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## **Greenways to health: the links between access to green space and healthy communities**

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### **Introduction**

The European Landscape Convention stresses the significance of “everyday” landscapes in which people live and go about their daily activities; it identifies such landscapes as important for people’s quality of life, their wellbeing and their individual and cultural identity (Council of Europe, 2000, pp 8-11, 23). As we reach the point, globally, where more people live in towns and cities than in rural locations, new questions are being raised about how well such environments serve as human habitat. There is a new impetus to interest in links between environment, health and quality of life, and greenways and green spaces have an important role within this.

### **Background and Literature Review**

Environmental interventions to enhance public health, so central to early health improvements in urban areas from the nineteenth century onwards, became marginalized in the pharmaceutically focused and high-technology world of post-war 20<sup>th</sup> century medicine (Morris & Robertson, 2003). The renewed interest in physical environment is now focused on identifying and understanding *salutogenic environments* (Antonovsky, 1979), that is, environments that support healthy behaviours and responses, recognising that such environments may have more permanent and population-wide effects than other forms of public health interventions targeted at individuals (Owen et al., 2004).

In our urbanised, 21<sup>st</sup> century society, a combination of poor diet and lack of physical activity is reflected in increased risk of cardio-vascular disease, type II diabetes and other physical ailments. Lack of physical activity is also one of many factors associated with problems in mental health. Mental ill health is on the increase in many parts of the world. Urban working lives are increasingly associated with high levels of stress and mental illness disproportionately affects more disadvantaged groups in the community. It is estimated that mental health problems affect one in four of the EU population at some stage in their lives: that is, it affects over 80 million people (World Health Organisation Regional Office for Europe, 2010). Young people’s mental ill health is of particular concern (Collishaw et al., 2004). In a world where poverty and socio-economic deprivation are still the principal predictors of

poor health, even among the comparatively wealthy developed nations, there is therefore an interest in environments that might reduce health inequalities among populations, i.e. that are *equigenic* (Mitchell et al., 2015).

In Scotland, the ‘Good Places, Better Health’ public health initiative (Scottish Government, 2008) has involved the development of a model for environment and health (Morris et al., 2006) that attempts to identify what kinds of environmental intervention are possible and desirable, and where the most effective point of intervention might be. While changes in the design and management of work, education, leisure and home-based environments, which is where people spend most of their time, may offer opportunities to reduce sedentary behaviour, there is also considerable interest in ways that the outdoor environment, particularly the public realm, may be designed to offer opportunities for physical activity and encourage more active lifestyles.

For landscape architects, the idea of salutogenic landscapes is beginning to inform client requirements and targets as governments and public authorities face the challenge of maintaining a healthy population in an urbanised and ageing society. There are multiple ways that landscapes might support health, above and beyond the fundamental ones of being the ultimate source of all food, drink and medicine (Hartig et al., 2014). These include the capability of vegetation to remove pollutants from the atmosphere and/or the soil; the possibility that landscapes might enable or encourage physical activity; the potential of certain landscapes to offer a pleasurable experience and relief from mental stress and illness; the opportunities for social activities and connections offered by the landscape; and the opportunity to grow one’s own fruit and vegetables that access to cultivable land can offer. It is evident that one and the same local landscape might offer benefits in several or all of these dimensions but, equally, that different characteristics of the landscape may favour one at the expense of another.

The role of greenways is potentially to contribute to all of these, but particularly to promote access to green and natural environments that encourage physical activity and active travel that is carbon-neutral, and to offer restorative environments that relieve mental stress.

### **Goals and objectives**

This paper draws on research undertaken by OPENspace research centre, and by colleagues interested in salutogenic landscapes, to set out, briefly, some recent evidence on the importance of access to green space for human health and wellbeing. It recognises that most health benefits obtained from accessing green space are likely to be results of several pathways and mechanisms, many of which interact in synergy.

## Methods and Results

In a study undertaken for the Scottish Government, researchers in OPENspace explored evidence of physical as well as psychological benefits to be gained from good access to green space. In particular we wanted to study physiological measures of stress that might be associated with lack of green space around the home environment, especially for poorer urban residents, that might help to explain epidemiological associations between green space and health.

In a sample of unemployed people aged 35-55 (n=106), we used salivary cortisol measures over the course of the day to indicate stress levels, and combined this with a questionnaire to explore people's perceived stress levels and normal levels of physical activity, as well as their general health. The findings, which attracted world-wide interest, showed that higher levels of green space in the local area can predict lower levels of stress in people who are not in work and living in deprived urban contexts (Ward Thompson et al., 2012; Roe et al, 2013). Green space was measured based on areas included in the national census and involved GIS measures of parks, woodland, scrub and other natural environments but not private gardens. The findings have been important in demonstrating that natural or park environments experienced as part of people's everyday lives may be associated not just with people's perceptions of mental health or stress but also with independent biomarkers of stress. Stress in turn is a predictor not just of poor mental health but a range of physiological problems such as lowering of the immune response, chronic muscle tension, and increased blood pressure.

In an extension of this study, a wider sample of participants (n=406) from different urban locations responded to a questionnaire (Ward Thompson et al., under review). The findings were analysed by comparison with a finer-grained measure of all green space in the residential zone where people lived, including roadside vegetation, parks and private gardens. The variables of social isolation and place-belonging were strong predictors of perceived stress in three out of the four deprived communities sampled, and of poor general health in the fourth (least healthy) community. However, we found that the quantity and nature of access to green space, including access to gardens and allotments and the percentage of all types of green space in the neighbourhood, were also significant predictors of stress. There are indications that social wellbeing may partly mediate the relationship between local green space and stress levels. For most of our participant communities, as green space in the neighbourhood increased, levels of perceived stress decreased. When considering predictors of general health, although physical activity was found

to be the strongest predictor in half of our sampled communities, the frequency of visits to green space, particularly in winter months, and views of green space from the home were also significant predictors of general health.

In a separate study in different locations in Scotland, we undertook research that involved a ‘natural experiment’, undertaking a longitudinal study of an intervention to improve local woodlands near a community of high socio-economic deprivation. This was a rare example of a pre- and post-intervention study in green space, using intervention and comparison sites to investigate differences over time. The findings demonstrated how improvements to accessibility and maintenance of a local urban woodland were associated with significant differences in woodland use patterns, and possibly in outdoor activity levels too (Ward Thompson et al., 2013). Our research also showed how differences in perceptions of local woodlands may contribute to enhanced perceptions of environmental quality and quality of life in a neighbourhood. The study provided the basis for a longer and more robust study, still ongoing, of the effect of such woodland improvements on the mental wellbeing of deprived communities, and particularly on their stress levels, funded by the UK’s public health research organisation (National Institute for Health Research) (Silveirinha de Oliveira et al., 2013).

### **Discussion**

Such findings contribute to demonstrating the importance of landscapes for health and quality of life. They are part of a wider range of research on the contribution that green and natural environments can make to wellbeing from early childhood to very old age. An English survey of urban areas showed that people living in deprived inner city locations have access to five times fewer public parks and good-quality green spaces than those living in more affluent locations (CABE 2010). This is reflected in evidence that the likelihood of children visiting any green space at all has halved in a generation.

Positive childhood experience of being active in outdoor and natural environments is associated with active use of outdoor environments from then on in life. Crucially, lack of access to such places in childhood is a particularly strong predictor of failure to use them in adulthood (Ward Thompson et al, 2008). 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, wellbeing and behaviour into adolescence and adulthood (Natural England, 2010). The proximity of local parks, and the quality of pedestrian routes to them, are two vital criteria for accessibility of open space. This is important for children and their families

if encouragement to use green and natural outdoor environments for stress relief, physical activity and general wellbeing are to be effective in later life. It is also important for people in older age: in an ageing society we need to understand the qualities of the environment that support healthy lifestyles and enable people to remain active and get out and about into very old age.

The WHO's guide to 'Age-friendly Cities' (World Health Organisation, 2007) underlines the importance of a well-designed public realm as well as homes and garden spaces that are flexible and accessible. In a UK OPENSspace study of people over 65 years of age, we found that the quality of paths on the way to the neighbourhood open space was a significant predictor of walking activity; good and attractive paths to the local park were associated with almost twice the likelihood of being a high level walker (Sugiyama et al., 2009). A related study showed that removal of incivilities such as signs of vandalism and provision of facilities such as toilets, as well as attractive trees and plants, were the most important attributes for a pleasant park, and were associated with healthy lifestyles (Aspinall et al., 2010). The wider message here is that the supportiveness of the neighbourhood environment has been shown to be significantly associated with older people's overall health, above and beyond providing opportunities for being active (Sugiyama and Ward Thompson, 2007).

## **Conclusion**

Our research has contributed to a growing body of evidence to show that urban green space offers many potential public health benefits, including cost-efficient alternatives to expensive health care and pharmaceutical interventions. It is likely that there will be an increasing demand for evidence on the topic and new and exciting research is emerging all the time. For example, Kuo (2015) has suggested that enhanced immune functioning plays a central role in the different pathways between nature and health. Evidence for this lies in new understandings of the microbiome, and the importance for health of exposure diverse microorganisms in the natural environment (Rook 2013). In particular, research suggests that exposure to high levels of certain allergens and bacteria very early in life (in the first year) are beneficial, and some of these may only be readily available via green space and vegetation.

One of the future challenges for those interested in the ecosystems services that urban greenways, in particular, can offer is to demonstrate the value to human health of connectivity in green space. There are hints of that in the evidence provided to date, but little hard evidence that greenways or highly connected green space is more beneficial for physical activity or mental and

social wellbeing than discrete parks and green space. If urban green space can encourage not just recreational activity but also active commuting by walking or cycling, it can make an important contribution to reduced greenhouse gas emissions and the creation of a low-carbon economy, further enhancing human health (Scottish Government, 2016). It may be that provision of urban greenways is a necessary but not sufficient condition for behaviour change towards more active forms of travel in the wider population; more evidence is needed. Equally, if better connected green space is shown to benefit local communities more effectively and offer socio-economically deprived communities, in particular, better access to environments that support their wellbeing and help reduce stress, this would be particularly valuable to demonstrate.

There is much to suggest that access to green space is salutogenic and equigenic, if it is well designed and well managed. The profession of landscape architecture has a vital role to play in this, both in providing the evidence to inform practice and in demonstrating the effectiveness of new interventions.

## References

- Antonovsky, A. 1979. *Health, Stress and Coping*, San Francisco: Jossey-Bass Publishers.
- Aspinall, P.A, Ward Thompson, C., Alves, S., Sugiyama, T., Vickers, A. and Brice, R. 2010 Preference and relative importance for environmental attributes of neighbourhood open space in older people. *Environment and Planning B: Planning and Design* 37(6): 1022 – 1039.
- CABE (2010) Urban Green Nation: Building the evidence base. London: CABE. Commissioned research report available at URL <http://www.cabe.org.uk/publications/urban-green-nation>
- Collishaw, S., Maughan, B., Goodman, R., and Pickles, A. 2004. Time trends in adolescent mental health. *Journal of Child Psychol Psyc* 45(8):1350–1362
- Council of Europe, 2000. *European Landscape Convention, Florence, 20 October 2000*, Strasbourg: Council of Europe.
- Hartig, T., Mitchell, R., de Vries, S. & Frumkin, H. 2014. Nature and Health. *Annual Review of Public Health*, 35, 207-228.
- KUO M. 2015. How might contact with nature promote human health? Promising mechanisms and a possible central pathway. *Front Psychol*. 25:6: 1093.
- Mitchell, R. J., Richardson, E. A., Shortt, N. K. & Pearce, J. R. 2015. Neighborhood Environments and Socioeconomic Inequalities in Mental

- Well-Being. *American Journal of Preventive Medicine*, 49, 80-84.
- Morris, G., & Robertson, R. (2003). *Environmental health in Scotland and the health improvement challenge*. Royal Environmental Health Institute of Scotland, available at URL <http://www.rehis.com/document./2007/01/morris-robertson-report-november-2003>, accessed 29 Oct 2010.
- Morris, G. P., Beck, S. A., Hanlon, P., & Robertson, R. (2006). Getting strategic about the environment and health. *Public Health*, 120, 889-907.
- Natural England. 2010. Wild Adventure Space: its role in teenagers' lives. Natural England Commissioned Report NECR025.
- Owen, N., Humpel, N., Leslie, E., Bauman, A., & Sallis, J. F. (2004). Understanding environmental influences on walking: Review and research agenda. *American Journal of Preventive Medicine*, 27, 67-76.
- Roe, J.J., Ward Thompson, C., Aspinall, P.A., Brewer, M.J., Duff, E.I., Miller, D., Mitchell, R., Clow, A. Green Space and Stress: Evidence from Cortisol Measures in Deprived Urban Communities. *Int. J. Environ. Res. Public Health* 2013, 10, 4086-4103.
- Rook, G. 2013. Regulation of the immune system by biodiversity from the natural environment: An ecosystem service essential to health. *PNAS*, 110(46): 18360-18367.
- Scottish Government. (2008). *Good places, better health. A new approach to environment and health in Scotland: Implementation plan*. Edinburgh: Scottish Government.
- Scottish Government. 2016. National Walking Strategy Overview. Paths for All on behalf of the National Walking Strategy Delivery Forum, Edinburgh: Scottish Government
- Silveirinha de Oliveira, E., Aspinall, P., Briggs, A., Cummins, S., Leyland, A. H., Mitchell, R., Roe, J., Ward Thompson, C. 2013. How effective is the Forestry Commission Scotland's woodland improvement programme—'Woods In and Around Towns' (WIAT)—at improving psychological well-being in deprived urban communities? A quasi-experimental study. *BMJ Open* 2013;3:e003648-e003648.
- Sugiyama, T. & Ward Thompson, C. (2007) Older people's health, outdoor activity and supportiveness of neighbourhood environments. *Landscape and Urban Planning* 83, 168–175.
- Sugiyama, T., Ward Thompson, C. and Alves, S. (2009) Associations between neighborhood open space attributes and quality of life for older people in Britain. *Environment and Behavior*, 41(1), 3-21
- Ward Thompson, C, Aspinall, P and Montarzino, A. 2008. The Childhood Factor: Adult Visits to Green Places and the Significance of Childhood Experience. *Environment and Behavior*. 40 (1) 111-143
- Ward Thompson, C, Roe, J., Aspinall, P., Mitchell, R., Clow, A. & Miller, D.

2012. More green space is linked to less stress in deprived communities: Evidence from salivary cortisol patterns. *Landscape and Urban Planning* 105, pp. 221–229.
- Ward Thompson, C., Roe, J.J. and Aspinall, P. 2013. Woodland improvements in deprived urban communities: what impact do they have on people's activities and quality of life? *Landscape and Urban Planning*, 118, pp.79–89.
- Ward Thompson, C., Aspinall, P., Roe, J., Robertson, L. & Miller, D. (Under review). Mitigating stress levels in deprived urban communities: the importance of green space and the social environment.
- World Health Organisation Regional Office for Europe, 2010. *Mental Health*, statement available at URL <http://www.euro.who.int/en/health-topics/noncommunicable-diseases/mental-health>
- World Health Organisation, 2007. *Global Age-friendly Cities: A Guide*. Geneva: WHO Press.