

# Building Health

Planning and designing for health and happiness

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## Masterclass Briefing

### Evidence Review

### Spatial Determinants of Health in Urban Settings

Part 2c

# Green space

**WHO Collaborating Centre for Healthy Urban Environments**

**University of the West of England, Bristol**

Text based extracts from:

**Evidence Review on  
the Spatial Determinants of Health in Urban Settings**

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### The basis of the material

Evidence was reviewed in terms of reports from 2005 onwards. The search for evidence was based in the main on meta-studies, systematic reviews and reviews of reviews. Other evidence, either from before this date or findings from single studies, has been included where significant. The four components of the urban situation looked at are:

- Land use pattern (Part 2a)
- Transport (Part 2b)
- Green space (Part 2c)
- Urban design (Part 2d)

This section of the evidence review (Part 2) takes one urban component and reviews its significance in terms of five health factors. The health factors are:

- physical activity
- social and psychological impacts
- air quality
- noise exposure
- unintentional injury

This section should be read in conjunction with the overview paper (Part 1).

With special thanks for additional material supplied by the UWE Air Quality Management Resource Centre.

## ***The evidence***

# **Green space and its impact on the determinants of health**

### **The effect of green space on the health risks**

In the urban realm, green space includes a huge variety of land from the strategic scale of country parks and river corridors running through cities, to the local, such as residential gardens and pocket parks. It includes land in public, commercial and individual ownerships. It includes a wide range of uses including public and private gardens and squares, amenity and sports open space (often associated with mown grass), play space (often associated with shrubberies and mown grass), green corridors, river and canal corridors and greenways, natural and semi-natural habitats (including derelict and previously developed land) and other functional green space such as allotments, churchyards and cemeteries. In some settlements this broad category could also include remnant countryside now within urban boundary such as woodlands, cliff ridges and coast-lines. For this review, green space is also taken to include two important elements of urban nature not necessarily connected with a specific territory, street trees and green roofs.

A number of reviews have established that there are multiple connections between urban green space and health (Brown and Grant 2005; Bird 2004, 2007; SDC 2008) with conclusion broadly in line with Newton (2007, p4) that 'the natural environment provides synergistic physical, mental and social wellbeing benefits'. The idea that engaging with nature has beneficial impacts on wellbeing is prevalent across many cultures and societies. A range of different cultures identify sacred places, set in natural landscapes, as having a role in the spiritual wellbeing of individuals (Burns 2006; Smyth, 2005). A biophilia hypothesis (Wilson 1984) has been used to describe an innate emotional affiliation of humans to nature, that goes beyond nature's role in providing basic needs, to include what could be seen as a role in salutatory health (Bird, 2007; Brown and Grant 2007).

Many studies indicate an association between living with green space and health and well-being (Green space Scotland et al. 2008), but components such as physical health, mental health and longevity are not always disaggregated. A large-scale epidemiological study in Tokyo found that living in areas with green space had a positive influence on longevity, independent of several other socio-demographic characteristics usually associated with health status, such as income and education (Takano 2002).

### **The effect of green space on physical activity**

The natural environment plays a large part in facilitating physical activity. 'Evidence consistently shows that accessible and safe urban green spaces have a positive influence on levels of physical activity' (Croucher et al. 2007). Accessible nature, including trees, wooded areas and green open spaces can both encourage and facilitate communities to become more active. A number of studies have found that these effects are only valid where the green space is well-maintained and safe to use (Green space Scotland et al. 2008).

The link between green space and activity can be separated into two domains. The first is the effect of background and everyday nature such as street trees, green verges, pocket and local parks, and front gardens and their associated flora and fauna. The second is green space used for active and passive recreation, local and regional parks and greenways. These two domains merge since the recreational green space will provide background nature within its immediate environs and visually at a distance in the urban fabric, and equally background green space can provide the setting for some recreational activities such as jogging or dog walking.

A number of reviews have attempted to explore whether green space in the environment actually encourages people to exercise more, these are reported on below. A review undertaken for the Institute of Public Health in Ireland concluded that provision of attractive parks and open spaces can facilitate people taking the opportunity for exercise (Lavin et al. 2006). Evaluations of programmes for encouraging exercise indicate that an attractive, green environment close to home and work provides the best opportunities to encourage daily exercise in the form of walking and cycling (HCN 2004, Bird 2004). In these studies it has also emerged that people keep exercising for longer in natural surroundings.

Evidence shows that children who have better access to safe green spaces, such as parks and playgrounds, are more likely to be physically active compared to those living in neighbourhoods with reduced access to such facilities (Croucher, et al. 2007). In the secondary analysis of an European cross sectional survey it was found that the likelihood of being physically active may be up to three times higher in residential environments that contain high levels of green space, compared with areas with low levels of green space; the likelihood of being overweight or obese may be up to 40% less (Ellaway et al., 2005). Access to green space also has a positive effect on physical health, particularly on those from low income groups (Mitchell et al, 2008).

A recent study conducted in Sweden found that access to such recreational green space areas was associated with a positive assessment of neighbourhood satisfaction and time spent on physical activity, which they predicted could be expected to reduce obesity (Björk et al. 2008). A comprehensive literature review selecting 87 primary studies from 550 identified was undertaken by Greenspace Scotland (Croucher et al. 2008). Approximately one third of the studies were from the USA, a further third in the UK, and the remaining studies in Australia, Canada, the Netherlands, Japan, Sweden and Denmark. Physical activity was found to be influenced the following attributes of green space:

- distance of residence from a green space
- ease of access in terms of routes and entry points
- size of the green space in terms of levels of population use
- connectivity to residential and commercial areas
- attractiveness, including biodiverse habitats and absence of graffiti and litter
- range of amenity, the wider the range of informal and formal facilities the more likely the space is to be used by different kinds of people.

The study concluded that exercise was not, however, the primary motivation for the majority of park users. Moreover, many green space activities are sedentary or involve gentle exercise. Evidence from a number of reported studies in Croucher et al. (2008 p4) indicates that green space is most valued as an escape from the stress, dirt, and noise of urban environments' (Croucher et al. 2008, p4).

## **The social impacts of green space**

According to several reviews, access to green spaces and nature has been shown to positively affect mental health, possibly through reducing stress and through providing a distraction, and through distancing ourselves from everyday activities (HCN, 2004; Pretty et al., 2005; Lavin et al, 2006). Additionally, green spaces have a positive effect on promoting social interaction and cohesion (Greenspace Scotland, 2008).

Conversely restricted access to green spaces has been associated with poorer mental health (Guite et al, 2006; Kuo 2001). Residents in urban social housing who had views of trees and open spaces demonstrated a greater capacity to cope with stress compared to those who did not have such access (Kuo, 2001). Older people in particular benefit from such access (Orsega-Smith et al, 2004).

However, in the UK, those who live in disadvantaged areas are less likely to benefit from green spaces and parks (Lavin et al, 2006). According to a UK report on urban green spaces (DLTR, 2002), in the 100 most deprived authorities, 40% of parks were in decline and 88% of parks that were already assessed as being in poor condition were in further decline.

A negative impact on health regarding the social impact of green space is a community's perceived risk of crime, in particular fear from assault or violence (Croucher et al, 2007). This fear manifests itself in a reduced ability to accrue the positive benefits to mental health from accessing green spaces (Croucher et al, 2007). Closed or over landscaped designs that restrict the view of the immediate environment can reduce feelings of perceived safety. Also there is a potential for crime and anti-social behaviour in green space where areas are relatively isolated, lack people and lack supervision (Greenspace Scotland, 2008).

However, in spite of this, an England based survey found that 57% of respondents felt that safety in parks was good (Sport England, 2003). However, it also noted that people rarely visit parks alone, unless walking a dog and that woman in particular are unlikely to visit green spaces, unless accompanied by others

## **The effect of green space on air quality**

Green space has a positive impact on health by improving air quality and removing pollutants. Both gases and particulate matter can be filtered by vegetation (Lavin et al 2006). Canopies of trees act as a physical filter for pollution by trapping particles on the leaf surfaces, as well as absorbing harmful gases (LUC 2004). Green space also helps to cool urban areas and moderate the heat island effect which also helps to address air pollution by reducing the formation of photochemical ozone (RCEP 2007). Woodland areas especially are cooler, although this varies with season and species. Research cited in Lavin et al. (2006) and LUC (2004) suggest that, for example, broad leaved woodland can reduce ambient air pollution by 17%, and that streets with trees have around a quarter of the particles of those without. A possible adverse effect of dense planting may be that in some situations, the effects of pollution may be amplified by creating an enclosed space (Greenspace Scotland et al. 2008). Some species, such as pine, larch, and silver birch, have a more positive effect on air quality than others like oak, willow and poplar, since the latter emit higher levels of volatile organic compounds that contribute to the formation of other pollutants, such as ozone and particulates (RCEP 2007 p70).

## **The effect of green space on noise exposure**

Green space, particularly trees and large shrubs, can have a positive impact in reducing environmental noise by providing a barrier to screen out noise (Greenspace Scotland et al. 2008; RCEP, 2007). The ability of vegetation to attenuate noise is related to the size and density of planting (Greenspace Scotland et al. 2008; LUC 2004). Research suggests that dense planting reaching to the ground and with no gaps may achieve noise reductions of up to 15db. It is also suggested that sharp tones especially may be softened (LUC 2004). Street trees are the most commonly found trees in urban areas, there are statements that these may absorb some limited traffic noise (Mayor of London 2007), but no empirical evidence was found for this.

People may also value green space for its restorative capacity in allowing an escape from the noise of the wider built environment (Greenspace Scotland et al. 2008). The perceived intrusion of noise from traffic can be reduced by vegetation obscuring the noise source and associated traffic movement, although there is little research to establish the actual benefits of urban green space as a distance barrier or oasis (LUC 2004).

## **The effect of green space on the risk of unintentional injuries**

This can include unintentional injuries from both water and land based open spaces. In 2005, there were 6,156 deaths from accidental drowning recorded from 26 European countries. This represents 3.4% of all deaths due to external causes. Many of these deaths occurred in naturally occurring water situated within green space. Other risks from open water include the possibility of contracting infections from protozoa, viruses, or bacteria, many of which are intestinal parasites. These are most likely to cause gastrointestinal disturbances.

Additionally, unsafe play areas in green space account for a large proportion of injuries to children and young people. Poor equipment design, poor design and layout of play areas, unsuitable equipment, incorrect installation, lack of regular inspection and inadequate maintenance all contribute towards injuries. However, not all injuries are equipment related. An estimated 424,000 injuries occur as a result of falling where 66% of these involve falling from a height. Unsafe ground surfacing in children's play areas is a major source of injury from falls in children.

Other risks from green space areas include contracting blood-borne disease through contamination from discarded syringes (Croucher et al. 2008). Additionally, there is a small potential for catching diseases from resident wildlife. However, further research is needed to properly explore these risks and associated risk-reduction strategies (Croucher et al. 2008)

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