdoors

Children play, explore and relax outdoors in streets, parks, green places, open spaces and have contact with nature in their everyday lives

The presence of children outdoors is welcomed, supported and valued by parents and the wider community

Neighbourhoods are well maintained, safe, appealing, support healthy food choices and have a strong sense of community
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Mobility, Mood and Place (MMP) explores how places can be designed collaboratively to make mobility easy, enjoyable and meaningful for older people.

Mobility Mood and Place conference 11th – 14th October 2016
http://www.mobilitymoodplace.ac.uk/

Mobility, Mood and Place is funded by Lifelong Health and Wellbeing, a cross-council initiative addressing the challenges and opportunities of an ageing population.
Real-time emotional responses to place during short urban walks: Do we find different patterns of brain activity in different environments? EEG outputs and ethnographic studies combined in mixed methods, alongside epidemiological study of lifecourse environments.
So what *types* of green space does a city need?

Nearby greenery, easily visible from most places
Important for mood, stress relief and mental restoration
A place near work to get outside in nature
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Small public / semi-private green areas at a local scale
For children’s play, schools, older people’s access, shaded outdoor living, especially in hot weather, gardening, etc.
Alexandra Road Park, London – by Janet Jack, still mostly social housing
Alexandra Road, London – Landscape Architect Janet Jack
Architect, Neave Brown,
Accordia housing, Cambridge, 2007
Landscape Architects: Grant Associates
Architects: Feilden Clegg Studios, Maccreanor Lavington and Alison Brooks.

Housing Design Award 2006, RIBA Stirling Prize 2008, Landscape Institute Award 2013
Accordia, Cambridge, 2007  Landscape Architects: Grant Associates
An inclusive local Park, Causewayhead Park, Stirling
Landscape Architect: Michael Hyatt
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Small or private/semi-private green areas at local scale
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**Green infrastructure networks**
To make active transport (walking and cycling) enjoyable, attractive (shaded in summer) to get to all parts of the city
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…

Green networks need landscape planning
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Large parks and natural areas, readily accessible for all
For sports pitches, active recreation, big family gatherings, environmental education, nature study,
How much green space does a city need? WHO Europe publication due 2016

Green space close to where you live and work is the key. Every urban resident should have access to a green space (min 0.5 ha) within 5 minutes’ walk (300 m) of home.
A city of well-connected green spaces is
A Healthy, Competitive and Resilient City

www.openspace.eca.ed.ac.uk