

# EMPLOYEES' USE, PREFERENCES, AND RESTORATIVE BENEFITS OF GREEN OUTDOOR ENVIRONMENTS AT HOSPITALS

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## ABSTRACT

*Work-related stress is an increasing problem among healthcare workers all over the world. The overall hypothesis of this study is that green outdoor environments (GOE) at hospitals may contribute to a less stressful working environment by offering psychological restoration. This study investigates GOE at five acute-care hospitals located in the capital region of Denmark. It aims to identify how the GOE are used by the employees and their potential for restoration. Data was collected through a survey where 183 employees completed an on-site questionnaire which included the perceived restorativeness scale (PRS). The main results indicate that the GOE are mostly used for a short while by the employees; the main activity is to have lunch, but they are also used actively to get away from the stressful working environment. The results from this study contribute to the international research on GOE at hospitals, and may be of inspiration for designers as well as for hospital staff and administrators.*

**Keywords:** *Attention Restoration Theory, Denmark's hospitals, restorative environments, the perceived restorativeness scale*

## 1 INTRODUCTION

During recent decades there has been an increase in work-related stress in the majority of European countries. According to the European Working Condition Survey (2000), work-related stress is the second most common work-related health problem in 15 European countries ([www.eurofound.europa.eu](http://www.eurofound.europa.eu)). In these countries, the economic cost of work-related stress was estimated at 20 billion Euros in 2002 (ibid). A current study shows that 79% of European managers are concerned about work-related stress (European Agency for Safety and Health at Work, 2011), and work-related stress has been associated with a number of illnesses, such as cardiovascular disease (Kivimäki et al., 2002), musculoskeletal disorders (Hoogendoorn et al., 2000) and neck-shoulder-arm-wrist-hand problems (Ariëns et al., 2001), as well as absenteeism (Houtman et al., 1999).

In the European Union (EU), employees in the health and social sectors have the highest risk of suffering from work-related stress ([www.eurofound.europa.eu](http://www.eurofound.europa.eu)). These two sectors also have the highest percentage of workers who are absent from work for more than 14 days (ibid). Fatigue and nervousness are frequently reported by healthcare

professionals (Poissonnet & Veron, 2000) and high levels of stress and depression have been reported by doctors (Caplan, 1994). Emotional exhaustion and stress may result in 'burnout syndrome' (Maslach & Jackson, 1986) and 80% of nurses suffer from moderate to severe burnout in the United Kingdom (Thompson, 1989). In Denmark, the situation may be exacerbated by the fact that, from 2002 to 2010, the number of employees in Danish hospitals decreased, while at the same time, the number of hospitalisations of patients increased steadily (www.dst.dk).

### ***1.1 Stress Interventions***

Against this background, it is hardly surprising that different types of intervention programs have been implemented at hospitals in order to reduce stress and to improve staff health, efficiency and job satisfaction (Clark, 2009). Intervention programs with different focuses have been carried out by numerous studies (Williams, Michie, & Pattani, 1998; Poissonnet & Veron, 2000; Van der Klink et al., 2001; Stansfeld, 2002; Lavoie-Tremblay, 2004; Parsons and Newcomb, 2007). In addition, recent findings show that hospital employees feel supported by the physical environment which makes them happier and leads to fewer sick days and reduced staff turnover (Mroczek et al., 2005; Ulrich et al., 2008).

### ***1.2 Green Outdoor Environments and Work-Related Stress***

Several studies address the importance of the green outdoor environments (GOE) at hospitals for patients' safety, response to treatment and recovery (Whitehouse et al., 2001; Mroczek et al., 2005; Sherman et al., 2005; Hendrich et al., 2008; Pati et al., 2008; Ulrich et al., 2008; Vischer, 2008). Other studies have highlighted the possibility of using GOE at companies and institutions to reduce stress, increase employees' well-being and job satisfaction (Kaplan, 1993; Kaplan et al., 1996; Leather et al., 1998; Shin, 2007). Furthermore, studies indicate that contact with GOE can increase attention (Tennessen & Cimprich, 1995) and work performance (Matsuoka, 2010). Pati et al. (2008) found that a window view of nature was positively related to a low level of acute stress, and a high level of nurses' alertness, while Hernandez (2007) found that access to GOE during the working day gives staff a feeling of freedom and helps them to cope with the uniformity

of work. Concerning the staff's use of a GOE at their workplace, Sherman et al. (2005) found that it was mainly used for 'walk-throughs', followed by 'having lunch', 'sitting and talking' or 'sitting and relaxing'. The GOE which was the most spatially isolated from patients, was the one which was most used by the staff. One study indicates that a preference for a window view of nature may be stronger for staff than for patients (Verderber, 1986).

Hospital employees are constantly faced with work-related stress due to the nature of their job (Leiter & Harvie, 1996; Poissonnet & Veron, 2000; Sale & Kerr, 2002; Stichler, 2009) and restorative environments have the potential to allow such employees to recover (Kaplan & Kaplan, 1989). There are several theories on how to recover from stressful situations, one of which is the Attention Restoration Theory (ART). ART (Kaplan, 1995) characterises psychological components that support a restorative environment which may help people to recover from depleted directed attention capacity. The 'Attention Restoration Theory' describes two different types of attention, which are based on different brain functions (Kaplan and Kaplan, 1989). The 'directed attention,' which is used when demanding tasks are performed or disturbing environmental factors are dealt with, has limited capacity, and if it is used without opportunities to restore, it may lead to mental fatigue. Environments that provide opportunities for more effortless attention, called 'soft fascination', facilitate mental restoration. Natural environments are found to provide this kind of attention (ibid.). Such restorative environments should have four components: being away, extend, fascination and compatibility. Fascination stands for attention that does not demand mental effort and involves stimuli with a fascinating quality. The feeling of being away can be psychological or physical and involves a feeling of being removed from daily routines and demands. Extend is a sense of being in a large place where no boundaries are evident, while compatibility refers to how well the content of the environment supports the needs of the user. Hartig et al. (1996) introduced the Perceived Restorativeness Scale (PRS) as an instrument for measuring the self-perceived restorative potential of an environment. The scale has since been developed and different versions exist. For example, the component coherence was added, (Korpela & Hartig, 1996).

The importance of GOE at hospitals for the health, efficiency and job satisfaction of employees has been largely neglected. This is despite the fact that research which addresses the relationship between GOE and improved health, concentration, and different types of satisfaction in other contexts (see for example Nilsson et al., 2011) has revealed promising results that may also be relevant for hospital staff. According to the report in the Capital Region's Hospital Plan (2007), a study on the outdoor space at hospitals in Denmark is needed as a growing awareness has developed in recent years in the healthcare community of the need to create functionally efficient environments that also have pleasant, stress-reducing characteristics.

### *1.3 Aim of Study*

The aim of this paper is to identify how the GOE are used by the employees and their potential for restoration. Based on the existing studies on GOE, it can be hypothesised that GOE at hospitals may contribute to a less stressful working environment by offering psychological restoration. This results in the following questions:

- How are the hospital GOE used by employees and how long do they spend there?
- Do the hospitals' GOE have restorative potential according to the staff?
- How satisfied are employees with the GOE where they work?
- Which features in the GOE do the hospital employees prefer?

## **2 RESEARCH METHODOLOGY**

### *2.1 Case Selection*

There are ten acute care hospitals in the capital region study area, which are located in four districts, the North, the Centre, the City and the South. To

ensure that the four districts were proportionally represented, i.e. one hospital in each, as well as to obtain as much varied information as possible, the study focuses on cases that vary according to the architectural time period, size, location and the type of GOE. Based on these focus, the following four cases were chosen for the study: Bispebjerg Hospital, Herlev Hospital, Hillerød Hospital and Hvidovre Hospital. Furthermore, Rigshospital was also included in the study, as while it is not associated with any planning district, it is the national hospital and is located within the study area. Furthermore, its GOE also satisfies the criterion for abundant and varied information. The five cases are presented in Table 1.






### *2.2 Data Collection*

In order to achieve more complete responses, data were collected using questionnaire during the summer months to increase the likelihood of good weather and thereby the likelihood of more frequent use of the GOE (Whitehouse et al., 2001).

### *The Questionnaire*

A pilot study using the questionnaire was conducted in June 2010, while the actual distribution of the questionnaire started in July and ended in September 2010. The visits started at nine o'clock in the morning and ended at three o'clock in the afternoon. Each hospital was visited alternately and each hospital was visited on different days of the week and during different months. In total, each hospital was visited 13 times during the three months. Potential respondents were approached and those who agreed to participate in the survey were asked to complete the questionnaire on-site. This was to ensure that the respondents' answers reflected their immediate experience of the GOE (Chiesura, 2004). A total of 183 employees answered the questionnaire.

Table 1: Description of the Five Cases

Acute care hospital/ District area	Population served	Number of employees (f=female m=male)	Year of construction	Type of GOE	Size of selected area for study (m. sq.)	General view of the selected GOE
Bispebjerg/ City	400,000	3,095 f=2,248 m=847	1913	Romantic, English garden design. Located between clinics, laboratories and administrative offices	2,400	
Herlev/ Central	425,000	4,173 f=3,357 m=816	1976	Enclosed, maze garden design adjacent to a café and overlooking an open field.	3,000	
Hillerød/ North	350,000	2,869 f=2,328 m=541	1943	Courtyard garden design located near the main entrance and adjacent to parking areas	1,800	
Hvidovre/ South	460,000	3,221 f=2,553 m=668	1970	Formal, post-modern design. Located on the roof top	8,000	
Rigshospital/ National Hospital	600,000	7,184 f=5,589 m=1,595	1960	Modern, urban landscape design. Surrounded by high hospital building and located near a café, shops and clinics.	6,000	

As shown in Table 2, the response rates were estimated based on the number of hospital employees who were observed visiting the GOE in a day. A simple survey to identify the peak hours of GOE usage among hospital staff was conducted. On the basis of the information from the case hospitals, it was estimated that, on an average, approximately 25% of the total number of employees for each hospital work a day shift during week days. At each

hospital, the total number of users of the GOE who were assumed to be hospital employees was recorded during the 13 visits. The findings were later compared with the total number of staff who responded to the questionnaires. The main reason given for declining to participate in the survey was limited time during the work break. The questionnaire, which was distributed by a non-Danish speaker, was written in English and Danish

in order to obtain as many replies as possible. Fifteen per cent of the respondents chose to answer in English.

*Table 2: Overview of the Response Rate to the Questionnaire based on the Estimated Number of Hospital Staff Using the GOE during a Day from the Total of 13 visits to Each Hospital.*

Hospitals	Peak hours for usage of GOE among hospital staff	Estimated number of staff on the day-shift	Average number of hospital staff observed using the GOE during the 13 visits	Total number of staff who responded to the questionnaires	Response rate (%)
Bispebjerg	10:30-12:00	800	<b>260</b> (20 staff x 13)	53	20.3
Hvidovre	10:30-13:30	770	<b>195</b> (15 staff x 13)	36	37.9
Rigshospital	10:00-12:30	1800	<b>156</b> (12 staff x 13)	40	25.6
Herlev	10:30-13:30	700	<b>130</b> (10 staff x 13)	32	24.6
Hillerød	11:30-12:30	1040	<b>65</b> (5 staff x 13)	22	33.8

The questionnaire was prepared based on several similar studies on the use of hospital GOE (Sherman et al., 2005; Whitehouse et al., 2001; Ismail et al., 2002; Cooper Marcus, 1999). The questionnaire consisted of five parts. The first part of the questionnaire asked respondents how long they had spent in the GOE and which activities they had performed there. The time categories were 5-10 minutes; 11-20 minutes; 21-30 minutes; 31-60 minutes and more than 1 hour. The 17 possible activities were 'having my lunch'; 'sitting & talking'; 'sitting & relaxing'; 'having a quick chat'; 'walking around'; 'using my cell phone'; 'having a work meeting'; 'sitting & waiting'; 'sitting quietly/contemplating'; 'reading a book'; 'relaxing &

resting'; 'getting away from a stressful environment'; 'enjoying the garden'; 'walking through; 'forgetting my worries'; 'exercising' and 'smoking'.

The second part of the questionnaire focused on the staff's perceived restorative potential of the GOE and included the PRS. The PRS version used in this study is based on the Attention Restorative Theory (ART) components; 'being away', 'fascination' and 'compatibility'. Regarding the variation in size of the GOE, 'scope' and 'coherence' were included in the PRS while 'extent' was excluded due to the variation of GOE sizes, in line with a study by Tenngart & Hagerhall (2008). The mean score of the PRS was matched with a study by Purcell et al. (2001). The version used in this study was developed by Bodin and Hartig (2003) and consists of 24 questions. Five items were evaluated for the component 'being away' (e.g. this place is like a refuge from things that distract me); five items were evaluated for the component 'fascination' (e.g. this place raises my curiosity); four items were evaluated for the component 'coherence' (e.g. this site is designed in accordance with a clear plan); three items were evaluated for the component 'scope' (e.g. in this place, I feel that it is a small world in itself); six items were evaluated for the component 'compatibility' (it is easy to do what I want here) and one item was evaluated for 'preference' (I like this place). The respondents had to mark their experiences on an 11 point Likert scale ranging from the lowest '0' (not at all) to '10' (completely).

The third part of the questionnaire focused on the opinions of hospital employees regarding how much they enjoyed the different features in the hospitals' GOE. The built features included 'water features,' 'shelter (such as trellis, gazebo),' while natural features included 'vegetation (such as trees, flowering shrubs)', 'lawn', 'fresh air', 'breeze', 'sunshine' and 'bird sound'. The possible response categories ranged from the lowest '0' (not at all) to '10' (completely).

The fourth part of the questionnaire focused on the respondents' level of satisfaction with the hospital GOE. They were asked 'are you satisfied with the hospital outdoor garden?' with the possible response categories being 'very satisfied'; 'satisfied'; 'neither satisfied/nor dissatisfied'; 'dissatisfied' and 'very dissatisfied'.

Table 3: Demographics of the Respondents

Demographics	Hospitals						P-value
	Bispebjerg	Hillerød	Herlev	Hvidovre	Rigshospital	Total	
<i>Gender</i>							
Men	26.4% (n=14)	59.1% (n=13)	56.2% (n=18)	27.8% (n=10)	45.0% (n=18)	39.9% (N=73)	ns
Women	73.6% (n=39)	40.9% (n=9)	43.8% (n=14)	72.2% (n=26)	55.0% (n=22)	60.1% (N=110)	
<i>Civil status</i>							
Married/ in long-term relationship	52.8% (n=28)	77.3% (n=17)	62.5% (n=20)	63.9% (n=23)	30.0% (n=12)	54.6% (N=100)	ns
Single	47.2% (n=25)	18.2% (n=4)	37.5% (n=12)	33.3% (n=12)	70.0% (n=28)	45.3% (N=83)	
<i>Age</i>							
20-29	37.7% (n=20)	4.5% (n=1)	37.5% (n=12)	22.2% (n=8)	27.5% (n=11)	28.4% (N=52)	0.000
30-49	43.4% (n=23)	68.2% (n=15)	62.5% (n=20)	61.1% (n=22)	62.5% (n=25)	57.4% (N=105)	
50-65	18.9% (n=10)	22.7% (n=5)	0% (n=0)	16.7% (n=6)	10.0% (n=4)	13.7% (N=25)	
<i>Nationality</i>							
Danish	94.3% (n=50)	100% (n=22)	90.6% (n=29)	83.3% (n=30)	100% (n=40)	93.4% (N=171)	ns
Other	5.7% (n=3)	0% (n=0)	9.4% (n=3)	16.7% (n=6)	0% (n=0)	6.5% (N=12)	
<i>Education level</i>							
Primary / Grundskole (7-10 years)	3.8% (n=2)	0% (n=0)	40.6% (n=13)	16.7% (n=6)	20.0% (n=8)	15.8% (N=29)	0.000
High school/ gymnasium(3 years)	79.2% (n=42)	40.9% (n=9)	50.0% (n=16)	19.4% (n=7)	47.5% (n=19)	50.8% (N=93)	
Vocational / Technical (3 years)	0% (n=0)	22.7% (n=5)	0% (n=0)	11.1% (n=4)	0% (n=0)	4.9% (N=9)	
Short term further education (1-2 years)	1.9% (n=1)	0% (n=0)	0% (n=0)	8.3% (n=3)	10% (n=4)	4.4% (N=8)	
Medium further education (3-4 years)	1.9% (n=1)	13.6% (n=3)	9.4% (n=3)	22.2% (n=8)	10.0% (n=4)	10.4% (N=19)	
Bachelor (3 years)	7.5% (n=4)	13.6% (n=3)	0% (n=0)	22.2% (n=8)	12.5% (n=5)	10.9% (N=20)	
Higher education (5 years or more)	3.8% (n=2)	4.5% (n=1)	0% (n=0)	0% (n=0)	0% (n=0)	1.6% (N=3)	
Other	1.9% (n=1)	4.5% (n=1)	0% (n=0)	0% (n=0)	0% (n=0)	0.1% (N=2)	

The last part of the questionnaire asked about the respondent's personal data, such as gender, age, country of birth, educational level and marital status. As for the age groups, the grouping was based on Statistics

Denmark's (2011) education and working age group, while the classification of the education group was based on The International Standard Classification of Education (ISCED). The questionnaire used for the actual

data collection was approved by the Danish Data Protection Agency. The statistical analyses were conducted using SPSS version 19, and a significance level of 0.05 was used.

### 3 RESULTS AND ANALYSIS

Sample characteristics are summarised in Table 3, in the Previous Page.

Staff from various work levels completed and returned the questionnaires (n=183). Of the total, 60.1% were women and 39.9% were men. The highest percentage of female respondents was from Bispebjerg Hospital (73.6%) followed by Hvidovre Hospital (72.2%), while Hillerød Hospital had the lowest percentage of female respondents with 40.9%. Respondents aged between 30 – 49 years comprised the largest age group (57.4%). In addition, more than half of the respondents (50.8%) listed high school degree/gymnasium as their highest education level, while only 1.6% (n=3) of respondents had a higher education of 5 years or more.

Table 4: Self-reported Activities Carried out by Staff in the GOE during the Working Day by Hospital

Most frequently reported activities	Hospitals					Sig	df	F
	Bispebjerg	Hillerød	Herlev	Hvidovre	Rigshospital			
Having lunch	45.3%	4.5%	56.2%	72.2%	75.0%	0.000	182	9.218
Sitting and talking	9.4%	27.3%	9.4%	38.9%	42.5%	0.001	182	5.028
Sitting and relaxing	15.0%	13.6%	15.6%	22.2%	22.5%	0.739	182	0.495
Having quick chat	18.9%	4.5%	0%	27.8%	27.5%	0.005	182	3.806
Walking around	13.2%	40.9%	0%	16.7%	5.0%	0.000	182	5.411
Talking on cellphone	18.9%	31.8%	15.6%	22.2%	5.0%	0.151	182	1.706
Having work meeting	5.7%	0%	0%	0%	0%	0.130	182	1.806
Sitting and waiting	15.0%	0%	0%	8.3%	10.0%	0.051	182	2.404
Sitting quietly	3.8%	0%	0%	2.8%	5.0%	0.611	182	0.674
Reading	3.8%	0%	0%	11.1%	7.5%	0.246	182	1.372
Relaxing	5.7%	0%	0%	0%	7.5%	0.177	182	1.598
Getting away from stressful environment.	35.8%	0%	0%	19.4%	20.0%	0.000	182	6.952
Enjoying the garden	15.0%	0%	6.2%	5.6%	10.0%	0.244	182	1.377
Walking through	7.5%	0%	0%	2.8%	11.3%	0.075	182	2.164
Forgetting worries	1.9%	0%	0%	5.6%	0%	0.260	182	1.331
Exercising	1.9%	4.5%	0%	2.8%	0%	0.678	182	0.579
Smoking	22.6%	27.3%	62.5%	5.6%	0%	0.000	182	16.391

How are the hospital GOE used by the staff and how often and how much time do they spend there? Hospital staff was asked to mark one activity or more from the list in the questionnaire which corresponded to their use of the GOE. As shown in Table 4, the most frequently reported activity is 'having lunch'. 72.2% and 75.0% of the hospital staff at Hvidovre and Rigshospital respectively, reported that they have lunch in the GOE, followed by Herlev (56.2%) and Bispebjerg (45.3%). The number of employees who use the GOE at Hillerød was significantly lower (4.5%). On

the other hand, hospital staff at Hillerød used the GOE for more physical activity such as 'walking around' (40.9%). Hvidovre and Rigshospital again have shown high activity for 'sitting', 'talking' and 'having a quick chat'. Hillerød has shown a high result compared to the other four hospitals for walking around the GOE with 40.9%. Using the cell phone is another popular activity in Hillerød with 31.8% compared to Hvidovre (22.2%), Bispebjerg (18.9%), Herlev (15.6%) and Rigshospital (5.0%).

Table 5: Significant Relationship between Activities Carried out by Staff and the Time Spent in the GOE during the Working Days by Hospital (the highest percentage of each activity is in bold)

Most frequently reported activities and the time spent in the garden	Hospitals				
	Bispebjerg (n=53) %	Hillerød (n=22) %	Herlev (n=32) %	Hvidovre (n=36) %	Rigshospital (n=40) %
<b>Having lunch</b>					
5-10 mins.	37.7	4.5	<b>56.3</b>	25.0	52.5
11-20 mins.	3.8	0	0	25.0	22.5
21-30 mins.	3.8	0	0	22.2	0
31 mins. to 1 hr.	0	0	0	0	0
More than 1 hr.	0	0	0	0	0
<b>Smoking</b>					
5-10 mins.	23.1	22.7	<b>62.5</b>	2.8	0
11-20 mins.	0	4.5	0	2.8	0
21-30 mins.	0	0	0	0	0
31 mins. to 1 hr.	0	0	0	0	0
More than 1 hr.	0	0	0	0	0
<b>Getting away from stressful environment</b>					
5-10 mins.	<b>32.1</b>	0	0	13.9	5.0
11-20 mins.	3.8	0	0	0	15.0
21-30 mins.	0	0	0	5.6	0
31 mins. to 1 hr.	0	0	0	0	0
More than 1 hr.	0	0	0	0	0
<b>Having a quick chat</b>					
5-10 mins.	17.0	4.5	0	<b>27.8</b>	12.5
11-20 mins.	1.9	0	0	0	15.0
21-30 mins.	0	0	0	0	0
31 mins. to 1 hr.	0	0	0	0	0
More than 1 hr.	0	0	0	0	0
<b>Sitting and talking</b>					
5-10 mins.	7.5	13.6	9.4	22.2	12.5
11-20 mins.	1.9	13.6	0	11.1	<b>30.0</b>
21-30 mins.	0	0	0	5.6	0
31 mins. to 1 hr.	0	0	0	0	0
More than 1 hr.	0	0	0	0	0
<b>Walking around</b>					
5-10 mins.	13.2	13.6	0	5.6	5.0
11-20 mins.	0	<b>27.3</b>	0	8.3	0
21-30 mins.	0	0	0	0	0
31 mins. to 1 hr.	0	0	0	0	0
More than 1 hr.	0	0	0	2.8	0



At Bispebjerg staff more often reported using the GOE to get away from stressful environment with 35.8% compared to Hvidovre (19.4%), Rigshospital (20.0%) and none at Hillerød and Herlev. Although smoking is prohibited among the hospital staff, the results have shown that it is significantly high at Herlev Hospital with 62.5% of the staff smoking in the GOE. Results from Hillerød (27.3%), Bispebjerg (22.6%) and Hvidovre (5.6%) indicated that smoking is also being carried there, while none of the staff at Rigshospital mentioned that they used the GOE to smoke.

Of the 17 activities, six ('lunch', 'smoking', 'getting away from stressful environment', 'having a quick chat', 'sitting & talking' and 'walking around') have shown significant differences ( $p < 0.005$ ) in the results.

From the cross tabulation between the activities and time spent, the results indicated that staff spent between 5-10 minutes doing most of the activities in the GOE (Table 5, in the previous page). However, 22% of the respondents at Hvidovre Hospital said that they spend 21-30 minutes for

lunch, while at Rigshospital, 22% of the respondents mentioned that they spend 11-20 minutes for lunch in the GOE. From the table it can also be seen that staff at Rigshospital (30%) spend more time (11-20 minutes) sitting and talking in the GOE.

How satisfied are employees with the GOE where they work?

Table 6 shows the percentage of respondents who are satisfied with the GOE where they work. At four out of five hospitals, staff members stated that they were satisfied, or very satisfied with the hospital GOE. The GOE at Bispebjerg Hospital was the most popular amongst respondents with 67.9% being very satisfied. The results also showed that hospital staff members were satisfied with the three GOE at Rigshospital (75%), Herlev Hospital (62.5%) and Hvidovre Hospital (52.8%). There was a degree of uncertainty regarding preferences amongst staff at Hillerød Hospital with 72.7% answering that they were neither satisfied nor unsatisfied.

Table 6: Percentage of Employees Satisfied with the Hospital GOE Where They Work (the highest percentage of each hospital is in bold)

Hospitals	Percentage of satisfaction with the GOE <i>n=183</i>					P-value
	Very satisfied	Satisfied	Neither/ nor	Dissatisfied	Very dissatisfied	
Bispebjerg (n=53)	<b>67.9</b>	32.1	0	0	0	0.000
Rigshospital (n=40)	15	<b>75.0</b>	10	0	0	0.000
Herlev (n=32)	0	<b>62.5</b>	37.5	0	0	0.000
Hvidovre (n=36)	27.8	<b>52.8</b>	8.3	5.6	5.6	0.000
Hillerød (n=22)	0	0	<b>72.7</b>	13.6	13.6	0.000

Does hospital GOE have restorative potential according to the hospital staff? A series of analyses based on the PRS components (being away, fascination, coherence, compatibility and scope) were carried out in order to determine whether the staff perceived the GOE where they work as being restorative. Post Hoc tests, using Duncan's alpha, for each of the subscales were performed which helped to indicate the scores for the restorative value of each of the hospital GOE. The results are presented in Figure 1.

Bispebjerg Hospital has the highest scores for all components: being away (7.02), fascination (7.22), coherence (7.41), compatibility (7.02), scope (7.43) and preference (7.2). Hillerød Hospital has the lowest scores (varies from 4.5 to 5.59) for all five components of the PRS. Rigshospital (varies from 5.6 to 6.05), Herlev Hospital (varies from 4.5 to 5.59) and Hvidovre Hospital (varies from 4.66 to 6.27) are generally in the middle regarding their scores for restorative value.

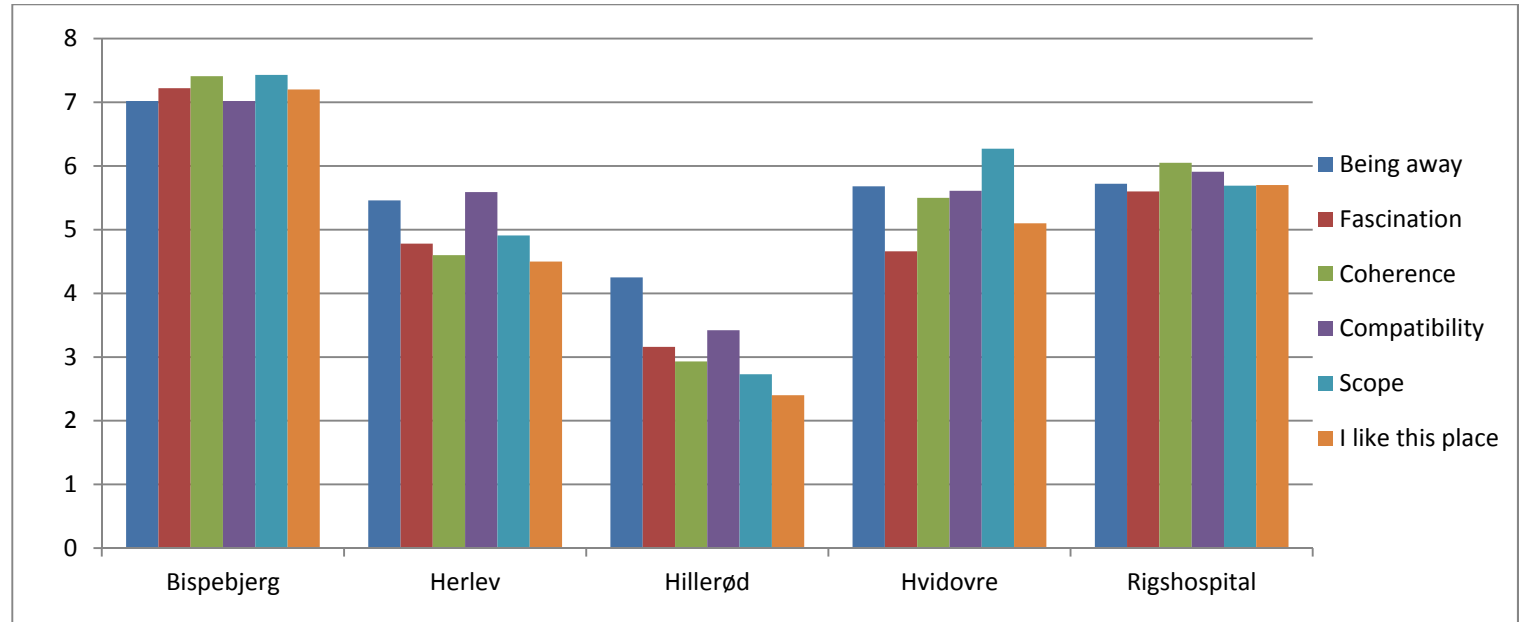


Figure 1: The mean score for the restorative components by hospital

Which features in the outdoor areas do hospital employees prefer?

Figure 2 illustrates the results using descriptive statistics regarding the staff's preferences for features found at the hospital GOE where they work. The bar chart indicates that respondents at Bispebjerg Hospital have a high preference for both the man-made and natural features found in the hospital's GOE. Herlev Hospital has a high mean value for all features. However, the chart indicates that water features and shelter are not present in the GOE at Herlev Hospital. The features shelter, water feature, vegetation, lawn and bird sound all received low scores at Hillerød Hospital compared to the other hospital GOE.

## 4 DISCUSSION

### Sample Characteristics

Of the questionnaire respondents, over 70% were female at Bispebjerg and Hvidovre hospitals. However, while the male to female ratio was on average 20:80, the results show that male staff members use the GOE slightly more than their female colleague at all five hospitals. This finding is consistent with Lottrup et al. (2012) who reported greater usage of GOE at work places among males. Information from all hospitals confirmed that a quarter of the total number of hospital employees was estimated to be on the day-shift each day. Based on this calculation and the number of users on site, it can be estimated that 12% to 30% of the employees from the five hospitals, who

were on the day-shift use the GOE. The percentages are somewhat similar to the results of a study on hospital GOE user groups by Whitehouse et al. (2001) who found that less than 20% of GOE users were staff members. It is logical to assume that, due to their work demand, staff (e.g. doctors) may not have very long or fixed breaks compared to other employees. The highest ratio of the responses to the questionnaire (compared to the total number of employees) was at Hvidovre Hospital. This may be because the GOE is

located close to the staff offices and staff canteen thereby making the GOE more accessible to employees. Therefore, many employees were likely using the GOE and thus, increase the number of approached respondents. This is in accordance with the findings of Sherman et al. (2005) who found that staff members are more likely to use GOE if such areas are closer to employees' offices.

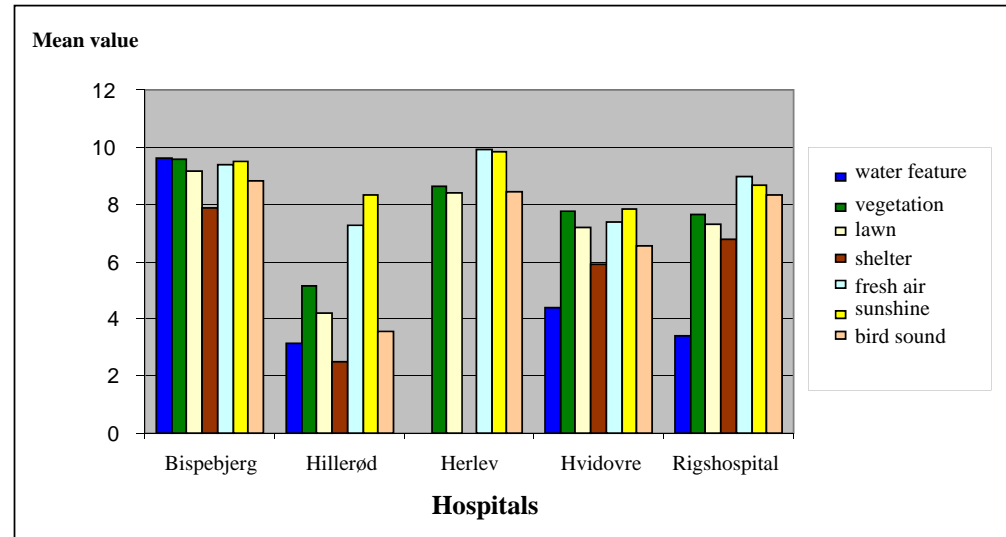


Figure 2: Staff's preference for the natural and man-made features by hospital

How are hospital GOE used by staff and how long do they spend there?

Noon was the most common visiting time among the staff which is consistent with a study by Whitehouse et al. (2001). It is assumed that the lunch break is held at midday and the results from this study indicate that lunch is the most frequent activity that takes place at this time. The majority of the activities in the GOE lasted for between 5 to 10 minutes which is also consistent with the findings of Whitehouse et al. (2001). More employees at Herlev Hospital reported that they use the GOE for lunch compared to the

other hospitals, which may be because the GOE is located close to the staff canteen at Herlev Hospital. In addition, staff at Hvidovre and Rigshospital spent more time eating lunch in the green areas which may be because the GOE at both hospitals are adjacent to cafes with enough outdoor facilities (e.g. tables and chairs). The present findings seem to be consistent with other studies which suggest that location; ease of access and GOE facilities may be important factors in ensuring higher usage (Barnhart et al., 1998; Cooper-Marcus & Barnes, 1999; Sach, 1999; Kovary, 2002; Rodiek, 2005). In addition, Rigshospital is the only hospital which provides a semi-enclosed

structure for smoking close to the GOE. This may explain why none of the staff at Rigshospital mentioned that they used the GOE to smoke. This finding is considered significant in efforts to increase GOE usage as studies by Cooper Marcus & Barnes (1999) and Shepley (1998) have highlighted that smoking is considered a negative distraction for many users of GOE.

The frequent use of the GOE to “get away from a stressful environment” at Bispebjerg Hospital may be related to the presence of water features as restoration can be psychological or physical (Kaplan, 1995) and the water features may provide opportunities for effortless attention in the form of ‘soft fascination’ (Kaplan & Kaplan, 1989). The staff at Bispebjerg Hospital may also be drawn to the GOE for other reasons such as the historical character and architectural beauty (Staats et al., 2003). The frequent use of the GOE to get away from stressful environments may be related to a study by Hernandez (2007) who found that access to GOE during the working day gave staff a feeling of freedom and helped them to cope with their work.

Do different GOE have the same restorative potential according to the hospital staff?

The PRS results in the Duncan tests provide patterns and groupings in terms of the restorative potential of the GOE at the five hospitals. The overall PRS score for the GOE varied from 2.4 to 7.4 and reveals some interesting results when compared with those found by Purcell et al. (2001). In their study, the mean overall PRS score was 3.6 for the scene type which characterised ‘industrial zone’; 3.9 for ‘houses’; 4.5 for ‘city streets’; 5.9 for ‘hills’ and 6.2 for ‘lakes’. Compared with the results by Purcell et al. (2001), the GOE at Bispebjerg Hospital is thus perceived as restorative by the staff as the mean corresponds with the more natural scene types and is likely to promote restoration. On the other hand, the low mean score at Hillerød Hospital clearly indicates that the GOE is considered sparse and does not attract usage. As expected, scope is the subscale that varies the most between the hospitals’ GOE. This finding is in agreement with Tenngart & Hagerhall’s (1999) study which reports similar results due to the difference in the size of the case areas. In terms of the physical arrangement as measured by the subscale coherence, it is not surprising that Rigshospital and Hvidovre

Hospital have higher scores because the GOE at both hospitals were designed with clear and proper plans.

How satisfied are the employees with the GOE where they work?

The high level of satisfaction at Bispebjerg Hospital and Rigshospital may be due to the fact that the GOE are located between buildings (e.g. the laboratories, clinics and offices) making them accessible by many employees so they can enjoy the GOE more. In addition, the variety in the plantings at Bispebjerg may make the GOE attractive (Marcus & Barnes, 1999; Whitehouse et al., 2001; Kearney & Winterbottom, 2005; Rodiek, 2005), although there are not many garden facilities (picnic tables, benches). However, at Rigshospital and Hvidovre Hospital, practical items like chairs, tables and shelters, which provide shelter from rain and shade on a hot day, may have promoted and encouraged more staff to use the GOE (Marcus & Barnes, 1999; Kearney & Winterbottom, 2005). The high number of employees at Hillerød Hospital who were undecided of the answer may be explained by the lack of facilities and lack of a clear demarcation between the GOE and the adjacent car park.

Which features in the GOE do the hospital employees prefer?

The preference for water is expected and consistent with other studies (Tyson, 1998; Cooper Marcus & Barnes, 1999; Moore, 1999; Whitehouse, et al., 2001; Sherman et al., 2005). However, only Bispebjerg Hospital has water features, a fountain and a pond, that function. Employees’ preference for water features may be linked with research on restorative places which suggests that the sight and sound of water are soothing to people who are stressed or upset (Francis & Cooper Marcus, 1992; Moore, 1999; Vapaa, 2002). Water features found at Bispebjerg Hospital may provide the distraction from the employees’ daily work demands (being away) and fascination from the stimulus of viewing the water (Kaplan, 1995). This could explain why the GOE at Bispebjerg Hospital received the highest score in the PRS and the positive satisfaction results.

#### **4.1 Discussion of methodology**

This is the first study carried out at acute care hospitals in Denmark which investigates how employees use GOE. Therefore, because of the limited prior research on the topic, it is highly exploratory. The strength of the study is that it includes five cases which were selected according to a selective and systematic process in order to identify cases that represent other acute care hospitals in Denmark. The five case studies provided a varied dataset in terms of the usage and design of GOE. The method used has managed to achieve the objectives of this study to determine the general use and preferences of the employees who use the hospitals' GOE. In addition, the questionnaire was distributed to the actual users on-site and therefore obtained evaluations of the GOE based on the users' direct experience of the case hospitals. The questionnaires were only distributed to those who chose to be in the GOE, thus leading to the possibility of a biased sample. In terms of the timing of the study, it started in July and ended in early October. Thus, the weather was quite warm in Copenhagen (17-20 degree Celsius) and the activities carried out in the GOE may vary during the colder months and may give different results. However, this limitation could also be said to be a strength of the study as similar research could be applied and compared to other hospitals in countries with warmer climates in other parts of the world, such as the tropical countries. The use of the PRS was successful in assessing the overall restorativeness score of the GOE at the five hospitals. The PRS scores help to further support and identify the strengths and weaknesses of GOE at hospitals. Due to the time limitation of this study, only selected GOE that are widely used were considered while other green areas in other parts of the selected hospitals were excluded. Information on the use of other green areas at the hospitals is therefore not included, and this may have provided significant information on how hospital employees use the outdoor green areas.

### **5 IMPLICATIONS FOR PRACTICE**

The findings from this study may be used as a guide for different audiences such as landscape architects and hospital managers when creating GOE to be used by staff. The main findings have identified aspects such as the location,

the facilities and the need for areas allocated for staff in the GOE which may contribute to the areas being used more by staff. Architects, landscape architects and planners should consider the spaces between buildings and how GOE can be designed to connect to the buildings and reduce the time to access the GOE. A green area which is located close to staff work stations may provide two possibilities. The first is easy access from work stations which may encourage more usage, while the second is that even if staff can not physically be in the GOE, it is beneficial if they can view it from their work stations during working hours. Therefore, having an awareness of the location of buildings' windows is important to provide views for employees who cannot leave their work place.

### **6 FUTURE PERSPECTIVES**

The gender difference and the difference between staff members with different job functions regarding the use of GOE would be an interesting topic for a more in-depth study. Variation in terms of the design of GOE would give broader comparisons using landscape analysis on each GOE. Studies could investigate larger green areas, such as the entire green infrastructure at hospitals, and attempt to determine which areas are used most frequently. An interesting option could be to study the actual stress reducing effect of GOE by using physiological measures and biomarkers. Comparison with similar studies from other countries could be another option.

This study is considered applicable as a source of information for hospitals located in other parts of the world, as the theoretical framework is widely used, and as internationally validated methods were used. Because the data was collected during a warm period, the results are also assumed to be relevant for countries with a warmer climate.

## 7 CONCLUSION

Work-related stress is a global and increasing problem among healthcare workers, and is extremely expensive for the health sector due to high staff turnover and low work productivity which may affect the quality of service given to patients. Green outdoor environments in different contexts are found to be positively related to human health and wellbeing, and this study contributes to the existing knowledge on GOE in the context of acute care hospitals by focussing on a range of different topics regarding such environments, and by investigating these topics through both quantitative and qualitative methods. The findings from this study support the hypothesis that GOE with restorative values have the potential to contribute to a less stressful working environment by offering psychological restoration. The study also shows that a hospital GOE can support a range of different outdoor activities, and that the location of the GOE is crucial in order to increase the staff members' opportunity to use and benefit from these environments. A short distance from a GOE to the workstation is important in order to give staff members with very limited breaks access to the GOE while making the GOE a part of the immediate working environment by making it visible through the windows. Overall, it can be said that the respondents are satisfied with the existing GOE where they work, but improvements in the GOE may ensure that the GOE could be used more by staff, patients, visitors, and the surrounding communities. In the present debate on staff's health and wellbeing, the hospital GOE represents a valuable asset, which could be used to create restorative environments at acute care hospitals.

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