

URBAN GREEN SPACES: PROMOTING HEALTH THROUGH CITY PLANNING

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Abstract

The Swedish government considers good public health to be the most important resource for future sustainable development. Research results referenced in Sweden's new public health bill show that high quality verdant environments may help promote health in urban populations. Over the course of just one generation, the city has become the everyday living environment of most Swedes; it is in cities we live, work, go to school and spend much of our leisure time, and finding locations for green areas in cities is today not uncomplicated.

This article aims to describe, develop and reflect on the research results that researcher at the Swedish University of Agricultural Sciences have obtained concerning the relationship between people's experienced health and access to open green spaces in cities. As used here, the expression urban green spaces is a comprehensive term for all green areas in the city: parks, nature areas near population centers, green open spaces, gardens, apartment courtyards, school gardens, workplace gardens, etc. On the basis of the research results, urban green spaces, are viewed as a health-promoting element of city planning. The purpose of health-promoting environments is to offer visitors rest or activities that help to promote their health over time. In view of the current public health bill, the Swedish Government's official communication about a strategy for sustainable development and the environmental quality objectives, it is imperative to try to apply the research results in the context of city planning.

This article presents design theories based on the research results. These theories address how urban green spaces can be designed and planned as city planning elements of importance to public health. In this way, they may be used by practitioners as tools to promote health through design and urban planning, i.e. evidence-based design and planning.

Keywords: Health, urban green spaces, stress and evidence-based design and planning

Background

Social changes and city planning during the past 200 years have entailed both positive and negative effects on human health. Thanks to vaccination as well as improved living standards and living environments – with better hygiene, housing and access to recreational areas – several communicable diseases have nearly disappeared. Despite this, there are still threats to public health in Sweden. Swede's life spans are increasing, but fewer and fewer years are spent in a state of good health (The Ministry of Health and Social Affairs, 2002). Last year, this increasing rate of ill health cost the Swedish government 28.2 billion euros (Lundgren, 2004). Recalculated, this equals 76.5 million euros every day, a cost that in the long run poses a threat to public welfare in Sweden. Besides the economic gains of improved public health, Western urban planning and construction includes the notion of social responsibility for the health of the citizenry.

Today, the overall goal of public health efforts in Sweden is to create the societal conditions for good health on equal terms for the entire population. In December 2002, the government submitted to the Parliament a public health bill entitled *Public Health Objectives* (Govt. Bill 2002/03:35). In April 2003, the Parliament decided to adopt the bill. Essential efforts of the bill are aimed at finding societal factors that can promote good health. One of these factors concerns urban green spaces in the cities. Under the heading Objective Area 5, Safe and Sound Environments and Products, the need for urban green spaces and their connection to human health are articulated: "There is a clear relationship between people's use of urban green spaces for general recreation and their access to such spaces in their own neighborhoods. Studies show that people's everyday environments are of great importance to their stress levels and health." (Govt. Bill 2002/03:35, p. 61, translation by K. Williams).

At the same time as urban green areas are in demand, the number of people moving into Sweden's big cities, i.e., cities with more than 100,000 inhabitants, is increasing (Statistics Sweden, 2002). The solution to this influx is often to densify existing urban environments and build on the city's parks and other green spaces (ibid.). During the past 30 years, there has been an increasing tendency to view urban parks and green spaces as land reserves (Swedish Government Official Reports, 2000:52). Hence, more and more parklands and green spaces, particularly those near the city center, are being used for building and traffic installations (ibid.).

The Swedish Government describes good health among the population as the most important resource for future sustainable development (Skr., 2003/04:129). The concept "sustainable development" appears often in contemporary discussions of the future of cities. The point of departure for the goal of sustainable development lies in an ethical discussion on current generations' responsibility for coming generations and the possible subsistence and welfare of contemporary humankind (The Royal Swedish Academy of Agriculture and Forestry, KSLA, 2003). International agreements and processes in Rio, Helsinki, Kyoto and Johannesburg have defined frameworks and action plans for sustainable development (ibid.). One result of these efforts is the fifteen national environmental quality objectives for

Sweden that the Parliament adopted in the spring of 1999 (Govt. Bill 1997/98:145). These environmental quality objectives, which form part of the foundation of the public health bill *Public Health Objectives*, indicate the state of the Swedish environment that is necessary for sustainable development. The overall objective is that we shall leave to the next generation a society in which the greatest environmental problems have been solved. This next-generation objective implies that all important measures in Sweden shall have been made by 2020 (ibid.). The environmental quality objectives aim at achieving five basic values: promoting human health, safeguarding biological diversity and natural environments, preserving cultural milieus and culture-historical values, maintaining the long-term productive capacity of the ecosystem as well as ensuring good management of natural resources. Working toward these environmental quality objectives is synonymous with working toward the creation of health-promoting living environments in the cities. There may seem to be no hurry: 2020 feels remote. Verdant environments, however, are made of living plant material, which we cannot hurry by force of will, but which take time to become established and develop. If such verdant and health-promoting environments are to be used by the next generation, the work must be started now.

Aims and objectives

This article aims to describe, develop and reflect on the research results that I and Associate Professor Patrik Grahn have obtained concerning the relationship between people's experienced health and access to green spaces in cities (Stigsdotter & Grahn 2004a; 2004b; 2003; Grahn & Stigsdotter, 2003). In view of the current public health bill, the Swedish Government's official communication about a strategy for sustainable development and the environmental quality objectives, we feel it is imperative to try to apply our results in the context of city planning. To achieve this objective, the scientific essay is used as a method.

On the basis of research results, we view urban green spaces as a health-promoting element of city planning. Over the course of just one generation, the city has become the everyday living environment of most Swedes; it is in cities we live, work, go to school and spend much of our leisure time. As used here, the expression urban green spaces is a comprehensive term for all green areas in the city: parks, nature areas near population centers, green open spaces, gardens, apartment courtyards, school gardens, workplace gardens, etc. (Grahn & Stigsdotter, 2003; Kaplan & Kaplan, 1989). The purpose of health-promoting environments is to offer visitors rest or activities that help to promote their health over time.

Rediscovery

It should be mentioned by way of introduction that the research results discussed here need not be viewed as new discoveries. Instead, they are better understood as rediscoveries or confirmation of a notion that has been considered quite self-evident for thousands of years. Ever since our early history, parks and gardens have been elements of city planning, i.e., they have constituted some of the

elements that together form the whole of the city room (Lövrje, 2003; Friberg, 1983). Written records of city plans with vast parks have been traced back to 1500 BC (van Zuylen, 1999). From antiquity we even find descriptions of city plans that explicitly mention health. In his great work on architecture *De Architectura libri decem* (Ten books on architecture), Vitruvius (1999) mentioned that with regard to fortified cities the choice of a healthful site for the city is the primary and most important requirement. The work also contains a polygonal city plan in which Vitruvius, in his concern for the health of city dwellers, described how the streets should be directed so that winds potentially dangerous to health could not ravage the city (ibid.). Ancient Rome was also the first rapidly growing big city in history – a place where land was exploited and densified to such an extent that people from all social strata complained about the noise, dirt, and lack of greenery, beauty and relaxation. Their vehement demands forced the Roman Empire to lay out several public parks (Mumford, 1966).

Health and city planning

During industrialization, the problems of increasing urbanization, poor living environments and of worsening public health appeared in Europe and in Sweden. These new demands and needs forced the cities to change. At the beginning of the 19th century, members of the British Parliament demanded that this densification must be checked, and instead they stressed the importance of nature in preventing ill health: "...to consider the best means of securing open spaces in the immediate vicinity of populous towns, as public walks calculated to promote the health and comfort of the inhabitants." (Richard Slaney, in the House of Commons Parliamentary Debates, 1833, 21 February, col. 1056, in *Urban parks and Open Spaces*, 1983). Attempts were made to create new planning instruments based on analytical foundations. "Surgical" interventions became normative throughout Europe, such as in Vienna and Paris, where cramped old neighborhoods were demolished to make room for grids of verdant boulevards lined with monumental buildings. The origins of this outlook on city development can be traced back to Vitruvius, who considered that the city should contain majestically designed places able to express the greatness and power of the empire builders (Vitruvius, 1999). Underlying these great transformations of cities, however, was also an explicit health perspective (Svedberg, 1988a). Laying out new verdant parks, tree-lined avenues, boulevards and promenades would create healthier cities, owing to increased sunlight, fresher air and more greenery (ibid.). Similar transformations took place in several major Swedish cities as well, e.g., through Albert Lindhagen's city plans of Stockholm (Selling, 1970).

Despite efforts by society, misery was still great and health poor in big Swedish cities during the first half of the 20th century. At the turn of the century (19th to 20th), Stockholm was considered to have the lowest housing standards of all the capitals of Europe (Svedberg, 1989; 1988b). During WWI, investigatory work was undertaken in Sweden that in 1920 resulted in a report entitled *Practical and Hygienic Dwellings* (Svedberg, 1989, 'Praktiska och hygieniska bostäder'). Hygiene, fresh air and the importance of being in green environments were again stressed, but now the importance of everyone, regardless of age, having access to

such environments was stressed. The report states: "The air outdoors is cleaner, the street noise less bothersome, walking consequently easier and more effective. And most importantly: people of all ages, children and adults alike, can more easily get the fresh air, exercise and recreation they need." (Svedberg, 1989, p. 43, translation K. Willams). In order to safeguard, among other things, city dwellers' health, different functions in the city were separated through zoning. Homes were separated from workplaces, dense city quarters were replaced by individual buildings placed in green environments surrounding the city. Even more subtle was le Corbusier's (1976) utopian project guided by the principle of "houses in parks." This meant that cramped old city districts would be torn down and replaced by high-rises, making room for extensive verdant areas between buildings. Swedish housing areas built between 1965 and 1975, when one million dwellings were to be built, have the unmistakable features of le Corbusier's ideas of "houses in parks" (Lundgren Alm, 1996).

It is worth mentioning that these efforts – carried out during the 19th and perhaps primarily 20th century and intended to improve public health by offering hygienic, verdant and salutary living environments with housing located in green areas, far from unhealthy workplaces and close to parks and recreations areas – are now viewed as a strong contributing cause of urban sprawl (Hardy, 2004; Nyström, 2001).

Two perspectives

In the current debate concerning how the city should be transformed to ensure sustainable development, we see a clear tendency toward polarization between two perspectives (Falkheden & Malbert, 2000; Oldenburg, 1999; Günther, 1993). The first advocates a dense and compact city, while the other considers that gradual sprawl or ruralization is necessary. There are many thoughts on this and much has been written. Simplifying and generalizing to the extreme, we could say that advocates of a dense city see a positive association between high housing density and low energy use per capita (Hardy, 2004; Falkheden & Malbert, 2000). Simplifying to the same degree, we could say that advocates of urban sprawl are fighting for more scattered building structures and smaller population centers in order to maintain and develop open green spaces, resulting in lower energy use per capita (Rådberg et al. 2003; Falkheden & Malbert, 2000; Günther, 1993). In the debate around compact and spread out cities, there are often ambiguities as to what densification and sprawl actually mean and on what basis they are calculated (Falkheden & Malbert, 2000). Unequivocal data showing which of the two approaches gives higher or lower energy use do not seem to exist. Moreover, the debate does not take into consideration the complex requirements entailed in sustainable urban development (Breheny, 1997). In this debate, many seem to overlook, for example, people's approval, desires and preferences (ibid.). Only recently has the debate become sufficiently nuanced to include the health of urban populations as an important resource in efforts toward sustainable urban development (McCann & Ewing, 2003). Here, however, the focus is primarily on health problems associated with car driving and exhaust emissions.

Research based on people

Having the ability to influence people's living environments entails great responsibility. Who is to say that we – landscape architects, architects, planners and decision-makers – know best? In my role as landscape architect, it is natural for me to talk and pose questions to the people involved before I start changing their living environments (Stigsdotter & Grahn, 2003; 2002; Stigsdotter, 2000). When I assume the role of researcher, it is equally natural for me to do likewise. The research project underlying this article is based on an extensive postal survey answered by almost 1000 individuals living in Swedish cities (Grahn & Stigsdotter, 2003).

The survey questions concerned the everyday living environments of urban populations. Respondents answered different questions regarding the home environment, e.g., whether they live in a detached house or apartment block, whether they have access to a garden, courtyard, summer house, allotment garden, etc. They were even asked about their workplaces. These questions concerned, among other things, whether they have access to a garden at work, whether it is possible for them to visit a garden during the working day as well as what kind of view they have from their workplace. They were also asked how often and for how long they visit urban green spaces and wooded areas near the population center during the working week and on weekends, as well as what types of natural environments they prefer to visit and most appreciate. Most importantly, they were also asked to estimate their own health. It is this aspect that distinguishes our study from most other studies of people's use of urban green spaces (ibid)

Urban green spaces are democratic

Why should society invest in urban green spaces with a view to promoting human health? Today we have solid research results showing a positive association between visits to urban green spaces and health. These results show statistically significant relationships between use of urban green spaces and individuals' self-estimated health (ibid). The more often and longer a person visits urban green spaces, the less likely that person is to suffer from stress (ibid.). Importantly, this relationship holds regardless of the individual's age, sex or socioeconomic status (ibid.). I will venture to say that, in this regard, urban green spaces are democratic. What has long been general knowledge is now partly explained using statistical relationships and figures.

What is health?

One expression of this general knowledge is found in the answer to a question posed in the survey: "If a friend felt stressed and anxious, what would you recommend he/she do?" (ibid). The respondents showed great consensus in recommending that their friend in the first place "take a walk in the woods" (ibid.). In the second place they recommended that their friend "listen to relaxing music," followed by "rest in a quiet and calm park" (ibid.). The respondents were also in agreement in placing "take a tranquillizer" last on the 10-grade list of recommendations (ibid.). This consensus in responses may indicate that they have

similar inherent feelings as to what they consider good for a person who is stressed and anxious. The three foremost recommendations all contain references to the senses. The importance of sound is expressed in the first instance, but in the woods and park all the senses are constantly being stimulated. The recommendations to "take a walk in the woods" and "rest in a quiet and calm park" both concern finding natural environments that can have health-promoting effects on a stressed and anxious person.

In order to work toward a sustainable and thereby health-promoting urban environment, however, the concept of health must be described. In recent decades, increasing numbers of scientific disciplines, including those in the humanities and social sciences, have begun to investigate human health. When humanistic definitions of health are mixed with those of Western medicine, some misunderstandings can arise, and this is in fact a problem today (Hansson, 2004; Qvarsell & Torell, 2001). Such difficulties in theoretically delimiting the concept of health can be traced far back in time. To understand the meaning of health, more and more researchers are lifting their perspective from the level of details to that of the whole. The most well-know attempt to define health, and the one to which most disciplines now adhere, was formulated in 1948 by the World Health Organization, WHO: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1948). When first introduced, the definition aroused debated and criticism. Some felt it meant that all people are ill, because so few consider that they live in a state of complete well-being (Hansson, 2004; Qvarsell & Torell, 2001). This comment was based on the notion that "Health" and "Ailing" are contradictory concepts. Yet the WHO's definition tells us just the reverse, that health is not the opposite of illness, but instead that health is viewed as a holistic and positive state that encompasses the entire individual in relation to his/her life situation. Thus, we should rather view "Health and Ill-health" and "Well and Ailing" as pairs of opposites (see Figure 1).

Health	Ill-health
A positive state encompassing the individual's entire life situation: biological, environmental, social and cultural aspects.	A negative state encompassing the individual's entire life situation: biological, environmental, social and cultural aspects.
Well	Ailing
A state in which the individual is not affected by a pathological phenomenon that gives rise to diagnosis of a defined illness.	A state in which the individual is affected by a pathological phenomenon that gives rise to diagnosis of a defined illness.

Figure 1. Matrix of pairs of opposites. An attempt at interpreting and representing the relation between the concepts Health vs. Ill-health and Well vs. Ailing.

To understand this, consider that two people suffering from the same illness may experience, manage and live with the illness in two completely different ways (ibid). This is because though the illness is a pathological state, it is positioned in a complex interplay between biological (physical and mental), environmental, social

and cultural circumstances. Despite the illness, an individual with a diagnosis may still be in good health if he/she is mentally well and has a full social life. If we look at the etymology of the Swedish word for health (*hälsa*), we see it comes from the Old Swedish *hælsa*, which is based on *hel* (whole) or *hæl*, which means *lycka* (happiness) (Hellqvist, 1999). Thus, the Swedish word *hälsa* (health) is directly related to *hel* (whole). Moreover, if we look at how the word *hälsa* (health) is used, we find additional support: It is used to describe in a sublime manner our dream of a good life – a happy and whole life lived in security, harmony and fitness (ibid). Perhaps it is a person's health we gain insight into when we pose the everyday question: "How are you?"

Why do research on stress?

If a researcher is interested in studying people's health, stress has proved to be a good measure of lack of health, that is of ill-health. Stress is not an illness per se, rather stress reactions are natural and necessary. They are fundamentally the same reactions that helped our early ancestors survive. In the event of a perceived threat, stress reactions trigger the fight-or-flight reflexes that serve to sharpen our senses. This is expressed physically through, among other things, increased muscle tension, increased blood pressure, reduced digestive system activity, increased sweat gland production, increased pulse and increased production of adrenaline as well as hydrocortisone (Atkinson et al., 1996). For early humankind, who lived on nature's terms, the body's own adaptation mechanisms were suited to their purpose. In today's urban communities, we seldom need to fight or flee. We experience stress instead. Stress-induced illnesses have become a huge problem in the entire industrialized world. Long-standing, frequently recurring or severe stress is harmful, because a constant buildup of stress hormones causes disturbances in normal body function (ibid). Such disturbances are seen after about three months of high stress load without substantial periods of recovery (ibid.). Receiving most attention in the worldwide debate is the dramatic increase in "burnout" or stress reactions, which is the medical term. However, a great number of other illnesses are triggered or aggravated by stress, because long-standing stress causes hormone disturbances and because increased stress-induced neural impulses to blood vessels, the digestive system, etc., are harmful. Among the most serious stress-induced illnesses are the cardiovascular diseases (ibid.). Other illnesses triggered or aggravated by stress are high blood pressure, depression, anxiety, thrombosis, digestive tract problems, chronic fatigue, aches and pains, allergies as well as increased risk for infection. Stress is also thought to play a crucial role in the emergence of autoimmune disorders and certain types of cancer (ibid.).

Stress reactions, however, can be beneficial to us even today. For instance, they can help us stay awake and alert during strenuous work situations. Thus stress can be positive during a limited time period. After long-standing exertion under stress, however, the body must get rest and have the opportunity to recover. It is precisely in their function as restorative environments, offering rest and recovery, that urban green spaces can play a crucial role in promoting public health. Moreover, neck and back pain as well as mental conditions such as stress-related fatigue and depression are the two most common illnesses among those who report in sick for

extended periods (Govt. Bill 2002/03:35). Exercise is also an important health factor with regard to these complaints. Well-designed outdoor environments in cities should be able to provide opportunities for both restoration and exercise.

Urban green spaces as future elements of city planning

Obstacles and lack of qualitative nuances

As mentioned, respondents to our survey were in great agreement in reporting that they would encourage a stressed and anxious friend to visit a nearby wooded area or a city park. Yet despite this insight, this is not what they themselves do. They even reported that they would like to visit urban green spaces more than they actually do. What, then, is keeping them from doing as they wish? Our spontaneous reaction may be that they feel the parks are unsafe, yet the survey answers show that the primary obstacle indicated was lack of time, followed by too great a distance from home to the nearest green area (Stigsdotter & Grahn, 2004a; Grahn & Stigsdotter, 2003). These responses emphasize the importance of proximity and that urban green spaces must be an integrated part of people's living environments. Yet how does this fit the overall picture of Swedish cities as ".../ relatively small, sparsely built and green, marked by a low level of development and often expanded at a calm pace" (Falkheden & Malbert, 2000, p. 28, translation by K. Williams)? At first glance, Swedish city plans appear to be fairly "green." This is because city plans largely partition ground areas into paved vs. non-paved surfaces (SCB, 2002). Areas marked as paved include buildings and infrastructure. Non-paved areas are colored green and include, e.g., public parks, wooded or grassy areas, residual green areas surrounding ongoing construction work (otherwise known as non-productive land), exposed rock, gardens belonging to private homes as well as green areas between roads and between apartment blocks and industrial buildings (ibid).

In other words, there are no levels of nuance in what is colored green on a city plan. Previous research at the Department of Landscape Planning at Alnarp reveals that an area marked green on the city plan is not necessarily a natural environment that city dwellers appreciate or wish to visit (Berggren-Bärring & Grahn, 1995). The city plans of Swedish cities contain green-marked areas that are essentially almost never visited or that city residents do not experience as green areas (ibid.). Similarly, there are areas on the city plan that are not colored green, but that residents value and use as green areas (ibid.). This indicates the need for evaluating green-marked areas on the basis of qualitative aspects. As with all types of design, good landscape design is a question of making a difference for users. The great role of landscape architects today is to promote city dwellers' health by offering them stress-free natural environments in which they can rest or exercise. If urban green spaces are not being visited now, can they be changed to make them attractive and appreciated? The factors governing whether a green-marked area is visited and appreciated are its spatio-experiential characteristics, its size and shape as well as its location in the city (ibid.).

Basic characteristics for rest and activity

We know today that different spatial characteristics of urban green spaces provide experiences that visitors desire (ibid.). We have called these characteristics the eight basic characteristics of urban green spaces (see Figure 2). They may be likened to primary colors on a palette – colors that can be mixed and put together in many ways. If a given green-marked area on a city plan contains several of the basic characteristics, it will generally be more popular, more appreciated and have more visitors than will areas containing only one or few of the characteristics (ibid.).

The eight garden room characteristics	Character of the garden room	Sketches showing what the garden rooms might look like
1. <i>Serene</i>	Peace, silence and care. Sounds of wind, water, birds and insects. No rubbish, no weeds, no disturbing people.	
2. <i>Wild</i>	Fascination with wild nature. Plants seem self-sown. Lichen- and moss-grown rocks, old paths.	
3. <i>Rich in Species</i>	A room offering a variety of species of animals and plants.	
4. <i>Space</i>	A room offering a restful feeling of "entering another world", a coherent whole, like a beech forest.	
5. <i>The Common</i>	A green, open place providing vistas and inviting you to stay	
6. <i>The Pleasure Garden</i>	An enclosed, safe and secluded place, where you can relax and be yourself and also experiment and play.	
7. <i>Festive</i>	A meeting place for festivity and pleasure.	
8. <i>Culture</i>	A historical place offering fascination with the course of time.	

Figure 2. Descriptions of the eight basic characteristics. Drawings by Agneta Persson..

The basic characteristics can even be tied to how health-promoting urban environments should be planned and designed, because certain characteristics are in direct demand and appreciated with respect to creating environments that have a restorative effect on visitors (Stigsdotter & Grahn, 2003; 2002). Mentioned

foremost here are the basic characteristics Serene, Space, Rich in Species and to some extent Culture (ibid.). Individuals who wish to be more active in urban green spaces instead desire the basic characteristics The Common and The Pleasure Garden (ibid.). From the perspective of health promotion, the objective is to get city dwellers to actually visit urban green spaces. Thus, promoting health among city populations involves giving people good design in the form of high quality green environments that afford the experiences they are seeking.

Size and shape

Urban green spaces vary greatly not only in quality, but also in size. Studies show that the two size categories that are most appreciated and that attract most visitors in the city are 1-5 hectares and 10-50 hectares (Berggren-Bärring & Grahn, 1995). If the goal is to create green areas that are experienced more as wilderness, larger areas are required, i.e., around 100 hectares. Even if a green area is less than 1 hectare, it can still be considered a health-promoting environment, though in this case its shape is of greater significance. Looking at city plans, we see that there are green-marked areas of any number of shapes. Among the eight basic characteristics, *Serene*, *Space*, *Rich in Species* and *Wild* are most sensitive to the shape of the area. The rule is that the more coherent the shape, the better (ibid., see Figure 3).

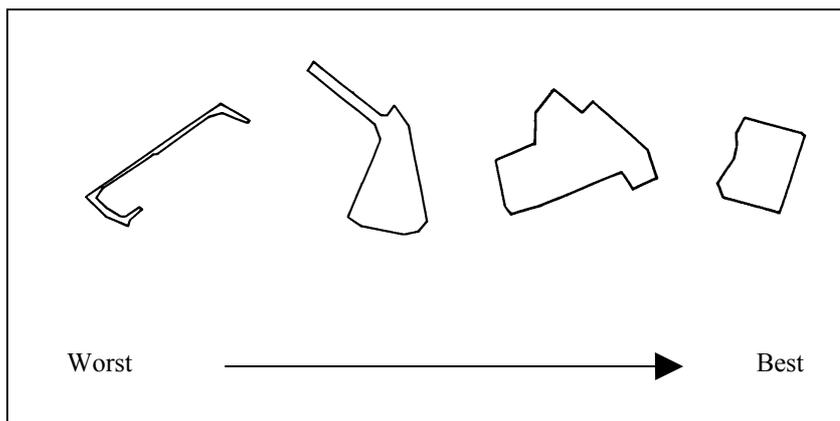


Figure 3. *The more coherent the shape of the green area, the more developed the eight basic characteristics can become. Modified picture from Berggren-Bärring (1995, p. 236).*

Distance to nearest public green area

A delicate relationship exists concerning the distance between the home and urban green areas; both city dwellers' use of these areas and their health can be affected by this relationship. The farther the park is from the home, the fewer and shorter are park visits (Stigsdotter & Grahn, 2004a; Grahn & Stigsdotter, 2003). After only a 50-meter distance, we see a decrease in visit frequency and an increase in number of occasions of perceived stress (ibid.). If a person has access to a green area within 50 meters of his/her home, the visit frequency is three to four times a week

(ibid.). The number of visits per week decreases with increased distance to a green area. If the distance is 1000 meters, the visit is postponed until the weekend (ibid.).

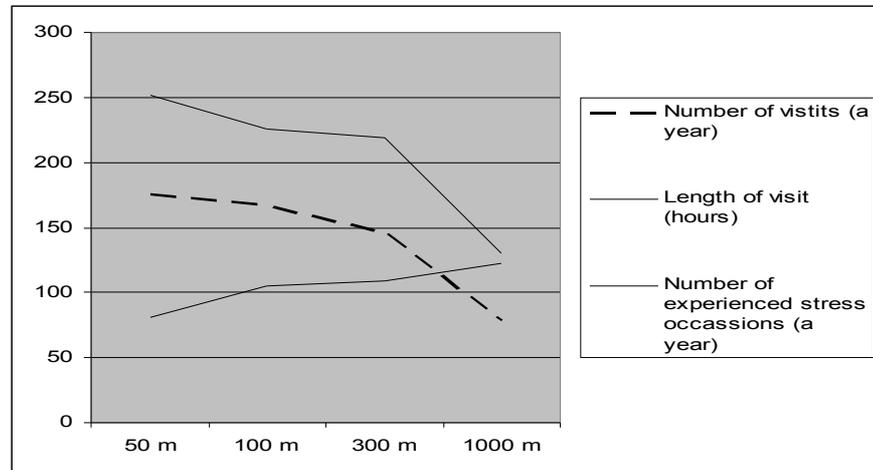


Figure 4. The diagram shows the relationships between distance from the home to the nearest green area and three factors: Number of visits (a year), Length of visit (hours), and Number of experienced stress occasions (a year).

Health-promoting home environments

Swedish studies of preferences for housing type show that most Swedes would like to live in their own house (Nutek & Glesbygdsvirket, 1997; Rådberg, 1996). When choosing a place to live, the two most important factors are access to a balcony/patio, followed by proximity to parks and natural environments (Berglund & Jergeby, 1992). For many Swedes, access to a garden is not just a dream, as more than half of the population, i.e., about 5.1 million, live in one-family houses with a garden (Falkheden & Malbert, 2000). This means there are slightly more than 2.5 million gardens in Sweden (ibid.).

The data from our study show no relationship between access to a garden and sex, age or socioeconomic status (Stigsdotter & Grahn, 2004a). It may be surprising that there is no relationship between socioeconomic status and access to a garden adjacent to the residence. Yet, as it seems, Swedish cities and population centers contain houses with gardens in different city districts, at different prices and with different forms of ownership.

Balcony or garden?

There are several different types of housing, each with different opportunities regarding access to green spaces. Some people have a balcony filled with greenery or a common courtyard between apartment blocks. If there is no garden at home, perhaps there is a summerhouse or an allotment garden instead. Even gardens surrounding one-family houses vary in size, amount of greenery and design. What,

then, is the relationship between type of outdoor environment adjacent to the home and health (see Figure 5)? People who live in apartment blocks without a balcony and without a common courtyard suffer from, on average, 193 stress occasions a year (ibid.). If they have a balcony, however, the number of stress occasions decreases to 126 (ibid.). If they have access to a garden – either a small private garden, an allotment garden/summerhouse or a verdant common courtyard adjacent to their apartment block – the number of occasions decreases to 86 (ibid.). The best situation is found for people who have a larger private garden (i.e., larger than 600m²); they suffer from, on average, 65 stress occasions a year (ibid.).

Type of outdoor environment accessible at home	Mean number of stress occasions a year
Respondents living in apartments, no balcony or outdoor area.	193.00
Respondents living in apartments, with balcony.	125.68
Respondents living in apartments with a verdant garden or access to an allotment garden or summerhouse. Or respondents living in a house with a small verdant garden.	86.30
Respondents living in a house with a large (> 600 m ²) and verdant garden.	64.96

Figure 5. *The relationship between different types of outdoor environments and number of stress occasions a year. Modified version of table from Stigsdotter & Grahn (2004a, p. 4).*

In summary, our research shows that there is a positive and significant relationship between stress and having or not having a garden adjacent to the home (ibid.). It is, naturally, not enough just to have a garden, you must also spend time in it. We also found a significant relationship indicating that the more often you are in your garden, the fewer stress occasions you will suffer a year (ibid.).

Given the established relationship between health and time spent in gardens adjacent to the home as well as between health and visits to urban green spaces, we may wonder: Which situation is actually the most important for maintaining health? Which is most efficient? When we directly compare these two situations, our data show that both are important for health, but that having your own garden is most important (Stigsdotter & Grahn, 2004a; Grahn & Stigsdotter, 2003). What is perhaps more startling is that people who do not have a garden tend not to compensate for this by visiting other people’s gardens or public parks and natural environments. This highlights the need for having green spaces very close to or as an integrated part of housing areas.

Health-promoting workplaces

Given that, in Sweden, the number of individuals of working age who are reporting in sick is increasing at an alarming rate, it would seem important to discover whether changes in the workplace environment might help to maintain employees' health. Interestingly, 69 percent of respondents in our study reported having access to an outdoor environment at the workplace (Stigsdotter & Grahn, 2004b). Here we see a similarity to access to a garden adjacent to the home: Access to a garden at work is not associated with a person's socioeconomic status (ibid.). Moreover, there is a statistically significant relationship between access to a garden at the workplace and the number of stress occasions experienced a year (ibid., see Figure 7). At the workplace, there may even be rooms with views of the garden.

Our results show that constant access to a view of a verdant garden is just as important as being able to spend time in a garden a few times a week (ibid.). This may indicate the importance of taking short pauses during the working day: micro-pauses during which the gaze can wander as well as longer pauses outside in the garden. It would be interesting to study how employees' health would be affected if they were allowed more frequent and longer stays in the garden. Another result regarding workplaces shows an association between contentment and access to a garden (ibid.). As an employer, offering employees a garden and a view would seem to be a cost-effective measure to promote contentment as well as a way to make the workplace more attractive to job applicants.

Type of outdoor environment accessible at work	Mean number of stress occasions a year
Respondents with no view of a garden, and no chance to go out during breaks	153.73
Respondents with no view of a garden and a chance to take a break out of doors (once a month at most)	104.08
Respondents with a view of a garden and few or no chances of a break out of doors (once a week at most)	96.66
Respondents with a view of a garden and chances of a break in a garden more than once a week	77.07

Figure 6. *The relationship between different types of outdoor workplace environments and number of stress occasions a year. Modified version of table from Stigsdotter & Grahn (2004b, p. 5).*

Conclusion

Urban green spaces could constitute an element of city planning of importance to public health. If such spaces are appropriately designed, they could help reduce city dwellers' experiences of stress. The more frequent and longer the visits to urban green spaces, the better the health of the urban population. Such health effects, however, require that green spaces be an integrated part of people's everyday living environments by being near the home and workplace. If the distance from the home to a park is greater than 50 meters, the number of visits decreases, the visits become shorter and the number of experienced stress

occasions increases. The great advantage of developing urban green spaces is that their health-promoting effects are democratic, that is, the effects are equal for men and women, across all age groups and across all socioeconomic categories.

What could be envisioned for the city and its inhabitants if the present results were used to transform the reality of urban life? The overall objective would be to promote public health by making urban green spaces accessible and by improving their quality so that city dwellers both are able and want to visit them. This would require new evaluation of the quality of green-marked areas on city plans – evaluation based on how people use, appreciate and perceive these areas. Such an evaluation would probably result in many green-marked areas losing their green color. Without their green color, these areas would be freed up and discussions about their use more open-ended.

It should be stressed in this connection that even if urban green spaces are mostly built of plants, i.e. living, organic and changeable material, they can still be given an urban design. It is entirely possible to work both strictly and organically – to include both hard and soft floors in urban green spaces. The notion that green areas can include paved surfaces is particularly pertinent in the city, where the crucial point is finding locations that are accessible (near city dwellers' homes and workplaces) and ensuring high quality.

To put it more sharply, we could say that even urban green spaces must be exploited and densified. Does this mean we should lay out city parks every 50 meters in order to promote people's health? Certainly not. But it does mean that, in Swedish cities, there are areas that residents neither use nor appreciate (Berggren-Bärring & Grahn, 1995). Urban areas in which not one of the basic eight characteristics is represented must be classified as "non-land" or empty space. Let us now take advantage of these areas!

This health-promoting perspective on urban green spaces, and thereby also the sustainable development of cities, must go beyond the city limits. New building within city limits and densification of the city may result in the thinning out and disappearance of the very value of parks and other natural and recreational areas, because the basic characteristics appreciated by people are closely tied to factors such as quietness, size and shape. The most important basic characteristics for recovery from stress, and thereby for promotion of health, are also the most sensitive to disruption, because these characteristics – Serenity, Space and Rich in Species – require large land areas (Stigsdotter & Grahn, 2003; 2002). Thus, if these characteristics are thinned out and thereby disrupted, the health-promoting qualities of parks and other natural and recreational areas may be lost.

This article has presented design theories based on solid research results. These theories address how urban green spaces can be designed and planned as city planning elements of importance to public health. In this way, they may be used by practitioners as tools to promote health through urban planning and design, i.e. evidence-based landscape architectural health promoting planning.

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