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Wellbeing and the Environment

An Overview

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The environment is everything that isn't me.

Albert Einstein

The first step toward success is taken when you refuse to be a captive of the environment in which you first find yourself.

Mark Caine

The two central dimensions of wellbeing and the environment are people and places. To understand this relationship, it is important to understand (a) how humans engage sensorially with their environment, (b) the type and quality of environment, and (c) its impact on people throughout their life course.

Quite simply, people are affected by their environment through their senses. This results in both psychological and physical effects, whereas people are also the agents that create, modify, and maintain much of the material world in which we live and work; a simple description of a very complex system of cause and effect. The more we know about this process and the intervening variables the more we may be able to design better places, moderate effects, and influence behavior.

The main factors in the environment that contribute to wellbeing relate to our sensory stimulation; that is, what we see, smell, touch, taste, and feel. Both the physical and the ambient environment have an effect on our senses.

Noise is cited by many scholars as a negative ambient property in physical environments. For example, noise from apartment neighbors is seen as a major cause of annoyance and reduction in individuals' quality of life (Evans & Cohen, 1987; Goldstein, 1990). Although there are positive aspects of noise in the physical environment, often the sound of birds, running water, and certain types of music are used as soothing effects and for the reduction of stress (Ulrich, 2000), and of course music is used as a buffer to general noise (Winter, Paskin, & Baker, 1994).

In contrast, what we see and the notions of aesthetics and beauty have been identified as contributing most often to restorative benefits and a higher sense of wellbeing. So, for instance, exposure and access to views of nature from a variety of physical environments can improve individuals' health and wellbeing by providing restoration from stress and mental fatigue (Kaplan, 2001; Van den Berg, Koole, & Van Der Wulp, 2003). Conversely, an inability to spend time in natural areas may be associated with poor psychological wellbeing (Wells & Evans, 2003). Art as a feature of the physical environment has been identified as a positive contributory factor to wellbeing according to Philipp (2002). The arts can help mitigate mental health conditions such as depression, anxiety, and low self-esteem, as well as improve social integration and isolation.

Other visual aspects of the physical environment have been investigated. Namazi (1993) and Zeisel et al. (2003) examined several environmental design features simultaneously (e.g., lighting, acoustics, color) and found positive and negative impacts on aggression, agitation, social withdrawal, depression, psychotic problems, incontinence, distractibility, self-sufficiency, and continuity.

Like noise, other ambient properties of physical environments exert a negative impact on wellbeing through our tactile, olfactory, and taste senses. For example, those living in damp dwellings experienced more emotional distress (Martin, Platt, & Hunt, 1987) and poorer mental health in general (Hopton & Hunt, 1996, as cited in Krieger and Higgins, 2002) than those not living in damp conditions. Excessive indoor temperatures have been linked with irritability and social intolerance (Collins, 1993, as cited by Krieger and Higgins, 2002). Also, high levels of air pollution predict levels of psychological distress, particularly among people experiencing a recent adverse life event (Evans, Jacobs, Dooley, & Catalano, 1987).

Two additional ambient properties that appear mostly to have an impact (often negative) on our wellbeing are crowding and density. Crowding is believed to have substantial negative effects on social relations (Baum and Paulus, 1987) and psychological health (Edwards, Fuller, Sermsri, & Vorakitphokatorn, 1990; Evans, Palsane, Lepore, & Martin, 1989; Gove and Hughes, 1983; Lepore, Evans, & Palsane, 1991).

However it is clearly not that easy to unpack each influence on individual senses. The way in which we perceive the environment, and its impact upon our senses and psyche is multifactorial, and in many ways it is important to consider the effects through the lens of our life course (Table 1.1.). Environmental stimulants combine to have multisensory effects, both positive and negative, on us across our life course. By looking at it from this perspective we see the nuanced effect of the way in which we design, develop, and engage with the physical environment has on our wellbeing.

Birth and Childhood

As Gilbert and Galea illustrate in Chapter 2 of this volume the environment has a negative effect on unborn children; for example, the increased risk of infection with a greater population density in the mother can have an effect on fetal brain development. In addition, exposure of pollutants such as lead to pregnant women can affect the child's cognition throughout life. Maternal stress too has been seen to affect the offspring and neighborhood factors contribute to stress in everyone.

Noise has been seen to have negative effects on children. Evans, Hygge, and Bullinger (1995) found that a general pattern of adverse psychological stress reactions occurs among young children exposed to chronic noise in their neighborhoods. Childhood noise has also been identified as having a negative effect on children's reading skills (Cohen, Glass, & Singer, 1973).

Dampness, mould, and cold indoor conditions are significantly associated with anxiety and depression (Hyndman, 1990). For children, high-density living will be more tolerated if: they live in smaller, detached dwellings; they have designated play space or a room of their own (Wachs and Gruen, 1982); the dwelling is designed to minimize controllable social interactions (Baum and Valins, 1977, 1979); and floor-plan layouts provide good room separation (Evans, Lepore, & Schroeder, 1996).

Table 1.1. An Illustration of some of the Relationships between the Environment and Wellbeing over the Life Course.

	Childhood	Adulthood	Older age
Senses			
High noise levels	Psychological stress, poor reading skills, general learning	Impact on mental performance, anxiety and stress, learning and blood-pressure, long-term memory, social conflicts work; stress anxiety, exhaustion, violence, job strain	Abnormal sleeping patterns, agitation
Light: too low/high	Impact on learning and cognitive performance	Impact on levels of satisfaction and wellbeing	Impact on sleeping patterns
No views: especially nature		Job dissatisfaction, job stress feelings of isolation, depression, claustrophobia tension	Impact on agitation
Unsafe: infrastructure Poor air quality	Accidents	Headaches, tiredness, itchy skin, muscle pain, psychological stress	Impact on accessibility/accidents
Damp/hot/cold	Anxiety and depression		

Dense/overcrowded/lack of privacy	Poor social interaction, strained relationship with parents	Psychological distress, increase in tension	Impact on social connectedness
No green space/leisure and play areas	Poor socioemotional development, poor learning and social environments	Impact on social connectedness	
Unsafe: crime	Impact on social interaction	Impact on social interaction psychological distress	Impact on social interaction isolation
No public space	Impact on social interaction	Impact on social interaction, isolation/mental wellbeing	Impact on social interaction, isolation/mental wellbeing
Poor maintenance	Antisocial behavior	Stress	Stress
Mobility: poor transport			Isolation
Mobility: not walkable	Obesity	Isolation: obesity, cardiovascular disease, diabetes	Isolation: obesity, cardiovascular disease, diabetes

Children are also at risk with regard to safety and fear of crime. Hutten-moser (1995) suggested that 4-year-olds who could not play independently outdoors, primarily because of traffic-related safety, had more strained relations with their parents, fewer playmates, and poorer socioemotional development than children who could play outdoors. However, the presence of nearby nature or restorative characteristics in the home protect children from the impacts of life stress, especially those most at risk from high levels of stress (Wells & Evans, 2003). As Martin and Wood (Chapter 7) and Maxwell and Evans (Chapter 11) illustrate there is a great deal to consider when designing neighborhoods for children and adolescents to ensure access to nature, and to better learning and social environments.

In a child's life *schools* (Jones and Harrison, Chapter 12) are obviously the physical environment in which they spend a significant amount of time, and as such they too have been studied in relation to wellbeing. Duker and Rasing (1989) discovered that classroom redesign had a positive impact on decreasing self-stimulation and inactivity and increased on-task behavior (although, they noted that no changes were observed on inappropriate behavior). Marx, Fuhrer, and Hartig (2000) found that children in a semicircle layout in their school classroom asked more questions than in the traditional row-and-column arrangement. Of course, comfort is important and Knight and Noyes (1999) observed improved on-task behavior with the use of new chair design.

Classrooms are usually decorated with pictures, images, and other displays of student work; teachers have always known this to be a valuable activity. Jago and Tanner (1999) indeed found that the visual environment affects an individual's ability to perceive visual stimuli, therefore affecting mental attitude, performance, and learning. The use of color and light is important here; the impact of light and lighting on learning varies according to the color and quality of light, from natural to artificial and from warm to cool. For instance, Knez (2001) found that individuals had better cognitive task performance in warm lighting, rather than in cool and artificial-daylight white lighting.

Noise impacts highly on learning. Addison, Dancer, Montague, and Davis (1999) explained how ambient noise levels in a classroom can interfere with teaching and learning. For example, noise that was higher than the recommended levels in primary schools in London had a negative impact on students' abilities to learn in the classroom (Shield & Dockrell, 2003, 2004).

Adulthood

As adults the pattern of influence and effect is repeated. Noise has again been studied a great deal: Belojevic, Jakovljevic, and Slepcevic (2003) found that noise has a negative impact on mental performance, anxiety, and stress. Similarly, Stansfeld and Matheson (2003) observed that noise impacts negatively on learning and blood pressure. Chronic exposure to noise can lead to long-term negative impacts, such as long-term memory (Knez and Hygge, 2002). Additionally, Lercher, Evans, and Meis (2003) found that noise impacted on intentional and incidental memory as well as recognition memory.

Our *homes* and our *workplaces* have a significant effect on our wellbeing. For instance, dwellings in direct contact with natural elements as well as views of nature have an enhanced restorative effect on individuals (Evans & McCoy, 1998; Hartig & Evans, 1993; Kaplan & Kaplan, 1989). A perceived lack of privacy in the home due to crowding is also significantly associated with psychological distress (Fuller, Edwards, Sernsri & Vorakitphokatorn, 1993). Not surprisingly perhaps, women aged 25–45 in London were found to suffer more psychological distress in crowded dwellings than any other demographic group (Gabe & Williams, 1987). And Evans, Lepore, Shejwal, and Palsane (1998) found that tension increases between adults and children with residential crowding, which can lead to a greater sense of helplessness among children (Evans et al., 1998). The design of dwellings comes into play here; Evans et al. (1996) found those in more crowded homes suffer less psychological distress when the dwelling unit has more "depth" (i.e., there are more interconnected spaces).

The *workplace* has been the site of considerable research in terms of its impact on our wellbeing, often in terms of the social, behavioral, and managerial activities, but so too has the physical environment. Noise in the workplace that can have a significant negative impact on wellbeing: In general, a noisy work environment is associated with stress, anxiety (Ahasan, Mohiuddin, Vayrynen, Ironkannas, & Quddus, 1999; Akerstert and Landstrom, 1998; Cohen, 1969; Kahn, 1981; Kryter, 1972; Menaghan and Merves, 1984; Norbeck, 1985), emotional exhaustion or burnout (Topf and Dillon, 1988), unhappiness (Loscocco and Spitze, 1990) and, in some cases, workplace violence (Verdugo and Vere, 2003). Higher noise levels in the workplace also can lead to nervousness, distress, and social conflicts at home and at work (Cohen, 1969; Granati et al., 1959, as cited in Halpern, 1995; Miller, 1974). One source of noise can come from people talking at work.

Overhearing conversations in the workplace is perceived to be a major dis-turbance in getting one's work done and may lead to irritation (Sundstrom, Town, Rice, Osborn, & Brill, 1994). However, our tolerance to noise can be moderated by our other variables such as our job tasks or job strain. Leather, Beale, and Sullivan (2003) found that the higher the strain under which workers find themselves and the louder the noise in their workplace, the more their coping resources will be taxed and the more stressed they will become.

Air quality is another property of the workplace that can impact on our wellbeing. Poor air quality can result in "sick building syndrome," as individuals continually breathe recycled air or do not get sufficient fresh air. This can lead to physical symptoms such as headaches, tiredness, itchy skin, and muscle pains, but symptoms also can include increased psychological stress (Jukes, 2000, as cited in McCoy, 2002).

The design of a building, its internal décor and external views and landscape are significant factors in our wellbeing. Unlike noise and air quality, which are generally perceived to have negative impacts on wellbeing, views from workplace windows and the presence of windows and plants can have a positive impact. For instance, when there is no access to windows in the work environment individuals have reported dissatisfaction with their jobs, feelings of isolation, depression, restriction, claustrophobia, and tension (Finnegan and Solomon, 1981; Ruys, 1970; Sundstrom, 1986). Yet it matters what view is seen from windows; if the individual sees only the built environment this does not have the psychological benefits desired. It has been found that individuals who view only the built environment from their windows experience higher levels of job stress and lower levels of job satisfaction than those who view natural elements or who have no view from a window at all (Kaplan, Talbot, & Kaplan, 1988). Therefore seeing natural elements from windows is important (Moore, 1981; Ulrich, 1984; West, 1986). Also, the presence of indoor plants has been identified as increasing the perceived comfort and attractiveness of a workplace, as well as feelings of wellbeing, although worker productivity may not improve (Kaplan, 1993; Larsen, Adams, Deal, Kweon, & Tyler, 1998; Shoemaker, Randall, Relf, & Geller, 1992).

The natural and the artificial are also relevant in terms of light in a workplace and again related to the design and windows. For instance, it has been maintained that the size of sunlit areas in windows (Boubekri et al. 1991, as cited in Leather, Pyrgas, Beale, & Lawrence, 1998) is important when thinking about windows in the workplace. This study revealed that

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the area of sunlight penetration in windows is directly and positively related to job satisfaction and general wellbeing. In terms of artificial lighting, Knez and Enmarker (1998) found that artificial light in the workplace can alter mood. It affects males and females differently; males prefer lighting that is more blue in color whereas females prefer more reddish lighting. Interestingly, though, both genders believed their lighting choices were the most warm and the least cool in terms of color temperature.

Older Age

Obviously in older age we are subject to the same dimensions and resulting effects on our wellbeing from the physical environment as we are in adulthood. However, our physical and mental condition with increased age and possible frailty can leave us more vulnerable to the impact of these factors. Therefore, careful consideration needs to be given to the design and maintenance of the environments we inhabit in old age. For instance, in Chapter 13 Dutton addresses the design of housing for older people. There has been controversy over the relationship between the exposure to noise, light, and sleeping patterns for patients and residents in *nursing homes.* Research conducted by Alessi, Martin, Webber, and Kim (2005) in nursing homes to improve abnormal sleep/wake patterns of residents showed that intervention efforts to decrease nighttime noise and light and increase daily sunlight exposure for some residents only had a modest decrease on nighttime awakenings (10.6 min at baseline versus 9.8 min at follow-up; for those residents who did not receive the intervention, there was an increase in nighttime awakenings: 9.8 min at baseline versus 13.8 min at follow-up). In contrast Van Someren, Kessler, Mirmiran, and Swaab (1997) found that, during periods of increased illumination, the stability of the rest-activity rhythm increased. Moreover, others have found bright light improves patients' sleep/wake cycles (Kim, Song, & Yoo, 2003; LaGarce, 2002).

Across the Life Course

Hospitals are environments we are likely to spend time in at any point in our lives, although often more frequently and for longer periods in older age. As such, they are a site of study from many perspectives; architects

and designers look at them from the points of view of the patient and the workforce, and many studies have focused on the patient's ability to recover or the impact on overall psychological health, for instance in relation to access to nature and views of nature (Ulrich, 2000).

Hospitals are of particular importance as the population ages. Dementia and mental illness is a specific area of interest. Frequently, research on mentally ill patients examines sleep/wake behaviors and agitation levels. For instance, Burgio, Scilley, Hardin, Hsu, and Yancey (1996) found that the use of white noise had a positive impact (23%) on the reduction of verbal agitation. Namazi and Johnson (1992) found that specially designed environments satisfying safety and health concerns enabled residents to have free access to the outdoors during daylight hours. The number of agitated behaviors in five categories of patients decreased under the unlocked-door condition. Wards, toilets, corridors, and elevators are considered the areas where patients have higher levels of agitated behavior (Cohen-Mansfield, Werner, & Marx, 1990; Passini, Pigot, Rainville, & Tetreault, 2000). Namazi and Johnson (1992) also found that the level of agitation and consequent utilization of the toilet can be increased when toilets are visually accessible. Mayer and Darby (1991) found that the use of a mirror on the ward front door reduced the number of individuals exiting.

These findings in terms of light, noise, location of toilets, and use of mirrors illustrate, as do all the studies mentioned here and in this volume, the macro and micro aspects of the buildings we design and use during our life course. There are of course many other overarching life-course buildings such as shops and leisure facilities that have an influence on our wellbeing. However, more generally with the growth of *the city* (more people now live in urban regions that rural ones) we must consider the impact of the urban environment on our wellbeing. This is especially so with the neighborhood: our locale has an impact on the lives we lead, the relationships we build, and our general sense of health and wellbeing across the totality of our life course.

At the *neighborhood* level, for instance, safety is associated with positive mental health (Ziersch, Baum, MacDougall, & Putland, 2005). That is, feeling safe while in the home and when walking around the neighborhood and feeling socially connected with the community may have an individual protective effect (Cho, Park, & Echavarria-Cruz, 2005; Rose, 2000; Ross and Jang, 2000; Sampson, Raudenbush, & Earls, 1997). Conversely, when individuals, particularly women and the elderly, perceive their community to be unsafe they are most likely to have high levels of psychological distress

(Phongsavan, Chey, Bauman, Brooks, & Silove, 2006; Ziersch et al., 2005). Furthermore, residents living in urban public housing with nearby vegetation (e.g., trees) were found to be significantly more effective in managing their major life issues (Kuo, 2001), felt a greater sense of connectedness to the community, and experienced fewer incidents of violence than residents living in more barren environments (Sullivan & Kuo, 1996, as cited in Wells, 2000). Health Canada (1997, as cited in Butterworth, 2000) maintains that socioeconomic factors as well as the physical environment (e.g., unused and empty spaces, poorly lit areas, those obscured with trees and shrubs) contribute to stress from the fear of crime. Thus, efforts at regeneration urban neighborhoods that center on safety may help families in their coping and everyday functioning (Whitley & Prince, 2006).

At the same time urban and neighborhood planning and regulation, in terms of the location of shops, leisure facilities, residential areas, green spaces, and street connectedness (i.e., the design of the physical environment), have been found to influence our physical behavior such as walking (Shores & West, 2008) and our general health (Mitchell & Popham, 2007). This in terms acts on our social relationships, our sense of isolation or otherwise, our levels of obesity, and thus our general health and wellbeing. For instance, lack of physical activity such as walking and being sedentary may lead to cardiovascular disease and diabetes (U.S. Department of Health and Human Services, 2000). Also it has been found that areas of lower socioeconomic status tend to have a higher density of fast-food outlets and a lower availability of healthy foods for people with diabetes (Horowitz, Colson, Hebert, & Lancaster, 2004), as compared with neighborhoods of high socioeconomic status that often have a higher density of supermarkets and food stores (Cummins, McKay, & MacIntyre, 2005; Morland, Wing, Diez Roux, & Poole, 2002). All of this influences diet, health, and wellbeing.

Nature and *green space* have, in particular, been highlighted as a necessary resource for everyone during their life course. Much work has focused on the presence of parks, gardens, and allotments in neighborhoods and cities as places of leisure, play, and recuperation, focusing on the restorative and stress-reducing aspects of nature (Bird, 2007). Palka (1999) describes therapeutic landscapes as places that "promote wellness by facilitating relaxation and restoration and enhancing some combination of physical, mental and spiritual healing." Kaplan and Kaplan (1989) discuss attention restoration theory whereby nature provides recovery from attention fatigues, where individuals can distance themselves from routine activities and thoughts. Indeed, contact with nature was found to significantly reduce the psychological

problems caused by stress in children (even) in rural environments (Wells & Evans, 2003). Other work has found that patients with views of nature from their hospital beds recover more rapidly than those who do not (Ulrich, 1984) and dementia patients find gardens soothing as long as there is a level of familiarity.

 Transport and *mobility* are major issues throughout the life course. Most individuals see the ability to move from one place to another, one city to another, and one country to another as essential. Most adults believe it is important to own and drive a car; it provides a level of independence and satisfies the desire to have control over where and when to move. Importantly, mobility enables individuals to socialize. For instance, use of buses by young adults in London (where there is free travel) was found to be a physically and socially active experience (Jones, Steinbach, Roberts, Goodman, & Green, 2012) even though we would encourage walking and cycling to enhance physical wellbeing. This aspect of mobility is also increasingly important as we age. Kendig and Stacey (1997), in their study of over-65-year-olds in Australia, found that independence, private car driving, and mobility were very important for older people living in the community, yet there were safety issues with dementia for those who drove and for those who had ceased driving but walked. Davey (2007) found the lack of a private car by older people in Canada to have a negative impact on quality of life, especially the ability to undertake discretionary trips. Whereas walking and cycling are of course recommended for physical wellbeing to ward off obesity and related diseases such as heart disease, it is clear that mobility enables us to socialize and therefore contributes to our mental wellbeing. Clearly, transport planners and urban designers must take notice of the transport as a determinant of wellbeing.

Future Planning for Sustainable and Low-Carbon Living

Globally we have the challenge of climate change and the need to move to more sustainable development and a way of living with less carbon consumption. However, without social acceptability any solution to deliver a lifestyle with reduced demands and impacts on the environment, however essential to society's long-term viability, is likely to be fatally compromised. Therefore, if we do not design environments that take into account the impact of the environment on our health and wellbeing we will not deliver the desired outcome for the planet or it inhabitants.

It must also be remembered that in terms of the environment and its impact on wellbeing this volume has been written mainly from the perspective of the developed world. We must also recognize that there are inequalities globally with regard to access to good-quality urban environments let alone access to the basic services of energy, water, infrastructure, food, and basic necessities. It is hoped that what we learn from the mistakes of the past and the relationship between humans and their environment can be taken into consideration as we plan the next generation of cities in both the developed and developing economies.

This volume attempts to draw together research related to many of the aspects of the environment that contribute to our health and wellbeing. It provides an overview of the environment and its relationship to wellbeing at neighborhood (Part 1) and building (Part 2) scales, while illustrating such intervening variables as green space (Part 3), and transport, crime, and the introduction of sustainable approaches to the climate-change challenge (Part 4). Many of the core concepts discussed above are developed and enhanced in this volume and this can be used as a basis for redesigning, developing, and enhancing our environment. However, it is clear there is a lot more to be done to understand the complex interaction between humans and their environment and to provide the evidence on which sound policy and design decision making can be based.

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