

**A Garden at Your Doorstep May Reduce Stress –
Private Gardens as Restorative Environments in the City**

Ulrika A. Stigsdotter and Patrik Grahn

Department of Landscape Planning Alnarp
Swedish University of Agricultural Sciences SLU

Abstract

Can gardens surrounding residential homes in cities help to create a less stressful everyday environment? This article is based on a study in which 953 randomly selected persons in nine Swedish cities answered a questionnaire concerning their experiences of their own health status and access to and use of gardens at home. The results show that having access to a garden has a significant positive impact on stress. There is also a significant positive relationship between frequency of garden visits and stress prevention. The study also shows that the amount of verdure in the garden is crucial to its restorative quality. The results indicate that verdant gardens in the city may play an important part in offering restorative environments, irrespective of the citizens' socio-economic background, gender or age.

Keywords: Garden; stress; restorative environment; health factor; residential home

1. Introduction

The starting point for this study is to view city gardens as a health factor. Thus, in this article, the concept 'health factor' is intended to be the antithesis of the epidemiological term 'risk factor'. Accordingly, exposure to a health factor implies increased chances of maintaining one's health. Here, the health factor constitutes gardens adjacent to homes in the city. The aim of this study is to examine whether there is a relation between gardens at residential homes in the city and stress. In other words, can gardens surrounding residential homes in cities help to create a less stressful everyday environment?

2. Background

2.1 What is stress?

Stress reactions helped our ancestors flee or fight when threats or dangers were at hand. Examples of stress reactions are increased muscle tension, increased blood pressure, reduced gastrointestinal function, increased sweat-gland production, increased heart rate, increased adrenalin and cortisol and reduced melatonin production (Maslach, 2001). These reactions can also assist us today, eg during a working period they can keep us sharp and awake. In other words, stress can be positive during a limited time period. But if we do not have opportunities for proper rest and recuperation, the body is put under strain that can worsen or even trigger serious illnesses (Atkinson et al, 1996).

2.2 Sensitivity to stress (SS) – a way to measure stress

Stress-related illnesses have been designated as a new type of national illness in Sweden. The illnesses most often afflicting long-term sick-listed individuals in Sweden are stress-related depression and pain, as well as backache, irritation, tiredness and ache in the back of the head (Socialdepartementet, 2002; Grahn & Stigsdotter, 2003). Research shows that the three illnesses stress, irritation and fatigue are closely linked together (Grahn & Stigsdotter, 2003; Klingberg Larsson, 2001; Dinan, 1996; Kaplan, 1990). When the term 'stress' is used in this

article we refer to a factor called Sensitivity to Stress (SS), which consists of all three illnesses (ibid).

2.3 Why are gardens restorative?

During our everyday lives, we are constantly exposed to stressors. Stressors can be constituted by the fact that we are continuously exposed to unnatural environments (Ulrich, 1993; 2001; Coss, 1991) as well as to large amounts of information that must be sorted (Kaplan, 1990; 2001; Kaplan & Talbot, 1983). Stress reactions can be reduced in various ways. For example, exercise rids the body of some of its adrenalin and cortisol (Blair et al, 1989) and exposure to daylight may reduce stress by adjusting hormone levels, especially cortisol and melatonin (Küller & Küller, 2001; Küller & Lindsten, 1992). Recently, increasing numbers of researchers claim that even the design of the environment per se could act as a restorative factor (Grahn & Stigsdotter, 2003; Stigsdotter & Grahn, 2002; Ulrich, 2001).

The physical environment constantly affects us, both positively and negatively, which means that many types of environments are not restorative (Ulrich, 2001; Rasmussen, 1986). Research shows that the human body reacts involuntarily to natural elements, whereas artefacts such as houses and streets do not provoke the same quick and strong reactions (Ulrich, 1999; 1993; 1984).

3. Method

The study is based on a questionnaire that was completed by 953 Swedes of all ages. The questionnaire itself consisted of three parts: the first part asked questions about the respondents' personal data, like age, sex and profession, but also about their home environment and access to a garden at home; the second part focused on how often and how long the respondents visited urban open spaces and private gardens; and in the third part, the respondents made self-estimations of their health status. All questions in the questionnaire were pre-coded, most often with multiple-choice options, however with an opportunity to make individual remarks.

The questionnaire was sent by mail to individuals of all ages selected at random, living in nine cities from the three geographical areas where most people in Sweden live, ie close to the three largest cities in the country: Malmö, Gothenburg and Stockholm. The state-owned company DAFA, which keeps the Swedish personal and address register, randomized the respondents' addresses. In total, 2,200 questionnaires were sent out to citizens in Enköping, Halmstad, Kristianstad, Lund, Trelleborg, Trollhättan, Uppsala, Varberg and Västerås. One hundred and sixty-three letters were returned to sender, which means 2,027 questionnaires were delivered successfully. Nine hundred and fifty-three completed or nearly completed questionnaires were received; the response-rate was thus 47 per cent.

The respondents' answers have been statistically analyzed using the statistical software SAS (SAS Statistics, 1996). Examination of the respondents' profile showed that the distribution of socio-demographic data is representative of the general situation in Sweden. This means that no statistically significant deviation existed with regard to socio-economic grouping (SEI), sex or age between the received material and the material one could expect (Grahn & Stigsdotter, 2003; Statistics Sweden, 2001; Swedish Socioeconomic Classification Reports on Statistical Co-ordination, 1995).

4. Results

4.1 The importance of having a garden

Initially, we wanted to see how many respondents have access to a garden at their homes (private garden or a green yard belonging to a residential block the inhabitants feel they can stay in). Table 1 shows that just over 74 per cent of the respondents have access to a garden, whereas not quite 26 per cent say that they have no access to a garden. Those who have no garden at home have a significantly higher sensitivity to stress, SS. That is, they suffer from stress on significantly more occasions per year than do those who have access to a garden. There are almost no differences in SEI as a function of people's access to a garden, nor are there differences in age or sex. Hence, gardens are found in all the SEI classes.

Table 1. Analysis of relationship between access to a green area at respondent's home and level of Stress, SEI, age and sex. SAS T-test. N = 891. (Modified version of Table 17, pp. 13 in Grahn & Stigsdotter, 2003)

	Having a garden	Having no garden	Significance
Sensitivity to Stress, SS	78.31	135.97	p<0.0005
SEI	4.09	3.95	Ns
Age	36.68	36.78	Ns
Sex	1.47	1.42	Ns
N	661	230	

Having access to a garden at home seems to be of fundamental importance in reducing stress, but what about actually visiting gardens? The number of occasions spent in a garden is of significant importance in relation to SS (see Table 2). A person who never spends time in a garden suffers from stress on almost 127 occasions per year, whereas the number of occasions of suffering from stress drops to about 76 for a person who spends time in a garden more than once a week.

One can lack access to a garden of one's own and still visit other people's gardens, and vice versa. In the data (see table 2), we discover that all persons who have access to a garden of their own do not visit their gardens often (99), and some persons (2) who lack immediate access to a garden do visit gardens often. However, the relationship between access to a garden and amount of time spent in a garden is evident: Almost all of those who never spend time in a garden lack immediate access (220 out of 223), and almost all of those who sometimes or often spend time in a garden have immediate access to a garden of their own (96 out of 100 and 561 out of 563, respectively).

Table 2. Relationship between number of visits to a garden, immediate access to a garden and SS. SAS GLM. Analysis of variance. Model: Dependent variable SS=Number of visits to a garden. Significant difference p=0.0007. SAS T-test, between number of visits to a garden and access to a garden. Significant difference p<0.0001

The number of visits to a garden	Sensitivity to Stress, SS	Having a garden	Having no garden	N
Never	126.77	3	220	223
Sometimes - up to every other week	116.92	96	4	100
Often > once a week	75.72	561	2	563

4.2 Home greenery index

A private garden may of course vary considerably with regard to area, amount of greenery and design. In order to get a clearer picture of the access to gardens among the respondents, we therefore constructed a 'home greenery index', presented in Table 3. Only 4.5 per cent of

the respondents have absolutely no access to greenery; that is home greenery index 1. Almost half the number of respondents, 47 per cent, say that they have access to a small garden or a green yard, and about a third of them have a large private garden.

Table 3 shows that SS differs significantly between home greenery indices. The higher the home greenery index, the fewer occasions of stress per year. This means that people with a garden of their own suffer from stress on significantly fewer occasions per year than do people with no access to greenery at their home.

Table 3. The four classes of home greenery index. Significance test SAS GLM Analysis of variance, where we tested whether SS differs significantly between home greenery indices. Classes=Home greenery index. Model dependent variable SS = home greenery index gives $p < 0.0001$. $N = 883$

Home greenery index	Type of outdoor environment accessible at home	Sensitivity to stress, (SS)	N
Home greenery index 1	The respondents live in a block of flats and have no balcony. They have no access to a yard and no allotment or summer house.	193.00	39
Home greenery index 2	The respondents live in a block of flats and have a balcony. They have no access to an allotment or a summer house. They have access to a yard but one without greenery.	125.68	187
Home greenery index 3	The respondents live in a block of flats but have access to an allotment or a summer house, or to a yard with much greenery, or live in a house with a small verdant garden.	86.30	411
Home greenery index 4	The respondents live in a house with a verdant garden (site 600 square meters or bigger).	64.96	246

4.4 Urban open spaces contra a garden at your home

Those citizens who do not have access to a garden suffer from stress on more occasions per year than do those who have access to a garden. They also visit urban open spaces on significantly fewer occasions per year than do those who have access to a garden at their home (Grahn & Stigsdotter, 2003). How important, then, are urban open green spaces compared to a garden? Another path analysis, SAS GLM analysis of variance Type III Sum of squares, was carried out. (Classes= Having access to a garden. Model: Dependent variable SS= Number of visits to urban open green spaces and Access to a garden, $N = 865$). The result was: Access to a garden $p < 0.0001$, Number of visits per year to urban open green spaces $p < 0.05$. The result of the analysis shows that the use of urban open green spaces is related to SS. However, having access to a garden – private or immediately adjacent to an apartment – seems to be of greater importance.

5. Discussion

In this study we view gardens as a health factor, which implies increased chances of maintaining one's health. But, what does the concept of health actually mean? The most well-known attempt at a definition was formulated in 1948 by the World Health Organization: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1948). This definition shows that health is not merely the opposite of illness, but that it should be viewed as a holistic and positive condition that encompasses the whole individual in relation to his/her life situation. Today, 'Health – Ill Health' and 'Healthy – Sick' are viewed as diametrically opposed. This is because disease is a pathological condition. Yet disease is positioned in a complex interaction between biological (physical and psychological), social and cultural circumstances (Qvarsell & Torell, 2001). If we consider, moreover, that 'health' is used subliminally to describe our dream of living a good life, its meaning then includes a happy and whole life of security, harmony and health

(Hellqvist, 1999; Qvarsell, 1996). Thus, if we are to increase our understanding of the content of the concept of health, what is required is an overall view of people's life environments.

From the perspective of research in landscape architecture, it is interesting to understand why and how people are affected by the environment – particularly in terms of people's health. Other research disciplines are working in this area as well, and even their results indicate that there are important health benefits of spending time in nature environments. This may indicate that gardens offer all the positive effects mentioned earlier in the paper, each individually as well as in combination. There may also be synergy effects: the positive health effects may well support one another, widening and deepening stress reduction in connection with gardens at residential homes. This would seem to indicate that gardens are a useful means of creating restorative environments that function in everyday life for all citizens, children as well as adults.

Key Concluding Points

- Having a garden of your own or a garden immediately adjacent to your apartment has a significantly positive impact on stress.
- Visiting the garden often has a significantly positive impact on stress.
- The closer you are to your garden and the more greenery there is (home greenery index), the more positive the effect on stress.
- With respect to stress reduction, having your own verdant garden seems to be more important than visiting urban open green spaces.

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