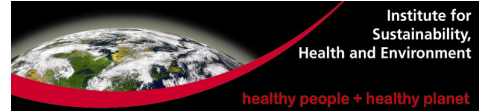


Building Health

Planning and designing for health and happiness

One-day conference, 22 January 2010

Frenchay Campus, University of the West of England, Bristol



Masterclass Briefing

Evidence Review

Spatial Determinants of Health in Urban Settings

Part 2d

Urban design

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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For WHO European Centre for Environment and Health, Bonn
October 2009

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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

Urban design and its impact on the determinants of health

The effect of local urban design on physical activity

There have been several recent major reviews of evidence of the effect of urban design on physical activity (Jones et al., 2007; Bauman and Bull, 2007; Croucher et al., 2007). However, much of the original data is based on studies in the United States of America or Australia. The dominance of lower density development means that the findings may not necessarily be comparable with those from European cities. These reviews also attempt to synthesise evidence from a disparate range of study methodologies with little consistency in the way potential variables in the urban environment are identified. Nevertheless, some broad conclusions can be drawn which may be generally applicable in Europe.

Street Networks: Evidence surrounding this element has been covered in earlier sections on land use patterns and transport. An example of the effect of street network form on physical activity is reported in Lavin et al. (2006, p17) in a study of Los Angeles residents where it was found that 'those living in areas laid out in a 'traditional grid system' were up to 25% more likely to regularly walk to work compared with residents in socio-economically similar areas that were laid out specifically for cars'.

Convivial spaces: Urban environments that lack public gathering places can encourage sedentary living habits (Lavin et al., 2006). In the same review the attribute of 'enjoyable scenery' also positively impacts on physical activity levels within a community. Urban environments that are aesthetically pleasing and landscaped have been shown to encourage people to explore and access their local community by foot or bicycle when compared to the same urban space prior to renovations (Cavill, 2007, Duncan and Marshall, 2005). There is also some evidence that observing people being active is positively associated with activity (Duncan and Marshall, 2005) though further research is needed to examine this effect in a variety of situations with differing levels of background activity.

Many studies have attempted to find correlations between people's perceptions of the local environment such as convenience, safety, satisfaction and perceived distance with physical activity levels. Few consistent significant associations have been found. However, two categories of environmental perceptions have been found to have fairly consistent positive patterns of association with physical activity. The first is an association between levels of physical activity (not including general walking) and perceived local safety and perceived leisure time. The second is an association between general walking and perceived convenience (Jones et al., 2007). Parent's perceptions of neighbourhood safety were found to impact on the levels of physical activity in children (Croucher et al. 2007).

A meta analysis by Duncan et al. (2005) found that the perceived presence of pavements, shops and services and perception of 'traffic as not being a problem' were each separately positively associated with physical activity after being adjusted for age, income and education. A Danish study found that both perceived and actual safety, with regard to risk from motorised traffic, were important factors in the take-up of cycling in areas where new cycling infrastructure is being developed (Jensen et al., 2007).

Lavin et al. (2006) found that deteriorating physical features of urban environments such as dilapidated environments, vandalism, graffiti and litter can impact on physical health through reduction in physical activity. The findings from this study indicated that people are more likely to exercise if pavements are appropriately maintained. This points to a situation where health inequalities are exacerbated since graffiti and vandalism were also disproportionately found in disadvantaged areas. The impacts are confirmed by Ellaway et al. (2005) in the secondary analysis of a European cross sectional survey of 12 cities. They found that, compared to respondents from areas with low levels of litter and graffiti, those from areas with higher levels were 50% less likely to be physically active and 50% more likely to be overweight.

In a systematic review, Jones (2007) notes that several studies have failed to find relationships between specific measurable attributes of the local environmental characteristics that might impact on physical activity. Attributes such as the presence of benches, trees, cleanliness, street width, traffic volumes have been investigated. However, Jones notes that some studies, both Australian, have demonstrated associations between combined composite variables.

Examples of composite variables

Pikora et al. (2006) uses a 'walkability score' based on the presence of features in the local neighbourhood, including safety, aesthetics (cleanliness, green space etc.), function (pavement quality, street width, traffic volume etc.) and density of destinations such as local amenities and parks.

Giles-Corti et al. (2003) uses a 'physical environmental determinate score' which includes living on a street that is aesthetically pleasing, with minor traffic, trees, pavements and a local shop.

Jones et al., (2007) note that "... using a combined variable might reflect the synergistic combination of a supportive environment, as hypothesised by theoretical ecological models of the environmental determinants of physical activity" (p26). The importance of treating the urban environment as a system, especially in rising to challenges of supporting public health is covered in more detail in the conclusions.

The social and psychological impacts of local urban design

At the larger scales of neighbourhood and estate layout, the local urban environment, as controlled through urban design also concerns itself with the placing of housing for different social groups. This is influenced though the nature of tenure, size and form of the residential units. Consequently the location and dispersal patterns of residence from different social classes and sub-cultures are strongly influenced by urban design, both during new build and regeneration programmes. The nature of dispersal, especially the size of similar residential units, is critical. People feel more secure in areas where there are others from a similar social culture. It has been shown that the level of social inclusion in a society is just as important for health as income (Marmot, 2004). Yet without a degree of mixing ghettos are created.

Urban design that facilitates neighbourhood bonds and encourages supportive social networks has been shown to be effective in reducing fear of crime (Lavin et al, 2006). Examples are urban designs that are mixed-use (including work and shops in predominantly residential areas) and those which include pedestrian and cycling

oriented facilities. Such designs enable residents who do not own car to perform activities of daily living.

Lack of availability and accessibility of municipal services such as libraries, health facilities, doctors surgeries, schools and social support can have a negative social impact on communities and affect both physical and mental health (Horowitz et al, 2005; Lavin et al, 2006). Places which lack facilities often become ghettoised, fostering a risk of further criminal activities

Lack of facilities such as public toilets (Greed, 2006), impacts on vulnerable groups, for example young children, older people and those with illnesses or chronic diseases. Lack of suitable areas for resting, for example benches and seating may also limit the ability for certain groups to explore or walk longer distances. With respect to the elderly this impacts negatively on social isolation.

The design of an urban environment can affect a community's perception of safety (Wilcox et al, 2003). There is an inverse relationship between the fear of crime and lack of safety and subjective measures of good mental, physical and social health. Although many neighbourhood characteristics may not directly affect physical health, the perceived fear of crime can act as barrier to participating in social and health-promoting activities, leading to feelings of social isolation. This can impact directly on mental, physical and social health (Foster et al, 2008, Stafford et al, 2007). Women and older people are more concerned about safety in their neighbourhoods compared to men and younger women.

One of the main social impacts related to urban form, is residents perceived fear of violence or crime (Horowitz et al, 2005; Whitley et al, 2005). These aspects have been shown to negatively affect mental health. Groups who feel most vulnerable include women in particular mothers on a low-income and those with mental illness (Horowitz et al, 2005; Whitley et al, 2005). Perceptions of safety are influenced by fear of street crime but also injury from traffic (Croucher et al. 2007) and a reaction to the aesthetic impression, which includes the presence of graffiti, litter and state of disrepair of the surrounding community (Lavin et al., 2006). The latter is disproportionately high in low-income and disadvantaged areas (Lavin et al., 2006).

Poor building design, for example those with small niches and blind spots, inadequate lighting and overgrown landscaping, increase perceived feelings of fear from crime. Such areas provide opportunities for refuge of prospective criminals, in addition to restricting the opportunity of escape for potential victims (Wilcox et al, 2003). However, according to Whitley, these fears are diminished if vulnerable areas are monitored by CCTV (Whitley et al, 2005).

Children who live in neighbourhoods that they perceived as unsafe are at greater risk of developing behavioural problems such as hyperactivity, aggression and becoming withdrawn (Lavin et al., 2006). According to recent research, up to 71% of children in a large metropolitan city in the west of the United States suffered from post traumatic stress disorder or partial post traumatic stress disorder (Horowitz et al, 2005).

The effect of local urban design on air quality

Air pollution in the outdoor environment has been dealt with extensively in preceding sections in terms of land use pattern, transport (giving rise to the bulk of urban emissions) and green space. But far from all aspects having already been dealt with, street design has a major impact on air pollution at the local level.

The Local Air Quality Management process in the UK has seen every Local Authority in the country undertake a rigorous assessment of air quality. Whilst it was initially thought that the worst air pollution problems would occur close to motorways and other very heavily trafficked roads (flows > 20,000 vehicle movements a day), a combination of open terrain leading to good dispersion of pollutants, and a lack of public exposure in close proximity to these roads mean that they are rarely a significant problem (Longhurst et al, 2006). Further work has identified that high levels of air pollution tend to be more dependent on the street geography and characteristics of the flow. The latest UK guidance for the Local Air Quality Management process now instructs local authorities to assess air quality on congested roads with flows as low as 5,000 vehicle movements a day where there are buildings on both sides of the road, and buildings on one side are within 2m of the kerbside (Defra, 2009a), as it is these narrow and congested streets which are causing most of the air quality problems in the UK.

It should also be noted that indoor air pollution originates from both outdoor and indoor pollutants. As outdoor pollution also enters buildings, indoor pollution problems are worse in urban areas where the general air quality is low. Indoor sources of air pollution include household chemicals and airborne biological agents such as bacteria, fungi, allergens from dust mites and animals and viruses. Of course these too can all contribute towards respiratory diseases, including childhood asthma.

The effect of local urban design on noise exposure

Noise exposure has been dealt with extensively in parts covering land use pattern, transport (giving rise to the bulk of noise emission) and green space. In terms of urban design and the local environment, the role of point sources related to urban planning comes to the fore.

Traditional concerns are 'noisy neighbour' impacts, whereby many planning systems attempt to limit incompatible users, e.g. nightclubs and pubs, through a mixture of zoning and licensing. New issues are coming to the fore, namely increased noise exposure from neighbours in higher densities, in mixed-use areas and in the central areas now being promoted in many cities for 24 hour living. These have not yet been the subject of study for long enough to provide the material for a systematic review of health risk.

The urban building form of perimeter block development can lead to tranquil inner courtyard areas but no reviews of empirical work were found for this study.

The effect of local urban design on the risk of injuries

Road traffic collisions, which are the main cause of injury in the urban environment, have been discussed in an earlier section and are partially contributed to by poor urban design in the local environment. Falls are the next main cause of unintentional injuries related to the local environment. Causes of falls are mainly extrinsic factors i.e. individual not medical conditions. Up to 20% of falls in all ages and 30-50% of falls among older people living in the community may be due to such factors (WHO, 2004b).

Unintentional injuries associated with urban design occur from several other sources. These can include poor street lighting (Beyer and Ker, 2009), choice of materials for footpaths and walkways or injury resulting from poor maintenance of the built environment, poorly designed urban environments and poor maintenance of public open spaces, play areas, paths, rights of way, and canal towpaths (NICE, 2008).

Another cause of injury from the local urban environment includes adverse reactions caused by exposure to heat. Determinants of this heat island effect are found at the strategic scale with regards to land use pattern, and strategic green space and these have been outlined previously. Contribution to heat islands is also found at a local level, with local contributors being the hot 'exhaust' from summer air conditioning plant, lack of greenery (which provides cooling both through shade and evapo-transpiration) and the use of materials in paving, walls and roofs, which captures a wide spectrum of the sun's energy and then re-emits it in the heat spectrum (Gartland, 2007). Sparse vegetation and having no open space in the neighbourhood were significantly correlated with higher temperatures (Harlan 2006). Local urban design detailing can lead to localised ambient air temperature differences with poorly designed areas being considerably warmer compared with other similar areas (Gartland, 2007).

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