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Is Landscape Life?

by Catharine Ward Thompson

Introduction

Landscape, a cultural as much as an ecological and geographical construct, is the habitat for humankind, the place where people live out their lives. The European Landscape Convention defines it as “an area, as perceived by people”, stressing 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). For many thousands of years, cities and towns have attracted people as places to live: centres of culture and transaction, sophisticated places for dwelling, working and recreation. Yet 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. We live in an era of increasing sophistication in our understanding of, and demands for, human health and wellbeing but it is also an era of rising concern over growing patterns of poor health in comparatively wealthy and developed nations. This has given new impetus to interest in links between environment, health and quality of life and this is the focus of my chapter.

The urbanizing world

To say that landscape is the habitat for humankind is stating the obvious if we consider the biological timeframe of human evolution: of course, the natural environment has shaped, and been shaped by, human beings and their ancestors for millennia. It has provided sustenance, shelter, opportunities for development and growth but it has also presented hazards, challenges and the threats of disease and death. As with other animals, much human energy from earliest times must have been spent in seeking the benign elements of the natural environment while attempting to avoid or constrain the influence of its damaging and threatening aspects. The drive to human settlements and urbanisation, although socially and culturally complex, is in part a response to the perceived need to constrain nature for human wellbeing. There are many, highly-acclaimed aspects of urban life that are prized as attributes of civilisation, and it is no wonder that, some time in the first decade of the 21st century, the proportion of people living in cities or urban environments exceeded 50%. It has been predicted that, by the year 2050, 70% of the world’s population, roughly 6.3 billion people, will be living in urban areas: almost double the urban population of 2007 and resulting in large part from growth in African and Asian countries (World Health Organisation, 2010, Alirol et al, 2011). In a market research report on the impact of urbanization on mobility and technology planning, Frost & Sullivan (2010), predicted that there will be about 30 ‘megacities’ around the

world with a total population exceeding 10 million by 2025 (as of 2010 there were 22 such megacities).

What aspects of the landscape are implicit in this move to the city? Certain natural elements in the living environment continue to be driving forces that 'push' people out of their rural dwellings into urban areas. These include landscapes vulnerable to disasters such as drought, floods and earthquakes, whose challenges may in turn be exacerbated by lack of economic opportunity and other, more extreme social phenomena such as wars and civil disruption. There are also 'pull' factors that encourage people to move into cities - the desire for better job opportunities, education and healthcare, for example, often assisted by enhanced urban infrastructure. So the move to a city or urban area may be good for people's health, and in certain contexts it is clearly associated with greater life expectancy or reduced disease. But urbanisation is increasingly likely to be viewed as having more equivocal effects, and may exacerbate rather than mitigate the effects of natural disasters, as the post-hurricane floods of 2005 in New Orleans, USA, so poignantly illustrated.

Urban landscapes of health

The potential benefits of urbanisation - ready access to healthcare, clean water, good sanitation and secure nutrition - may be overridden in terms of health outcomes by problems relating to overcrowding, industrialisation, social deprivation, crime, and stress-related illness (Godfrey & Julien, 2005). Pollution, especially where populations live in close proximity to hazardous industries and industrial waste, continues to be an urban hazard in many parts of the world. In addition, the close proximity of so many people creates prime conditions for the transmission of infectious diseases (Alriol et al, 2011). In many rapidly developing urban areas, past and present, informal settlements – shanty-towns, favelas or the like – are beyond the formal jurisdiction of urban authorities and residents of such places may suffer from poor or no service provision, in addition to overcrowding and hazardous building constructions. Uncontrolled or poorly managed urban growth can thus lead to severe inequalities in health among the urban population

As a result of the factors described above, urbanisation increasingly affects the epidemiological characteristics of infectious diseases, either promoting or hindering the spread of pathogens depending on the nature of the development and its infrastructure. Beyond this, and a cause of concern not just for developed and affluent nations but also for developing countries, urbanisation opens the door to 'western' diseases, such as hypertension, heart disease, obesity, diabetes and asthma. Chronic diseases of this sort have become more prevalent because of changes in lifestyle, with many people leading considerably more sedentary lives than previous generations. At the same time, affordable and energy-rich food is now more readily available to many urban dwellers than ever before and the growing problem of obesity is one result. 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, but 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).

People have attempted to place a cost on this. In 2009/10, the social and economic costs of poor mental health in Scotland alone were estimated at £10.7 billion (SAMH, 2011). An earlier estimate of the costs of lack of physical activity to the economy in England was £8.2 billion (Bird 2004). In the light of these figures, the UK government has started to explore health policies which target individual behaviour and lifestyle factors, in which the physical environment plays a key role. A report prepared for the Treasury and Department of Health in England suggested that the importance of people 'engaging' in their own health may have a cost implication of £30 billion by 2022/23, represented by the gap between best and worst scenarios (Wanless 2004).

Why does this matter to landscape planners and designers? If the physical environment has an influence on people's health, and if we can identify the key features of the local landscape that make a significant difference, particularly in enhancing health, then this might offer a public health benefit at considerably less cost than individually focused medical interventions. For example, if it is possible to create attractive streets, parks and other outdoor spaces that encourage physically active behaviours such as walking, such interventions have attraction as 'upstream' interventions likely to benefit health at a population level (McIntyre, 2008). After a century or so of focus on medical interventions, health professionals and policy makers are once again open to an ecological approach to public health (Morris et al., 2006). They are turning to landscape planners, designers and managers for answers to questions about how to create environments that will encourage healthy lifestyles and reduce health inequalities (Marmot, 2010). Barton and Grant's 2006 'health map for the local human habitat' (see Figure 1) shows how the natural and built environment contribute in over-arching ways to health and wellbeing and reflects an ecological approach to public health.

[Figure 1 about here: Barton and Grant's Health Map]

Salutogenic landscapes

The term 'salutogenic environment' is increasingly used by people interested in public health to describe the kinds of places that support and promote good health. Antonovsky's original (1979) conception of salutogenesis focused on the sense of coherence in people's perceptions of their lives, and how this might support healthy human functioning. More recently, the conception of the physical

environment as salutogenic, one that can play a key positive role in health, has gained considerable currency (Ward Thompson, 2011a). 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. 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.

At the same time, it is not clear which mechanisms or associations between landscape and human experience are most likely to yield significant health benefits. While the therapeutic and salutogenic effects of certain gardens and natural landscapes have been recognised from earliest times, the value of public parks was particularly highlighted in the rapidly industrialising cities and towns of the nineteenth century, when they were frequently termed 'the lungs' of the city (Ward Thompson, 2011a). The idea that development of publicly accessible green space might improve health in densely-populated, working-class urban areas, was based on a broad consensus concerning the overall health benefits of parkland environments. In 1839, a sanitary reformer said: "A park in the East End [of London] would diminish the annual deaths by several thousands, and add several years to the lives of the entire population" (Mernick and Kendall, 1996). Others supported the idea that parks offer beneficial access to clean air. "The principal good [...] which the formation of the park has effected is in the inducement it holds out to the artisan and labourer to benefit their own health and that of their families by inhaling the fresh air at least once in the week, at a distance from their own confined and wretched habitations" (Alston, 1847).

Similar support for urban parks was evident in the USA, where Frederick Law Olmsted and Calvert Vaux described their Greensward Plan for New York City's Central Park as "the antithesis of the confined spaces of the town" (Olmsted, 1858, in Schuyler, 1986, p. 93). Olmsted considered it to be generally accepted that overexposure to the artificial sights of the city would lead to "excessive nervous tension, over-anxiety, hasteful disposition, impatience and irritability" and that the antidote was pleasing rural scenery, devoid of prominent buildings, ornamental plantings or "artificially contrived" scenes (Olmsted, 1886, p. 42). Thus green space was promoted as offering both physical and mental health benefits. The enthusiasm of philanthropists and public authorities for developing parks in towns and cities across Europe and North America reflects widely-held

views on the salutogenic properties of such environments, particularly for working-class, industrial populations, but the mechanisms behind such health benefits were not always well understood, despite some very prescient statements from the Olmsted firm. So how, in the 21st century era of demands for 'evidence-based policy', might we understand links between access to green space and health? What evidence is there that 'green' or 'natural' landscapes, however anthropogenic in origin, *are* actually beneficial for health?

What can the natural landscape do for our health?

A recent theme in epidemiological evidence on disease is the positive association that has been demonstrated between health and access to natural environments, 'green space' in particular. A pioneering study of dense urban areas in Tokyo demonstrated the benefits of access to green space: the five-year survival rate of people aged over 70 was shown to increase for those with more space for taking a stroll near their residence and with nearby parks and tree-lined streets near the residence (Takano et al., 2002). A study in England of mortality rates due to cardiovascular disease among the (pre-retirement aged) population showed that these declined as the amount of green space in the local neighbourhood increased (Mitchell & Popham, 2008). The measure of green space in this study was based on a general classification of land use in England, where green space includes parks, other open spaces, and agricultural land, but excludes domestic gardens. The study reinforced earlier findings based on the 2001 census population of England, which found that a higher proportion of green space in an area was generally associated with better population health (Mitchell and Popham, 2007). However, this association varied according to the combination of income deprivation and urbanity in the area. In both studies, the positive link between green space and health was more marked in low-income, urban areas, an important finding because it suggests that environmental planning and design of green space might help to reduce health inequalities between rich and poor.

A separate study using survey data from over 10,000 people living in urban areas of England showed that both lower mental distress and higher wellbeing were associated with living in urban areas with more green space (White et al., 2013). The study used the same land use measures as Mitchell and Popham (2007) and showed that including or excluding private gardens did not change the main findings. A 5-year longitudinal study of people from the same survey who had moved home in the middle of the period under study showed that moving to greener urban areas was associated with sustained mental health improvements (Alcock et al., 2014). This reinforces findings from other parts of Europe, such as the Netherlands, where green space levels were shown to be associated with general health (Maas et al., 2006) and with lower levels of anxiety disorder and depression, especially for children and people of a lower socioeconomic status (Maas et al., 2009).

While these studies are more complex in detail than the above summary might

suggest, and raise a number of further questions about size, accessibility and quality of the 'green space' in question, they do point to a recurring theme on the value of green space for certain health benefits. There would seem to be, at least for lower income people living in some kinds of urban conditions, a beneficial effect from having more publicly accessible green space in the local neighbourhood. However, when a similar approach was used in a city-level (as opposed to neighbourhood-level) study of green space coverage across 49 of the largest US cities, greenness was not associated with mortality from heart disease or diabetes and, by contrast with the previously mentioned studies, it was weakly associated with increased all-cause mortality (Richardson et al., 2011). The authors suggest this may reflect the fact that, in the USA, greener cities are more sprawling cities than in Europe and the negative effects of sprawl may eclipse any positive effects of green space.

Such findings raise questions about what kinds of mechanisms lie behind the apparently salutogenic effect of high green space areas, where such an effect *is* found. It seems likely that a more spacious and car-dependent style of residential neighbourhood typical of North American cities is high in green space but low in 'walkability' compared with a typical European counterpart. Conversely, many European urban neighbourhoods may have very restricted green space, whether private or public, but be well provided with pavements (sidewalks) for walking and access to public transport. Walkability may be a key element in urban environments that support healthy lifestyles. It has been promoted by the New Urbanist movement as a key element of a 'liveable' and salutogenic environment (Rodriguez et al., 2006) and it is a theme I will return to later but it is valuable, first, to consider what evidence there is for the mechanisms by which green or natural environments might engender health in urban contexts.

What are the mechanisms behind links between green space and mental health?

A recent review of the evidence for links between 'nearby nature' and human health, particularly in the European context, concluded that stress reduction and support for social cohesion are more likely to explain the relationship between the availability of green space in a residential neighbourhood and its inhabitants' health than enhanced air quality or enhanced physical activity (de Vries, 2010). A study in Adelaide, Australia, supports this, showing that people's perception of neighbourhood greenness was associated with both physical and mental health but more strongly with the latter (Sugiyama et al., 2008). Some of the studies cited earlier also suggest that green space links to health may be most important for mental health (Alcock et al., 2014; Maas et al., 2009). It is therefore pertinent to ask how and why such links exist.

There are three, principal mechanisms which have been suggested for the way that green space may support mental health and relief from stress. Firstly, green spaces offer an opportunity for physical activity, from energetic field sports, informal games, running or cycling to simply walking - by far the most popular

activity in open spaces. The positive effects on mood and stress of physical activity are well established (Penedo & Dahn, 2005; Mason and Kearns, 2013), so it may be that physical activity, rather than the environment *per se*, is behind any mental health benefit. Secondly, people frequently have the opportunity for some kind of social contact, however informal or unplanned, when they experience green space: they may go to the park with someone, a parent or grandparent taking children out to play, for example, or engage with others while in a local park or open space, as when a person living alone nods or chats to neighbours while taking a daily walk. Social contact is also known to be important for health and wellbeing and to have positive effects on mood and stress level (Heinrichs et al., 2003) as well as on mortality rates, a significant finding in an ageing society where many older people live alone (Steptoe et al., 2013). Thirdly, people often seek green or natural environments as places to relax and it seems likely that such places are better for mental relaxation than many other environments (Hartig, 2007; Grahn et al, 2010).

It is this, third potential mechanism that is perhaps most intriguing. The work of some researchers such as Appleton (1975) and Bourassa (1991) was important in suggesting a biological basis for human preference for certain types of environments and Wilson's Biophilia hypothesis (Kellert and Wilson, 1993) suggested an underlying cause based on genetic fitness and competitive advantage. By contrast, Rachel and Stephen Kaplan have developed Attention Restoration Theory by focusing on the modern human condition and ways to cope with the stresses of contemporary life. They define the virtues of a "restorative environment" as follows: "The struggle to pay attention in cluttered and confusing environments (such as crowded urban ones) turns out to be central to what is experienced as mental fatigue [. . .] The natural environment seems to have some special relationship to each of the four factors [. . .] that are important to a restorative environment" (Kaplan and Kaplan, 1989, p. 182). The Kaplans discuss "directed attention fatigue" and how it can be relieved by spending time in a natural environment which offers restoration through four factors: being away, extent (of conceptual exploration), fascination, and compatibility (with the need or desire of the moment). Kaplan (1995) notes that people suffering from mental fatigue who spent time in natural environments tend to perform better on tasks afterwards, under experimental conditions. The Kaplans' description of the 'soft fascination' of natural environments: an aesthetic experience that invites attention but leaves room for reflection (Kaplan and Kaplan, 1989) resonates with more recent interest from psychology and psychotherapy in the beneficial qualities of 'mindfulness' (Kabat-Zinn, 1990) and the value of natural environments in helping achieve this (Howell et al, 2011). It is probably no coincidence that the resurgence of interest in such strategies for stress relief relate to Buddhist meditation, *inter alia*, which has such a powerful physical exposition in the Zen gardens of Kyoto, Japan.

Physiological responses to natural or green spaces

Attention restoration theory and concepts of mindfulness are helpful in explaining the way that certain landscapes may be perceived as restorative and consciously

sought out because of this experience. However, there is also evidence that we have physiological responses to different kinds of landscapes that appear to occur independently or at a sub-conscious level (Ulrich et al., 1991). This supports psycho-evolutionary theories about our response to natural environments and suggests there are physical as well as psychological benefits to be gained from simply being in certain landscapes.

Being in, or even just viewing, green space has been shown to reduce physiological measures of stress, including blood pressure (Hartig et al., 2003; Ulrich et al., 1991; Ottosson and Grahn, 2005), heart rate (Ulrich et al., 1991; Ottosson and Grahn, 2005), skin conductance and muscle tension (Ulrich et al., 1991). Intriguing evidence of psychoneuroendocrine responses to woodland environments comes from Japan, where studies exploring the effect of entering an attractive forest ('Shinrin-yoku' - taking in or 'bathing in' the forest atmosphere) has shown that such environments can promote lower concentrations of cortisol, lower pulse rate, lower blood pressure, greater parasympathetic nerve activity and lower sympathetic nerve activity when compared to city environments (Park et al., 2007; 2010). More interesting still is the notion that we might find physiological measures of stress associated with lack of green space around the home environment, especially for poorer urban residents, perhaps helping to explain the epidemiological associations between green space and health mentioned earlier in the chapter. Recent research, using salivary cortisol measures over the course of the day to indicate stress levels, has shown that higher levels of green space in the local area can predict lower levels of stress in people who are out of work and living in deprived urban contexts in Scotland (Ward Thompson et al., 2012; Roe et al, 2013). Green space here included GIS measures of parks, woodland, scrub and other natural environments but not private gardens (measured in a similar way to the epidemiological studies mentioned earlier, see Mitchell et al., 2011, for more discussion of these measures). This finding is 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.

Considering the salutogenic landscape at a more detailed level, there has been considerable work on the use of gardens as part of therapeutic environments for treatment of severe stress or 'burnout'. Here there is an assumption that the different mechanisms outlined above may work synergistically, acting both at a conscious and at a subconscious level and offering both physiological and psychological health benefits. Researchers with landscape architecture expertise have worked with a team of health therapists in the rehabilitation of women in Sweden who suffer from burnout (Grahn et al., 2010). They have been remarkably successful at getting people who may have been off work for several years because of stress back to good health and able to re-enter the workforce. The researchers suggest that nature-assisted rehabilitation from stress-related mental diseases is a matter of what the environment communicates to people's senses, emotions, and cognition. When people feel well, they can cope with and function in most kinds of environments but, when they are highly stressed, it

appears that the psychological resonance of natural environments is the only one that may be tolerated. "Here nature acts as a fundamental resource" (Grahn et al., 2010, p. 149). The therapeutic garden design and its different elements, important for different stages in the recovery process, are described in relation to eight dimensions considered relevant for a salutogenic environment: 'serene, nature, rich in species, space, prospect, refuge, social, culture' (Grahn et al., 2010, p. 127).

[Figure 2 about here: Layout of the therapeutic garden at Alnarp (note key to the text in Swedish)]

The significance of these dimensions of landscape experience for stress relief have been further explored using wider sample of people, representative of the urban population across Sweden. Asking participants to identify their preferences for certain qualities in urban green space, Grahn and Stigsdotter (2010) looked for associations between these qualities and people's stress levels. They confirmed that these eight perceived sensory dimensions are relevant to this wider population, recognising that there can be negative as well as positive aspects of the dimensions ('social', for example, may refer to busy spaces, or signs of vandalism, that stressed people particularly dislike). 'Serene' was the most preferred dimension, followed by 'space' and 'nature', with 'rich in species' and 'refuge' next preferred. The preferred dimensions of 'refuge' and 'nature' were most strongly correlated with stress, indicating a need to find the most restorative environments.

[Figures 3-7 about here]

Such findings are useful to landscape designers, helping to identify the qualities people seek from parks and green space for mental relief in the urban context. They rely on a straightforward but always valuable research approach: asking people to tell us about their perceptions, beliefs, desires and experiences. However, new technologies allow us also to explore responses to different environments in independent and increasingly sophisticated ways. They offer insights into the nature of landscape experience never before possible. One such advance is in the use of mobile electroencephalography (EEG): a method that now allows researchers to record and analyse the emotional experience of a person while they are walking within the urban environment. Researchers analysed the EEG recordings of people walking in busy, built-up streets and green parkland settings; they found evidence of lower frustration, engagement and arousal, and higher meditation when people walked into the green space and higher engagement when moving out of it into a busy street again (Aspinall et al., 2013). Such findings are no doubt just the beginning of a new era of investigations into the neurological effects of different physical environments (see <http://sites.ace.ed.ac.uk/mmp> for evidence of this in a research project on 'Mobility, Mood and Place'). In time we may be able to understand better how different combinations of landscape elements relate to fascination, or a sense of

'being away', or the different aspects of arousal, whether pleasurable excitement or anxious nervousness.

Getting outdoors and being active

Turning now to broader considerations of the landscape and how we dwell within it and use it as a habitat for life, it is worth underlining the simple benefits of getting outdoors. In northern latitudes in particular, there is a growing awareness that our sedentary, indoor life may also be depriving us of the benefits that exposure to sunlight can bring. Apart from contributing to the problems of seasonal affective disorder (SAD) that many people suffer from in winter, and increasingly so in older age, lack of access to sunlight can limit production of vitamin D, disrupt circadian rhythms and lead to insomnia (Holick, 2004, Czeisler et al., 1986). There is an alarming list of diseases contributed to by insufficient vitamin D or insufficient sunlight: bone conditions such as osteoporosis and rickets (the latter on the increase in the UK and indeed, worldwide); diabetes; multiple sclerosis; high blood pressure and probably heart disease. Furthermore, while there is a need to guard against too much sun and risks of skin cancer, it is also the case that daily or regular exposure to a certain amount of sunlight reduces the risk of many other types of cancer.

The significance of the above is that an attractive environment, an urban landscape that offers more than the purely functional, is one that encourages people to get outdoors, to enjoy their time while outside, and to remain longer in outdoor pursuits. All of this may be enhancing people's health by simply encouraging regular access to daylight and sunlight, above and beyond any benefit from physical activity or mental restoration and stress relief. If we then consider that almost everyone is more active outdoors than if they remain indoors, then there is potential for greater physical activity from an environment that makes it easy and enjoyable to get outside; in other words, a supportive environment (Sugiyama and Ward Thompson, 2007). Since it is the pedestrian environment that everyone uses once they go out beyond their home, whether or not they use motorised transport as part of their journey, this is the environment that matters most to everyone in terms of health and wellbeing. Rich and poor alike need a good pedestrian environment to enable them to get out and about.

A walkable environment that is not also pleasurable is less likely to encourage any but the most necessary of journeys. Planners and designers need to understand how best to promote design of streets, plazas and squares, as well as parks and other natural areas, so that the pedestrian environment is prioritised over that for motorised transport. Much of this knowledge is already well integrated into landscape architects' education but in order to persuade financiers and developers and those responsible for the wider public realm, including public health, there is a need for a new level of evidence (see for example the US Transportation Research Board, 2005). The work of the Robert Wood Johnson Foundation's Active Living Research Program since 2001 has had a considerable impact on our understanding of walkability and pedestrian-

friendly environments, especially in the North American context (Orleans et al., 2009). An important part of this work recognizes the difference between walking for transport (utilitarian walking) and walking for recreation, where demands from the environment may differ. An overview of a number of studies on environments that support utilitarian walking identified building density, distance to nonresidential destinations (such as local shops and services), and land use mix as consistently significant, with some, more equivocal, associations for route/network connectivity, parks and open space, and personal safety (Saelens and Handy (2008). A wider comparison of environmental attributes and physical activity in 11 different countries - Belgium, Brazil, Canada, Colombia, China (Hong Kong), Japan, Lithuania, New Zealand, Norway, Sweden, and the U.S. – found 5 perceived attributes of neighbourhood environments associated with respondents achieving recommended levels of physical activity. Those 5 attributes were: many shops nearby; a transit stop in the neighbourhood; sidewalks on most streets; bicycle facilities; and low-cost recreational facilities. The purpose of walking or other physical activity was not distinguished in this meta-analysis, but the most significant factor was having sidewalks on most streets, emphasizing the utilitarian importance of this attribute (Sallis, 2009).

Other studies have focused on links between environmental attributes and walking for recreation. The attractiveness of parks and open space has been shown to be associated with walking for recreation in several studies, including work with older people, (Bedimo-Rung et al., 2005; Rhodes et al., 2007; Sugiyama & Ward Thompson, 2008) and may indeed be the most important characteristic for some groups (Sugiyama, Francis, Middleton, Owen, & Giles-Corti, 2010). This finding contrasts with a study on older people's utilitarian walking routes, where green strips (i.e. areas of vegetation between pavements and streets) and parks (open space) were seen as inhibitors rather than supporters of walking, as were changes in level, litter on the streets and 'blind' or windowless walls facing the streets (Borst et al. (2009). This study confirmed the importance to utilitarian walking of good pavements, as well as front gardens, dwellings on the first floor, or shops along them, and low traffic volume. Such findings suggest that convenience and speed of pedestrian movement, along with feelings of safety, are what is wanted in terms of environmental support for utilitarian walking. Walking for recreation, by contrast, seems to be much more linked to the aesthetic quality of the experience, where natural environments and open space may become a significant attractor (Giles-Corti et al., 2005; Sugiyama et al., 2010).

Figure 8 around here (

Evidence of this kind underlines our different individual preferences and attitudes, and how our purpose of the moment influences the way we perceive our environment and its supportiveness. In considering environments that support physical activity, one area of research has studied whether exercise in a green environment is better for health, or offers different health benefits, compared with that in built environments. Examining links between green space and physical activity, the research accepts that exercise is good for cardio-vascular health but

looks at whether exercise in a more natural environment offers greater indirect benefits for mental health. Pretty and colleagues (2005) have shown how “green exercise” (physical activity undertaken in green settings) can positively improve mood and self-esteem. Others have shown that walking in a natural setting can induce changes in blood pressure and greater stress reduction compared with the experience of walking in urban surroundings (Hartig et al., 2003). A study based on a nation-wide health survey in Scotland showed that physical activity in natural environments, such as a park, woodland or beach, is associated with a reduction in the risk of poor mental health to a greater extent than physical activity in other environments (Mitchell, 2013). Mitchell’s research also suggests that people respond positively to different kinds of environments depending on the health benefits under consideration.

Supportive landscapes for different groups in society

One dimension of landscapes for life is the variation in experience and demands from different ethnic groups in society. Research in the UK (CABE, 2010a) revealed how much green space provision in urban areas across England differs according to people’s socio-economic and cultural background: poorer communities had poorer access to, and poorer quality of, publicly owned and managed urban green space and suffered from poorer overall health. A companion study on deprived and minority ethnic communities in major urban centres of England found significant relationships between perceptions of local green space quality and overall health, quality of life, physical activity and social wellbeing (CABE, 2010b). Ethnic groups varied in how they liked to use local parks and green space. For example, most minority ethnic groups rated social uses, such as shared outdoor meals and entertainment, higher than white British respondents, while white British and Indian ethnic groups were more likely to visit green space for relaxation and to enjoy the peace and quiet of green space than other groups. Participants were asked how they would respond if their local green space were made more pleasant, and they began to use it more. Sixty percent of participants thought it would improve their overall physical health, 48% perceived it could improve their mental health, and 46% thought it could improve their social relationships with family and friends (Ward Thompson & Aspinall, 2011). While there may be variations required in the design of local parks to serve different communities’ needs and aspirations, it is important to recognise that the quality of this vital element of urban life matters a great deal to minority groups, many of whom may be living in very deprived urban conditions.

A US study of white (non- Hispanic), African-American (black, non-Hispanic), and Hispanic communities found some comparable differences in park-based activity according to neighbourhood income and racial/ethnic composition. Park-based physical activity was lowest in low-income Hispanic neighbourhoods, and highest in high-income African-American neighbourhoods. However, there was also an association between physical activity and facilities (e.g., presence of tennis courts, basketball courts or soccer fields) which suggested that the specific physical features of the park were as important to levels of physical activity as

income or racial/ethnic group.

Different preferences for places to walk or exercise are also found between men and women. Across innumerable studies, there is evidence that women feel more vulnerable in certain outdoor places than men, and this is often regardless of the statistical likelihood of experiencing interpersonal crime. Enclosed spaces with poor sightlines, such as dense woodlands and road underpasses, are frequently cited as places where women feel unsafe. Nonetheless, the natural environment is appreciated by women just as by men and, if the qualities of the environment are not perceived as safe, women often choose different strategies from men to enable them to feel secure while enjoying it. Research on local woodland use by urban residents in the central belt of Scotland found that many women were generally positive about visiting woodlands and denied feeling vulnerable or fearful, perhaps because they reported usually visiting woodlands with a companion, or even a dog, rather than on their own (Ward Thompson et al., 2005). A study of women's experience of physical activity (often running, cycling or skating rather than walking) in Prospect Park, New York City, illustrated what constitutes a supportive environment in this context (Krenichyn 2006). Women reported that exercise was more enjoyable and meaningful in the park compared to in the street because of the beautiful scenery and the therapeutic or spiritual experience associated with the park's aesthetic qualities. Practical features, such as provision of water fountains and toilets, were also an attraction for some. Deterrents commonly experienced when participants exercised in street environments included feeling unsafe from traffic and harassment in the form of catcalls and male comments. By contrast, the park afforded a traffic-free environment where women felt freer to dress comfortably and generally less susceptible to unwelcome remarks. Qualities that contributed to feelings of fear or safety from interpersonal crime were more complex, with the enclosure experienced in heavily wooded areas a detractor for some, despite the general aesthetic attraction of the natural environment. There is no doubt that social and cultural factors as much as physical qualities of the environment play a part in women's perceptions of safety and, as indicated in earlier discussions, preference varies according to activity and life stage as well as gender.

[Figure 8 about here: The Meadows, Edinburgh, a public park with open views that attracts active and passive use from a broad spectrum of society]

A landscape for all ages and stages in life

This leads to considerations of life course and the importance of landscapes for health and quality of life from early childhood to very old age. Concern over constraints on children's freedom to play outdoors have received growing media attention in the last decade or so, with studies pointing to declining levels of physical activity and poverty of real world experience as a result (Gill, 2007; Louv, 2005). Much of this has to do with changing parental attitudes and social norms, including increasing car ownership and use, longer parental working hours, rising fear of crime, and the rapid growth of indoor, screen-based

entertainment, but access to appropriate physical environments for outdoor play can also be an issue for many urban children. 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 and yet surveys of young people confirmed that outdoor space is one of the things that they need to 'feel good and do well' (DEFRA, 2011).

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 into adolescence and adulthood (Natural England, 2010). Louv's 2005 term 'nature deficit disorder' has encapsulated a widely recognised anxiety over children's increasing disconnection from the natural environment. Planning and design of local open space that is readily accessible to every family household and which offers opportunities for flexible use and engagement with the natural environment, not just formal play equipment, is clearly part of what is needed if this trend is to be reversed. There is evidence of initiatives that are attempting to promote and assist in the delivery of this aspiration, from the US-based Natural Learning Initiative (www.naturalelearning.org) to the UK based Playlink (www.playlink.org) and work on 'Sowing the Seeds: Reconnecting London's Children with Nature' (Greater London Authority, 2011).

Studies of teenage need for outdoor activity have also underlined the importance of outdoor and natural space. Research in the UK has shown that there is a great attraction in risky and adventurous activity, especially for adolescent boys, and wild or natural environments that offer challenge within an accessible context are well suited for such purposes (Natural England, 2010). Natural environments can also offer valued places for retreat, places where young people can 'be themselves' in a society where gatherings of youth in public space is often seen as problematic *per se*. Positive childhood experience of being active in outdoor and natural environments is also important in that it appears to be 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). Thus we need to consider carefully what kinds of landscapes are available to children growing up, if encouragement to use green and natural outdoor environments for stress relief, physical activity and general wellbeing are to be effective in later life.

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 and important for people in older age as well. 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. While people remain just as

varied in their chosen activities and aspirations in old age as they do in youth, there are certain elements of streets, squares and public open space that are well-established as requirements for age-friendliness. This is partly a reiteration of the importance of a high quality pedestrian environment identified earlier as necessary for walkability. But in addition to good quality, even paved surfaces, requirements include a need for benches or places to sit on the way to destinations, and not just at the end point, attractive routes that offer visual interest (such as front yards or gardens that also offer the potential for social engagement) and accessible public toilets in many parts of the urban environment (Bevan & Croucher, 2011). A UK study of people over 65 years of age found that the quality of paths on the way to the neighbourhood open space was a significant predictor of walking activity, with good paths associated with almost twice the likelihood of being a high level walker. Distance to the open space was shown to be an important factor not only in levels of walking but also in more general wellbeing (Sugiyama et al., 2009). A related study used a conjoint analysis technique that allowed scenario modelling to test what changes to the outdoor environment would have the greatest impact on for participants and for sub-groups within the sample. It 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). As with children, it is clear that access to good quality, local, readily accessible environments, using a pedestrian system that is easy, attractive and safe, is very important for quality of life, and that access of this kind to local parks and green or natural space in particular is an important predictor of many other aspects of health and wellbeing. There is a danger, however, that an overly simplistic interpretation of this means that only certain kinds of street, park or open space are provided. When we consider green and natural spaces in particular, it is clear that what counts as 'natural' varies widely, and cultural preferences as well as individual differences and varying life stages mean we need to promote ready access to a choice of open, green and natural space. A good quality urban environment should offer ready access to some kind of nature very close by (within 300 metres if we take English Nature recommendations for accessible Natural Greenspace Standards seriously, see Harrison et al, 1995 for details). But what works for some in terms of safe, well-manicured landscape (and this is what many people want) needs to be supplemented by access to wilder and more natural places where exploratory and messy play for children, teenagers hanging out, or the chance simply to be away from urban control is also possible (Ward Thompson, 2011b).

Conclusion

The World Health Organisation (2002) has stressed that “for development to be sustainable, it must benefit the health and well-being of both present and future generations. Development policies and economic strategies must be aligned to health objectives”. In the UK, there has been a growing emphasis on the need to address health inequalities within and between communities as a core requirement for achieving sustainability (Marmot, 2010). Marmot’s study recognised that the UK, alongside many other developed countries, still suffers from huge health inequalities that are in turn the result of other forms of inequity within society. Part of this is a reflection of socio-spatial inequalities, where issues of environmental justice come to the fore (Pearce et al., 2010). If certain kinds of landscapes are supportive of health and quality of life, above and beyond removing the negative effects of pollution etc., then we need to consider how best to enable all sectors of society to access such landscapes, ones that are life-enhancing and salutogenic. Equity of access to environments that engender good health is a key element of sustainability, and understanding what kinds of landscapes these should be is both an opportunity and a challenge for landscape architects in an age that espouses evidence-based policy.

Saying that this demand is new is, of course, just a matter of degree or interpretation. From ancient Mesopotamian times onwards, landscapes of ‘paradise’ and wellbeing have universally been associated with abundance of vegetation: fruitful and well-watered landscapes. A recurring characteristic in these descriptions is the healthful nature of the garden, supporting human beings in every way, providing delight to every sense. However, they go beyond descriptions of landscapes that merely provide physical sustenance – food and water – to places important for all aspects of human wellbeing and that appear to resonate throughout history as an ideal kind of landscape for living. For lack of space, I have not mentioned landscapes of growing – the importance of understanding where all food comes from, ultimately, and the physical and psychological pleasure that seems to come to people of all ages from growing and harvesting food. This, too, is part of what make landscapes for life. I believe we need gardens of paradise, gardens of plenty but also gardens of wilderness and the chance to explore the untamed.

The evidence set out above shows that inner urban areas may be particularly constraining for outdoor activity and this range of uses, especially for poorer communities and for young children. Rural and small town communities may offer a richer range of affordances for children, as research in Finland and Belarus, for example, suggests (Kyttä, 2004). However, providing local and readily accessible open spaces with sufficient environmental quality and variety to encourage children’s play can offer a freedom of access outdoors that elicits greater activity levels in childhood. In turn, such planning and design efforts may contribute to greater likelihood of maintaining active use of the outdoors in adult life, even for those growing up in cities and inner urban areas. Indeed, the evidence on older people’s outdoor use suggests that well managed urban areas may in many cases offer better support for walking than rural or small communities.

While this chapter has pointed to an important relationship between access to green and natural open spaces, such as parks or woodlands, and physical activity, health and quality of life, the studies also make clear that the details of environment matter in different ways for different groups of people, varying according to age, ethnicity and socio-economic status. (Ward Thompson & Aspinall, 2011). The evidence also suggests there are multiple potential pathways between environmental quality and wellbeing or quality of life. So what do we want from landscape architecture? Green and natural places near where urban dwellers live: enough of it to allow everyone walking access within 5-10 minutes and a space to be in (and probably sit in) that is large enough to feel 'away' from immediate urban life. But we also want different qualities to suit our personal idiosyncracies and mood of the moment, so choice is also important.

We want wild and comparatively untended places as well as neat garden spaces, and enclosure as well as views, places to play a knock-up game of football and places to have picnics or just listen to the birds. We need a menu of options, just like we want a variety of foods to maintain good health. And, finally, we want to enjoy our time in these environments, as we all hope to live into increasing old age. So playful environments that suit every age and stage are also welcome, and I have suggested before that a sandy beach may be one example of some kind of archetypal playful space that induces us all to kick off our shoes and have fun (Ward Thompson, 2007). The discipline of landscape architecture is particularly well-placed to contribute to the planning, design and management of places that are genuinely health-enhancing. Let us learn well and contribute to the evidence as well as drawing on it to create landscapes for life, in every sense of the words.

References

- Alcock, I., White, M., Wheeler, B., Fleming, L. & Depledge, M. 2014 Longitudinal effects on mental health of moving to greener and less green urban areas. *Environmental Science and Technology*, 48: 1247–1255
- Alirol, E., Getaz, L., Stoll, B., Chappuis, F. & Loutan, L. 2011. Urbanisation and infectious diseases in a globalised world. *The Lancet Infectious Diseases*, 11: 131-141.
- Alston, G., 1847. Letter to The Times of London. September 7, 1847, Available at URL <http://www.victorianlondon.org/entertainment/victoriapark.htm>, viewed 15th Feb. 2014.
- Antonovsky, A. 1979. *Health, Stress and Coping*, San Francisco: Jossey-Bass Publishers.
- Appleton, J., 1975. *The Experience of Landscape*. Wiley, New York.
- Aspinall P., Mavros P., Coyne R. & Roe, J. 2013. The urban brain: analysing outdoor physical activity with mobile EEG. *British Journal of Sports Medicine*. Published Online First: March 6, 2013, doi:10.1136/bjsports-2012-091877

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.

Barton, H. & Grant, M. (2006). A health map for the local human habitat. *The Journal for the Royal Society for the Promotion of Health*, 126, 252-253, developed from the model by Dahlgren and Whitehead, 1991

Barton, J. & Pretty, J., 2010. What is the best dose of nature and green exercise for improving mental health? A multi-study analysis. *Environmental Science and Technology*. 44 (10), 3947–3955.

Bedimo-Rung, A. L., Mowen, A. J., & Cohen, D. A. (2005). The significance of parks to physical activity and public health: A conceptual model. *American Journal of Preventive Medicine*, 28, 159 –168.

Bird, William. 2004. Natural Fit: Can Green space and Biodiversity Increase Levels of Physical Activity? RSPB

Bourassa, S.C., 1991. *The Aesthetics of Landscape*. Belhaven Press, London and New York.

Borst, H.C., de Vries, S.I., Graham, J.M.A., van Dongen, J.E.F., Bakker, I., & Miedema, H.M.E. (2009). Influence of environmental street characteristics on walking route choice of elderly people. *Journal of Environmental Psychology*, 29, 477–484.

CABE (2010a) *Urban Green Nation: Building the evidence base*. London: CABE. Commissioned research report available at URL <http://www.cabe.org.uk/publications/urban-green-nation>

CABE (2010b). *Community green: using local spaces to tackle inequality and improve health*. London: CABE. Commissioned research report available at URL <http://www.cabe.org.uk/publications/community-green>

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.

Czeisler, C.A., Allan, J. S., Strogatz, S. H., Ronda, J. M., Sanchez, R., Rios, C. D., Freitag, W. O., Richardson, G. S. and Kronauer, R. E. 1986. Bright light resets the human circadian pacemaker independent of the timing of the sleep-wake cycle. *Science*, 233(4764): 667-671.

Dahlgren, G. and Whitehead, M. (1991). "The main determinants of health" model, version accessible in: Dahlgren G, and Whitehead M. (2007) *European strategies for tackling social inequities in health: Levelling up Part 2*. Copenhagen: WHO Regional Office for Europe.

DEFRA (2011) *The Natural Choice: Securing the value of nature*. London: The Stationary Office.

De Vries, S. (2010). Nearby nature and human health: looking at the mechanisms and their implications. In C. Ward Thompson, P. Aspinall & S. Bell (Eds.), *Innovative approaches to researching landscape and health: Open space: People space 2* (pp. 75-94). Abingdon: Routledge.

Bevan, M. & Croucher, K. 2011. *Lifetime Neighbourhoods*. London: Department for Communities and Local Government,

Frost & Sullivan, 2010. "Impact of Urbanization and Development of Megacities on Mobility and Vehicle Technology Planning", see Green Car Congress URL <http://www.greencarcongress.com/2010/12/megacities-20101215.html#more> [Last accessed 11/02/2014].

Gill, T. (2007). *No fear: Growing up in a risk averse society*. London: Calouste Gulbenkian Foundation.

Godfrey, R., and Julien, M. 2005. Urbanisation and health. *Clinical Medicine*, **5**: 137-141.

Grahn, P., Ivarsson, C.T., Stigsdotter, U.K., Bengtsson, I., 2010. Using affordances as health promoting tool in a therapeutic garden in Ward Thompson, C., Aspinall, P., Bell, S. (Eds.), *Innovative Approaches in Researching Landscape and Health, Open Space: People Space 2*, Routledge, Abingdon, UK, pp. 120-159.

Grahn, P. & Stigsdotter, U.K. 2010. The relation between perceived sensory dimensions of urban green space and stress restoration. *Landscape and Urban Planning* 94: 264-275.

Greater London Authority. 2011. *Sowing the Seeds: Reconnecting London's Children with Nature*. London: Greater London Authority.

Harrison, C., Burgess, J., Millward, A. & Dave, G. 1995. English Nature Research Report Number 153: Accessible Natural Green Space in Towns and Cities. *A Review of Appropriate Size and Distance Criteria*. Peterborough: English Nature.

Hartig, T., 2007. Three steps to understanding restorative environments as health resources, in Ward Thompson, C., Travlou, P. (Eds.), *Open Space: People Space*, Taylor and Francis, Abingdon, UK, pp.163-179

Hartig, T., Evans, G.W., Jamner, L.D., Davis, D.S. & Gärling, T. 2003. Tracking restoration in natural and urban field settings. *Journal of Environmental Psychology*, **23**: 109-123.

Heinrichs, M., Baumgartner, T., Kirschbaum, C., Ehlert, U., 2003. Social support and oxytocin interact to suppress cortisol and subjective responses to psychosocial stress. *Biological Psychiatry* 54(12): 1389-1398.

Holick, M. F. 2004. Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease, *American Journal of Clinical Nutrition*, 80(6 Suppl):1678S-88S.

- Howell, AJ, Dopko, RL, Passmore, HA, and Buro, K (2011) Nature connectedness: Associations with well-being and mindfulness. *Personality And Individual Differences* 51:166-171
- Kabat-Zinn, J. 1990. *Full catastrophe living: Using the wisdom of your mind to face stress, pain and illness*. New York: Dell.
- Kaplan, R., Kaplan, S., 1989. *The Experience of Nature: A Psychological Perspective*. Cambridge University Press, Cambridge.
- Kaplan, S., 1995. The restorative benefits of nature: toward an integrative framework. *Journal of Environmental Psychology* 15,:169–182.
- Kellert, S.R., Wilson, E.O. (Eds.), 1993. *The Biophilia Hypothesis*. Island Press, Washington DC.
- Krenichyn, K. (2006). “The only place to go and be in the city”: women talk about exercise, being outdoors and the meanings of a large urban park. *Health & Place*, 12, 631–643.
- Kyttä, M. (2004). The extent of children’s independent mobility and the number of actualized affordances as criteria for child-friendly environments. *Journal of Environmental Psychology*, 24, 179-198.
- Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. Chapel Hill, NC: Algonquin Books of Chapel Hill.
- Maas, J., Verheij, R.A., de Vries, S., Spreeuwenberg, P., Schellevis, F.G. & Groenewegen, P.P. 2009. Morbidity is related to a green living environment. *Journal of Epidemiology and Community Health* 63: 967-973.
- Maas, J., Verheij, R.A., Groenewegen, P.P., de Vries, S. & Spreeuwenberg, P. 2006. Green space, urbanity, and health: how strong is the relation? *Journal of Epidemiology and Community Health* 60: 587-592
- Macintyre, S. (2008). Briefing paper on health inequalities by Professor Sally Macintyre (Sept 2007) in *Equally well: Report of the ministerial task force on health inequalities - Volume 2*. Edinburgh: Scottish Government.
- Mason, P. & Kearns, A. 2013. Physical activity and mental wellbeing in deprived neighbourhoods. *Mental Health and Physical Activity* 6: 111-117.
- Marmot, M. (2010). *Fair Society, Healthy Lives: A Strategic Review of Health Inequalities in England Post-2010*. London: UCL, URL <http://www.ucl.ac.uk/gheg/marmotreview>
- Mernick, P., Kendall, D., 1996. A Pictorial History of Victoria Park. In: London E3. East London History Society, London
- Mitchell, R. 2013. Is physical activity in natural environments better for mental health than physical activity in other environments? *Social Science & Medicine* 91: 130-134.

Mitchell, R., Astell-Burt, T., Richardson, R., 2011. A comparison of green space indicators for epidemiological research. *Journal of Epidemiology and Community Health*. doi:10.1136/jech.2010.119172.

Mitchell R. & Popham, F. 2008. Effect of exposure to natural environment on health inequalities: an observational population study. *The Lancet*, 372(9650):1655-1660

Mitchell, R. & Popham, F. 2007. Greenspace, urbanity and health: relationships in England, *Journal of Epidemiology and Community Health* 61:681–683

Morris, G. P., Beck, S. A., Hanlon, P. and 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, First published 20 May 2010, available at URL <http://publications.naturalengland.org.uk/publication/41009>

Olmsted, Frederick Law. 1886. *Notes on the Plan of Franklin Park and Related Matters*. Boston: Printed as a supplement to the City of Boston Eleventh Annual Report of the Board of Commissioners of the Department of Parks for the Year 1885.

Pearce, J. R., Richardson, E. A., Mitchell, R. J., & Shortt, N.K. (2010). Environmental justice and health: the implications of the socio-spatial distribution of multiple environmental deprivation for health inequalities in the United Kingdom. *Transactions of the Institute of British Geographers*, 35, 522-39.

Rhodes, R. E., Courneya, K. S., Blanchard, C. M., & Plotnikoff, R. C. (2007). Prediction of leisure-time walking: an integration of social cognitive, perceived environmental, and personality factors. *International Journal of Behavioral Nutrition and Physical Activity*, 4, 51-61.

Orleans, C. T., Leviton, L. C., Thomas, K. A., Bazzarre, T. L., Bussel, J. B., Proctor, D., Torio, C. M., & Weiss, S. M. (2009). History of the Robert Wood Johnson Foundation's Active Living Research Program: origins and strategy. *American Journal of Preventive Medicine*, 36, S1–S9.

Ottosson, J. & Grahn, P., 2005. A comparison of leisure time spent in a garden with leisure time spent indoors: on measures of restoration in residents in geriatric care. *Landscape Research*. 30(1): 23-55.

Park, B.J., Tsunetsugu, Y., Kasetani, T., Hirano, H., Kagawa, T., Sato, M. & Miyazaki, Y., 2007. Physiological effects of Shinrin-yoku (taking in the atmosphere of the forest) - using salivary cortisol and cerebral activity as indicators. *Journal of Physiological Anthropology*. 26(2), 123-8.

Park, B. J., Tsunetsugu, Y., Kasetani, T., Kagawa, T. & Miyazaki, Y., 2010. The physiological effects of Shinrin-yoku (taking in the forest atmosphere or forest bathing): evidence from field experiments in 24 forests across Japan. *Environmental Health and Preventive Medicine*. 15, 18-26.

Penedo, F.J., Dahn, J.R., 2005. Exercise and well-being: a review of mental and

physical health benefits associated with physical activity. *Current Opinion in Psychiatry* 18(2): 189-193.

Pretty, J., Griffin, M., Peacock, J., Hine, R., Sellens, M. & South, N. 2005. A countryside for health and wellbeing: the physical and mental health benefits of green exercise, A report for the Countryside Recreation Network.

Richardson, E.A., Mitchell, R., Hartig, T., de Vries, S., Astell-Burt, T., & Frumkin, H. 2011. Green cities and health: a question of scale? *Journal of Epidemiology and Community Health*, 66 (2):160-165.

Rodriguez, D.A., Khattak, A.J. & Evenson, K.R. 2006. Can new urbanism encourage physical activity? Comparing a new urbanist neighborhood with conventional suburbs. *Journal of the American Planning Association*, 72(1): 43-54.

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.

Saelens, B. E., & Handy, S. L. (2008). Built environment correlates of walking: A review. *Medicine & Science in Sports & Exercise*, 40, S550–566.

Sallis, J. F. (2009). Measuring physical activity environments: A brief history. *American Journal of Preventive Medicine*, 36, S86-92.

SAMH (Scottish Association for Mental Health). 2011. What's it worth now? The social and economic costs of mental health problems in Scotland. Glasgow: SAMH.

Schuyler, D., 1986. *The New Urban Landscape: the Redefinition of City Form in Nineteenth-Century America*. John Hopkins University Press, Baltimore.

Steptoe, A., Shankar, A., Demakakos, P. & Wardle, J. 2013. Social Isolation, loneliness and all-cause mortality in older men and women. *Proceedings of the National Academy of Sciences of the USA* 110 (15): 5797-5801.

Sugiyama, T., Francis, J., Middleton, N. J., Owen, N., & Giles-Corti, B. (2010). Associations between recreational walking and attractiveness, size, and proximity of neighborhood open space. *American Journal of Public Health*, 100, 1752-1757.

Sugiyama, T., Leslie, E., Giles-Corti, B. & Owen, N. 2008. Associations of neighbourhood greenness with physical and mental health: do walking, social coherence and local social interaction explain the relationships? *Journal of Epidemiology and Community Health* 62: e9.

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. (2008). Associations between characteristics of neighbourhood open space and older people's walking. *Urban*

Forestry & Urban Greening, 7, 41-51

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

Takano, T., Nakamura, K., Watanabe, M., 2002. Urban residential environments and senior citizens' longevity in megacity areas: the importance of walkable green spaces. *Journal of Epidemiology and Community Health* 56: 913–918.

Transportation Research Board (2005). *Does the built environment influence physical activity? Examining the evidence*. TRB Special Report 282. Washington DC: Transportation Research Board.

Ulrich, R.S., Simons, R., Losito, B.D., Fiorito, E., Miles, M.A., Zelson, M., 1991. 'Stress recovery during exposure to natural and urban environments'. *Journal of Environmental Psychology* 11, 201–230.

Wanless, Derek. (2004) *Securing Good Health for the Whole Population*. Norwich: Her Majesty's Stationery Office (HMSO).

Ward Thompson, C. 2011a. Linking Landscape and Health: the Recurring Theme, *Landscape and Urban Planning*, 99(3), 187-195.

Ward Thompson, C. 2011b. Places to be Wild in Nature. In Jorgensen, A. & Keenan, R. (eds) *Urban Wildscapes* Abingdon, UK: Routledge, pp. 49-64.

Ward Thompson, C. 2007. Playful nature: what makes the difference between some people going outside and others not? In C. Ward Thompson & P. Travlou (Eds.), *Open space: People space* (pp. 23-38). Abingdon, UK: Taylor and Francis.

Ward Thompson, C. & Aspinall, P. 2011. Natural environments and their impact on activity, health and quality of life. *Applied Psychology: Health and Well-Being*, 3 (3), 230–260.

Ward Thompson, C., Aspinall, P., Bell, S. and Findlay, C. 2005. "It gets you away from everyday life": local woodlands and community use – what makes a difference? *Landscape Research* 30 (1), 109-146

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.

White, M. P.; Alcock, I.; Wheeler, B. W.; Depledge, M. H. 2013. Would you be happier living in a greener urban area? A fixed effects analysis of longitudinal panel data. *Psychological Science* 24(6): 920–928.

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, 2010. Urbanisation and Health. At URL <http://www.who.int/bulletin/volumes/88/4/10-010410/en/index.html> [Last accessed 11/02/2014].

World Health Organisation, 2007. *Global Age-friendly Cities: A Guide*. Geneva: WHO Press.

World Health Organisation, 2002. Health and Sustainable Development: Addressing the Issues and Challenges. Johannesburg, South Africa 26 August – 4 Sept 2002

List of Figures and Captions

Figure 1. The determinants of health in human habitation (Barton and Grant, 2006, after Dahlgren and Whitehead, 1991) (used under Creative Commons license)

Figure 2. Layout of the therapeutic garden at Alnarp © Frederik Tauchnitz)

Key: Välkomsträdgården = Welcome Garden
Parkering = Parking
Plommonlunden = Plum Orchard
Lommavägen = Lomma Road
Ängen = Meadow
Köksträdgården = Kitchen Garden
Skogsträdgården = Forest Garden
Den Urbana Trädgården = The Urban Garden

Figure 3. Welcoming sign at the entrance to the Alnarp therapeutic garden © Inga-Lena Bengtsson

Figure 4. View to entrance from the Welcome Garden, Alnarp therapeutic garden © Inga-Lena Bengtsson

Figure 5. View towards the Meadow, Alnarp therapeutic garden © Inga-Lena Bengtsson

Figure 6. The conservatory by the entrance area, Alnarp therapeutic garden © Inga-Lena Bengtsson

Figure 7. The entrance to the Forest Garden, the Alnarp therapeutic garden © Inga-Lena Bengtsson

Figure 8. The Meadows, Edinburgh, a public park with open views that attracts active and passive use from a broad spectrum of society.