Linking urban green space and health: opportunities and challenges for all ages

Catharine Ward Thompson
Professor of Landscape Architecture
University of Edinburgh
Landscape perception and 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:

If, above and beyond any consideration of basic sustenance – food to eat and water to drink – the natural environment is a resource vital to human wellbeing …

what does this mean for an urbanised society?
Urban Green Space Interventions and Health

A review of impacts and effectiveness

WHO European Region report 2017

A review of local case studies and Impact Assessment experiences, their impact on environment, health, wellbeing and equity
Goal 11.7: “By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities”
There’s nothing new in this:
Martial (c. 100 CE) promoted the virtues of *rus in urbe*
Urban parks were first labelled “the lungs of the city” in London in the 18th century.

Birkenhead Park, Joseph Paxton, 1843
“A park in the East End [of London] would diminish the annual deaths by several thousand, and add several years to the lives of the entire population” 1839.

It will benefit artisans’ and labourers’ health “and that of their families, by inhaling the fresh air at least once a week, at a distance from their own confined and wretched habitations” 1847.
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 1886
Prospect Park, Long Meadow, Brooklyn, by Olmsted & Vaux, 1866
The current socio-ecological approach to wellbeing

Green/blue space is salutogenic

Urban studies from Japan, England, Lithuania, Canada, USA and Australia 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.
Green space is also equigenic

Associated with reducing the difference in health between the most economically deprived people and those better off.
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)
Potential mechanisms linking landscape and health: Psychophysiological responses

Include independent physiological responses: psychoneuroendochrine mechanisms
(Ulrich et al., Hartig et al, Ottoson & Grahn, Park et al)
The importance of biological pathways

If green space reduces or buffers the allostatic load of chronic stress, it will influence physical as well as mental health.

We found we could predict chronic stress patterns in a deprived urban population (measured via cortisol) by % green space.
GreenHealth: relationships between green space and health and wellbeing for residents of deprived urban areas

A study for the Scottish Government

Catharine Ward Thompson, Jenny Roe, Lynette Robertson, Peter Aspinall, Mark Brewer, Betty Duff, Richard Mitchell, Angela Clow, David Miller:
Green space measured using Census Wards - includes parks, woodlands, scrub and other natural environments, but not private gardens
Circadian rhythms

Th1 Melatonin

Th2 Cortisol

pg/ml

5 pm 9 pm 1 am 5 am 9 am 1 pm 5 pm

Night
Relationship of cortisol slope to % green space (n=88)

Cortisol (nmol/l) vs. Hours post awakening

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


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 show longer term exhaustion or stress disorders.

Results from a larger household questionnaire and more detailed green space measures (n=407)
Green space and social wellbeing

Higher levels of green space in the neighbourhood were linked with a sense of place belonging, and both predicted lower stress.

Ward Thompson et al., 2016, Mitigating stress and supporting health in deprived urban communities: the importance of green space and the social environment. *International Journal of Environmental Research and Public Health* 13(4): 440
Green space and gardening

Access to a garden or allotment also predicted lower stress and was linked with place belonging and social connectedness.

Ward Thompson et al., 2016, Mitigating stress and supporting health in deprived urban communities: the importance of green space and the social environment. *International Journal of Environmental Research and Public Health* 13(4): 440
What might encourage us to get out more?

In a study across Britain, older people (aged 65+) living in an environment that makes it easy and enjoyable to go outdoors were more likely to be physically active, healthier and more satisfied with life.

Sugiyama et al. 2009. Associations between neighborhood open space attributes and quality of life for older people in Britain. *Env & Behavior, 41*, 3-21

Understanding use of woods near urban areas in deprived communities:

“You can just go away by yourself. You can just disappear and nobody can see you...you can’t do that in the city, you can’t just keep walking, walking, walking”

“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
What did you do when you were small?

“Collected conkers, look for fishing in the river; there’s hardly any fish there now”
Teenager

“I was always in Greenfield when I was a wee lassie, climbing the trees”
Teenager

“We used to cook just at this little dip, and we used to play in it (Water of Leith) ...and we used to swim...it was very wild.”
Adult

Central Scotland
Experiential learning in childhood

In addition to being important for healthy physical, mental, cognitive, emotional and social development, childhood play in natural settings appears to have a long-term and positive effect on attitudes, well-being and behaviour.

“Vivendo discimus” – “by living, we learn”

Patrick Geddes, c.1904
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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How does design encourage or deter new users?

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Mobility, Mood and Place (MMP) has explored how places can be designed collaboratively to make mobility easy, enjoyable and meaningful for older people.

Mobility, Mood and Place is funded by Lifelong Health and Wellbeing, a cross-council initiative addressing the challenges and opportunities of an ageing population.
To envision places, from homes to public spaces, which are inclusive, that are truly enabling and inspirational for older people, we must include older people in the design process.
Castlefield, Manchester

Remote rural Scotland

Hackney Wick, London

Edinburgh and the Lothians
Co-design work with older participants and students: Orkney

Alice Mears

Unit 3: Mobility, Mood and Place
Iain Scott, Derek Fraser and Elinor Scarth
AD:Tectonics, ESALA, 2015-16
Qualities that really matter to our participants:
access for all
access to nature
access to others
access to light

Environment and affect: measuring mood

We’ve been working with older participants to test neural imaging and ethnographic approaches to understanding emotional response to different environments.
In our study with older participants, do we get different patterns of brain activity response in different environments?
**EEG:** poor at spatial resolution in the brain but excellent at temporal resolution: millisecond accuracy

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<thead>
<tr>
<th>Delta</th>
<th>Theta</th>
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<tbody>
<tr>
<td>0.5 – 4 Hz</td>
<td>4 – 8 Hz</td>
<td>8 – 13 Hz</td>
<td>13 – 30 Hz</td>
<td>30 + Hz</td>
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<td>Deep sleep</td>
<td>Drowsy</td>
<td>Relaxed</td>
<td>Engaged</td>
<td>Cognitive decline</td>
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<tr>
<td>High amplitude</td>
<td>Inhibition</td>
<td>Reflection</td>
<td>Spans calm &gt; stress</td>
<td>Sensory perception (cross-modal)</td>
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**Electroencephalography**
Using Emotiv software to measure ‘excitement’: transitioning from Urban Busy <> Urban Green

Excitement is higher in UB as hypothesised.

Neale et al., The ageing urban brain: Analysing outdoor physical activity using the Emotiv Affectiv suite in older people. *Journal of Urban Health* https://doi.org/10.1007/s11524-017-0191-9
“It was quite nice at that point and quite peaceful really because it’s away from the traffic and noises”
“I felt a bit more self-conscious, by this time, I think, you know, a bit more people around, and worried ... what I looked like with this headset on”
Ethnographic Results

- Colourful nature and wildlife
- Memories and familiarity
- Social contact and interaction
Environmental histories: the influence of place over a lifetime

We have mapped life-course environments for the 1936 Lothian Birth Cohort, using GIS to integrate longitudinal environmental measures with cohort data.

Mobility, Mood and Place is funded by Lifelong Health and Wellbeing, a cross-council initiative addressing the challenges and opportunities of an ageing population.
Lothian Birth Cohort 1936

13. John is younger than Jim, and Jim is younger than Bill. Which is the oldest of the three? (John, Jim, Bill)

(Do not write anything, just underline the right one in the bracket).

In a certain secret writing

lqkgcfo, frr ygg means
STARVING, NEED FOOD

In the same secret writing you find this. Write below it what it means:
yoc t kgctk rtrq.

What number is in the triangle and square but not in the circle? ...
‘Life grid’ technique – local, global and personal events are used to prompt recollection of past home addresses

<table>
<thead>
<tr>
<th>Year</th>
<th>Home address</th>
<th>Local/global/personal events</th>
<th>Work</th>
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<tbody>
<tr>
<td>1970</td>
<td>31 Highfield Road</td>
<td>Write the street name, suburb and town/city of the home when you lived at the start of each decade e.g. 1930, 1940, 1950...</td>
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<td>Write the title of your job (or your Father's job if appropriate) at the start of each decade</td>
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Mapping the public parks in Edinburgh in 1914, 1949, 1969 & 2009
Mobility, Mood and Place is funded by Lifelong Health and Wellbeing, a cross-council initiative addressing the challenges and opportunities of an ageing population.

Figure 3. Distribution of the pseudo cohort in relation to public parks in the Edinburgh region in 1949.

Pearce et al., 2016 *IJERPH* 13(3), 331
Green space & cognitive ageing

No association with change in cognitive test score 11-70

Positive association with change cognitive test score 70-76
• Childhood a particularly sensitive period: affecting cognitive function trajectory in later life
• enhanced by green space in adulthood
• Strongest amongst women, & low SES

Green space & mental health in older age

Anxiety and depression – green space influence over the lifecourse

• influence limited to most socially disadvantaged neighbourhoods
• green space during childhood makes a difference
• For anxiety, every decade of life near more green space makes a difference in older age (over 70yrs)

What about people with no good childhood experience of nature or green/blue space?
What can we learn from other kinds of longitudinal studies? Does inclusive design increase woodland use or are additional social interventions needed in deprived communities?
What is the impact of urban woodland improvements on deprived communities’ mental health?

Three woodland intervention sites and three matched ‘control’ sites

1. Physical woodland improvements (management of vegetation and litter, new paths and surfacing, benches, more attractive entrances, etc.)

2. Increased promotion in the community (led-walks, family fun days, art work)


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Ward Thompson et al. (2019, in press) Health impacts of environmental and social interventions designed to increase deprived communities’ access to urban woodlands: a mixed methods study. *NIHR Journals: Public Health Research, volume 7, no. 2.*