From Experiences of the Outdoors to the Design of Healthcare Environments

A Phenomenological Case Study at Nursing Homes

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Cover: My grandmother Elsa Viola Antonia Lindberg
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Abstract

This thesis strives to create opportunities within landscape architecture to promote the development of the outdoors as a resource for health and well-being in healthcare settings. The overall aim is to describe users' experiences of contact with the outdoors in healthcare environments, and from this generate frameworks and tools for use in the design processes of such environments. The work is built on theoretical frameworks including person-environment fit and universal design, together with theories on restorative and supportive environments. In the background, evidence-based design is described in relation to outdoor environments in healthcare and this leads to the identification of four zones of contact that are used as part of a holistic approach to explore the experience of contact with the outdoors. The result reflects two different parts of the working process. The first part describes the users' contact with the outdoors, as experienced by staff, next of kin and residents. These descriptions portray a variety of universal wishes, needs and opportunities in relation to the outdoor environment in healthcare settings. Such universal needs and wishes became the main perspective in the second part of the work, as the empirical results were interpreted from a researcher's and designer's point of view.

The main contribution of the present work is the generation of frameworks and tools useful in design processes that correspond to users' wishes and needs in healthcare settings. The quality evaluation tool (QET) is the final manifestation of these frameworks. In all, these frameworks consist of 19 environmental qualities, the three design concepts of *comfortable design*, *inspiring design*, and *the gradient of challenge*, and the principal model of *the four zones of contact with the outdoors*. The frameworks also offer explanations of the ways in which the 19 environmental qualities relate to theories on different resources of the outdoors. These frameworks are designed to help designers to be comprehensive and aware in their work, and not overlook important qualities and aspects of the outdoors in a healthcare context. Furthermore, they are designed to be useful in participatory design processes.

Keywords: case study, evidence-based, healthcare architecture, instorative, landscape architecture, nursing home, person-environment fit, phenomenology, place attachment, restorative, salutogenesis, supportive environment, universal design.

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Dedication

To the most wonderful parents, Tore and Eva, for making this thesis possible.

Often, things that are deeply personal prove to be surprisingly universal.
(Ottosson, 2001)

Preface

My interest in landscape architecture and the choice of my professional career have both been influenced by my concern for the people environment interaction. To study this interaction at a very critical point test design issues to their extremes. The point in question is where there is the greatest need for a supporting environment but also where the possible positive impact of the environment is greatest. Therefore, I find the topic of outdoor environments in healthcare truly stimulating and I find it a privilege to research and teach with this focus. This thesis work has been conducted in parallel with part-time teaching and part-time parental leave. Therefore, the goal felt distant at times. However, this allowed for synergies between research and teaching, and time for processing was much appreciated. In my work, I am driven by the conviction that if designers in general knew more about how to design environments for the most vulnerable they would design better environments generally.

Two of the Papers (I and III) in the present thesis were published in special issues of *the Journal of Housing for the Elderly*. Publishing papers in these two special issues was particularly fortunate since both of the issues focused on themes central to the thesis. Paper I was thus published in a special issue on the role of the outdoors in residential environments for aging, and Paper II was published in a special issue on research regarding housing and care for older adults in the Nordic countries of Denmark, Sweden, Norway, Finland, and Iceland. The other two Papers (II and IV) were published in *the Journal of Urban Forestry & Urban Greening.* This journal was selected twice for two reasons. First, because it is a recognized journal focusing on topics central to the present thesis, such as form, function and design of urban forests and other vegetation. Second, because of the fine service performed by the journal service team.

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Contents

List of Publications

This thesis is based on the work contained in the following papers, referred to by Roman numerals in the text:

I Bengtsson, A., Carlsson, C., 2006. Outdoor Environments at Three Nursing Homes: Focus Group Interviews with Staff. *Journal of Housing for the Elderly* 19 (3), 49-69.

II Bengtsson, A., Carlsson, C., 2013. Outdoor Environments at Three Nursing Homes -Qualitative Interviews with Residents and Next of Kin. *Urban Forestry and Urban Greening* 12, 393-400.

III Bengtsson, A., Hägerhäll, C., Englund, J-E., Grahn, P., 2015. Outdoor Environments at Three Nursing Homes: Semantic Environmental Descriptions. *Journal of Housing for the Elderly* 29 (1-2).

IV Bengtsson, A., Grahn, P., 2014. Outdoor Environments in Healthcare Settings: A Quality Evaluation Tool for Use in Designing Healthcare Gardens, *Urban Forestry and Urban Greening* 13 (4), 878-891.

My contributions to the papers included in this thesis are as follows:

I I planned the study and was responsible for the data collection. I performed the analysis and the interpretation, which was examined critically by the co-author. I was responsible for writing the paper.

II I planned the study and was responsible for the data collection. I performed the analysis and the interpretation, which was examined critically by the co-author. I was responsible for writing the paper.

III I planned the study and was responsible for the data collection. The statistical analyses were performed by the third author, and the interpretation was performed jointly. I was responsible for writing the paper

IV I planned the study and was responsible for the data collection. I performed the analysis and the interpretation, which was examined critically by the co-author. I was responsible for writing the paper.

1 Introduction

1.1 From experiences of the outdoors to the design of healthcare environments

This thesis is entitled 'From experiences of the outdoors to the design of healthcare environments'. This title is intended to express that the content ranges from descriptions of experiences of the outdoors to dealing with design issues. The first part concerns the development of environmental qualities and design concepts in relation to the outdoors at nursing homes for residents aged 65 and over. This part is based on descriptions of residents' contact with the outdoors, as experienced by staff, next of kin and the residents themselves. Since the functional capacity varied so much among the nursing home residents, the descriptions portrayed a variety of universal wishes, needs and opportunities in relation to the outdoor environment in healthcare settings. Such universal needs and wishes became the main perspective in the last phase of the working process, as the empirical results were interpreted from a researcher's and designer's point of view.

Thus, as will be shown in the discussion, owing to the character of the results, the overarching focus moved from the specifics of outdoor environments at nursing homes to the wider concept of outdoor environments in healthcare settings in general. This latter concept encompasses both long-term and short-term care, and includes nursing homes for the elderly.

1.2 Rationale – a salutogenic perspective

This thesis strives to create opportunities within landscape architecture to promote the development of the outdoors as a resource in healthcare settings and in particular at nursing homes for the elderly. Specifically, this work is founded on a salutogenic perspective. Salutogenesis is an overarching concept in health studies that was put forward by Antonovsky (1979). Salutogenic strategies strive towards optimal physical, mental and social wellbeing; they complement and also contrast to pathogenic strategies that focus on disease origin and strive to avoid, manage or eliminate disease and infirmity (Antonovsky, 1996; Becker et al., 2010). According to Antonovsky (1996), more than preventive efforts are required to promote health. Used in combination, pathogenic and salutogenic strategies should work to create an environment that facilitates optimal wellbeing (Becker et al., 2010).

Thus, this thesis, focusing on the outdoors in healthcare settings, requires an understanding of not only how to avoid barriers, risks and problems in the

outdoors, but also how the outdoors could benefit the users the most as a resource for their health and wellbeing.

In this regard, there is mounting scientific evidence pointing out that the features and characteristics of outdoor environments in healthcare can play a significant role in patient outcome (Ulrich, 1999; Ulrich et al., 2008; Gonzales & Kirkevol, 2013) and have a positive influence physically, psychologically, on the amount of sleep and sleep patterns, and on the use of drugs (Ulrich, 1986; Rodiek, 2002; Tang & Brown, 2006; Rappe et al., 2006; Whear et al., 2014).

The benefits of encounters with natural elements in the outdoors seem to be greatest for nursing home residents with the greatest psycho-physiological imbalance (Ottosson & Grahn, 2006), for individuals experiencing stress or anxiety (Ulrich, 1999) and for individuals greatly affected by a crisis (Ottosson & Grahn, 2008). Furthermore, individuals with low competence, as regards functional capacity, are more sensitive to the demands of the physical environment than those with higher competence (Lawton & Simon, 1968; Iwarsson, 2005).

Altogether, these results emphasise the potential benefits of appropriately designed outdoor environments in healthcare settings and particularly at nursing homes.

Furthermore, an ageing population, with more elderly people and fewer to take care of them (University of Oxford, 2015; WHO, 2015), increases the importance of research concerning how environments can support health and wellbeing. Research on supportive environments in healthcare, could also be used at a more general level in other parts of society, for instance, as more and more older people in need of care choose or are forced to stay in ordinary housing.

This is in line with the worldwide goal of advancing the rights of persons with disabilities in society (United Nations Enable, 2015). The United Nations Convention on *the Rights of Persons with Disabilities* builds upon full participation and equality throughout society and applies to all those with disabilities, including physical, mental, intellectual or sensory impairments. Therefore, knowledge on how to design and plan environments that provide full participation for the disabled in society on an equal basis with others is essential.

Based on this background, there are many good reasons to obtain information useful for designing outdoor environments in healthcare and to strive for an evidence-based design (Stankos & Schwartz, 2007) that utilises such information.

2 Theoretical framework

2.1 Person-environment fit and universal design

The possibility of accessing and using the environment is essential for the outdoors to be available as a salutogenic resource in healthcare and especially at nursing homes for the elderly. This means that the relationship between the person and the environment has to be considered. The relationship between the person and the environment is often referred to as the *person-environment fit* (Iwarsson & Ståhl, 2003).

The ecological model (Lawton, 1986) illustrates the person-environment fit by describing the relationship between people's competence (e.g., functional capacity) and environmental demands (e.g., barriers in the environment). The relationship between these two factors has an impact on people's experience of wellbeing and emotions, and results in different adaptive behaviours. For instance, if competence is too low in relation to environmental pressure, this results in a negative affect and maladaptive behaviour.

In line with the ecological model, *the docility hypothesis* points out that individuals with lower competence are more sensitive to the demands of the environment than those with higher competence (Lawton & Simon, 1968).

Furthermore, the lower the competence, the more limited is the range of environments supporting wellbeing and positive emotions. *The proactivity hypothesis* (Lawton, 1989) expresses that the higher the competence a person possesses, the greater the probability that this person will satisfy his or her needs by seeking opportunities in the environment.

Nonetheless, Lawton and Nahemow (1973, p. 666) claim that, *"No person is immune to the seductive power of too easy life no matter on what level of competence. It is possible to discourage independent behaviour in the name of service to the elderly."* Furthermore, since individuals with low functional capacity are sensitive to small changes of environmental demands, whereas those with high functional capacity can manage major environmental changes without being negatively affected, it is an important aspect of planning to take into account the users' range of functional capacity.

Iwarsson and Ståhl (2003) describe three useful concepts in relation to the person-environment fit. The first is *accessibility*, which describes the encounter between the person's functional capacity and the design and demands of the physical environment. Accessibility is objective in nature as it refers to the compliance with norms and standards.

Second, *usability* is described as the possibility of moving around, being in and using the environment on equal terms with other citizens. Usability is partly based on the person-environment encounter, but also takes into account users' subjective experience of the degree of usability in an environment.

Third, *universal design* represents an approach to design that corresponds to the needs of the maximum number of users in an environment. Thus, the concept of universal design appears as synonymous to *design for all* (European Commission, 2015) and *inclusive design* (British Standard Institute, 2015)

According to Iwarsson and Ståhl (2003), universal design denotes a process of democracy, equity and citizenship and it most of all concerns the changing of attitudes throughout society.

However, from a salutogenic perspective, for the environment to cause wellbeing and positive emotions, designing in order to prevent inappropriate environmental demands is not the only important dimension. When studying outdoor environments in healthcare, restorative effects of experiences in the outdoors are obviously fundamental. This connects to the original use of the term universal design, which includes the *aesthetic experience.*

According to the architect Ronald Mace, universal design is a concept for designing all products and the built environment to be aesthetic and usable to the greatest extent possible by everyone, regardless of their age, ability or status in life (The Center for Universal Design, 2015).

2.2 The outdoors as a restorative resource

The attention restoration theory (Kaplan, 1995; 2001) and *the psycho-evolutionary theory* (Ulrich, 1984; Ulrich et al., 1991) are two of the most cited theories on restorative environments. *The theory on supportive environments* (Grahn et al., 2010) adds to these two, not least by including a user-environment-specific perspective in relation to the benefits of restorative environments.

2.2.1 The attention restoration theory and qualities of restorative environments

The basic conviction of the attention restoration theory is that humans have two kinds of attention: *directed attention* and *fascination*. Directed attention is used to focus and fight distraction; it helps us to sort the important stimuli from the unimportant (Kaplan, 2001). In contrast, fascination is automatic rather than intentional. Whereas overuse of directed attention may lead to directed attention fatigue, soft fascination instead supports its restoration and recovery. Urban environments tend to be poor for restoring directed attention, whereas natural

environments have been shown to restore directed attention fatigue in a wide range of populations and situations (Kaplan & Berman, 2010).

According to Kaplan and Berman (2010), it is the combination of attracting soft fascination while at the same time limiting the need for directed attention that makes an environment restorative.

Many illnesses, traumatic experiences and difficult life transitions place extreme demands on directed attention (Kaplan, 1992). Such experiences are common in healthcare contexts and promote the idea that people in such situations in particular may benefit from restorative experiences of, for example, natural environments. However, it is not clear exactly what kinds of environment can be counted as natural. For instance, parks and gardens are manmade, but still contain natural elements.

A study by Tenngart Ivarsson and Hägerhäll (2008) pointed out the four restorative qualities described by Kaplan and Kaplan (1989) as essential properties of manmade healthcare gardens. The first quality, of *being away*, describes the importance of an environment that offers change from the everyday environment. The second, *extent*, describes an environment with connectedness and scope, giving a feeling of being in a completely different world. The third, *fascination*, describes the importance of fascinating stimuli in the environment. Fascination calls forth involuntary attention and allows one to function without using directed attention. The fourth, *compatibility*, describes the importance of a balance between what one is inclined to do and wants to do in the environment and what is needed in and supported by the environment (Kaplan & Kaplan, 1989).

Tenngart Ivarsson and Hägerhäll (2008) found that different healthcare gardens are experienced as differently restorative and that the experience of each of the four restorative qualities varies depending on differences in the design and content of the physical environment.

2.2.2 The psycho-evolutionary theory

The attention restoration theory and the psycho-evolutionary theory are based on evolutionary explanations as they suggest that people have an inherent ability to attend to natural elements such as vegetation and water and other physical features of the environment that have been beneficial to survival and wellbeing during human evolution. Thus, both theories suggest that natural environments can be particularly restorative; however, whereas the attention restoration theory focuses on restoration from attentional fatigue, the psycho-evolutionary theory instead focuses on recovery from psycho-physiological stress (Hartig et al., 2010; Joye & van den Berg, 2011).

According to Ulrich et al. (2008), views of nature can produce substantial restoration from psychological and physiological stress within a few minutes. The restorative benefits are manifested as a constellation of emotional, psychological and physiological improvements. Furthermore, scenes of nature sustain positive interest and thus block worrisome thoughts. The psycho-evolutionary theory suggests that immediate, preconscious, affective responses play a central role in the initial stage of responding to nature (Ulrich et al., 1991). The initial affective response influences attention, physiological responses and behaviour differently depending on whether it is positive or negative. This response process is adaptive because it triggers approach-avoidance behaviour that fosters ongoing wellbeing or survival (Ulrich et al., 1991).

According to Ulrich (1986, 1999, 2008), humans have a genetic carryover from evolution so that natural settings with characteristics favourable for survival and wellbeing trigger approach and stress-reducing responses. Ulrich (1986) suggests that this genetic carryover explains the high preference for park-like or savannah-like environments with elements of vegetation, water and the possibility of use as a refuge (places where people can see without being seen), described by among others Orians (1986) and Appleton (1975) and also confirmed in empirical studies (see e.g. Falk & Balling, 2010).

In contrast, looking at built environments that lack nature is significantly less restorative and may even exacerbate stress (Ulrich et al., 2008).

2.2.3 The supportive environment theory

Theories on restorative environments offer explanations as to how experiences, in particular those of natural environments, have the potential to benefit health and wellbeing. Kaplan and Kaplan (1989) and Ulrich (1999) also suggest different resources of such environments, as described above. Together, this contributes to an overarching understanding of the important properties of restorative environments.

Still, seen from a designer's perspective where one has to come up with practical design solutions, there is a gap between theories and the practical design of healthcare environments. In this respect, *the triangle of supporting environments* (Figure 1) makes an important contribution as it is a model that more directly connects needs and preferences in the outdoor environment to different states of executive functions (Grahn et al., 2010).

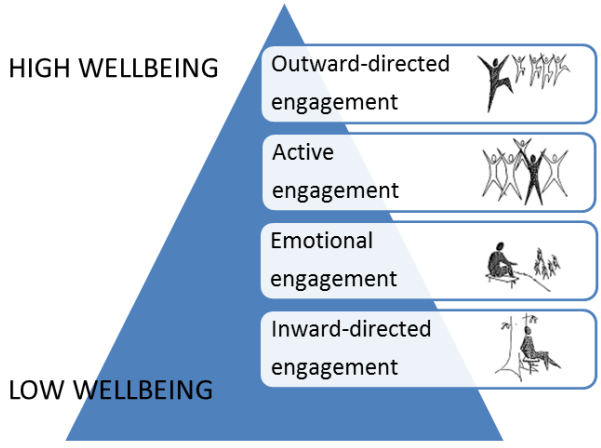

Figure 1. Triangle of supporting environments (from Bengtsson & Grahn, 2014).

The triangle of supporting environments illustrates the way in which a person's relationship with the physical and social environment is dependent on his/her executive functions (i.e., the capacity to prioritise, plan and carry out a duty) (Grahn et al., 2010; Ottosson, 2007).

For instance, in terms of stress-related disorders, it appears that individuals situated at the bottom of the triangle experience low wellbeing and high sensitivity to the environment. They manage directed inwards engagement and need environments where they can be alone. The second level of the triangle comprises individuals who manage emotional engagement. These people still want to be alone, but, at the same time, they desire visual contact with other people, from a distance. At the third level, individuals engage actively in social and active environments and take part in group activities. Finally, at the fourth level, individuals show outward-directed engagement. They have obtained high executive functions and easily handle even very social and/or active environments.

Ulrich (1999) suggests that the likelihood of obtaining restorative benefits of viewing nature is greatest for individuals experiencing high levels of stress, for example, when being confined to healthcare facilities. The triangle of supporting environments illustrates this hypothesis via its shape, as the base (i.e., the widest part of the triangle) corresponds to individuals experiencing the greatest need for environmental support.

The supportive environment theory further builds upon research on different environmental qualities that people in general experience and seek in green

spaces (e.g., parks and gardens), the so-called *perceived sensory dimensions* (Grahn & Stigsdotter, 2010; Grahn et al., 2005). People generally prefer the eight dimensions of *serene, space, nature, rich in species, refuge, culture, prospect* and *social* (Björk et al., 2008). Some of the perceived sensory dimensions are more important the more stressed a person is (Grahn & Stigsdotter, 2010). The preference for the dimensions refuge and nature and to some extent the dimension rich in species has a positive correlation with stress, whereas the dimension social shows a negative correlation (Grahn & Stigsdotter, 2010).

Furthermore, research indicates that the more stressed a person is, and the lower the general health and wellbeing of a person, the more sensitive the person is to the physical environment and its content and design in terms of particular environmental qualities, such as the perceived sensory dimensions (Grahn & Stigsdotter, 2010; Grahn et al., 2010; Björk et al., 2008; de Jong et al., 2012).

According to Ulrich (1999), stress is a central mechanism through which gardens potentially can have significant beneficial effects on health outcomes (i.e. restoration). Patient stress is due to a variety of emotional manifestations such as anxiety and depression, and occurs in a variety of healthcare settings. According to Ulrich, this connection between stress, gardens and health outcomes therefore applies not only to patients that are sensitive to environments that are experienced as over-stimulating and hence stressful. In nursing homes and other long-term care contexts there is the opposite risk of experiencing the social-physical environment as under-stimulating and stressful (Ulrich, 1999).

This indicates that to develop an understanding of the restorative resource of the outdoors, the triangle of supporting environments might be a useful model not only for persons suffering from stress-related disorders but also for persons in healthcare contexts in general.

2.3 Other resources of the outdoors

As presented above, theories on the restorative environment describe the potential of natural environments to restore health and wellbeing. A salutogenic strategy, however, would strive for optimal health (Antonovsky, 1996); in addition, according to Hartig et al. (1996), experiences of nature also have the ability to be *instorative*.

Hartig (2007, p. 164) defines *restoration* as the process of recovering physical, psychological and social capabilities that have become diminished in ongoing efforts to meet the demands of everyday life. The benefits of instorative processes instead involve the deepening or strengthening of capabilities for meeting everyday demands, and these processes need not involve the restoration

of diminished capabilities. For example, a person may become more self-confident, acquire new skills or gain in physical fitness in a particular environment (Hartig, 2007). Furthermore, Stigsdotter and Grahn describe that an instorative environment strengthens identity and self-esteem and makes people feel part of a meaningful context. When the experiences and activities in the environment are in harmony with the user's background and character health, well-being and drive are promoted (Stigsdotter & Grahn, 2002, 2003).

This definition of instorative processes indicates that the outdoor environment has potential as a resource for *personal development*.

In addition, in specific healthcare contexts, other resources of the outdoors besides the restorative have occurred. Ottosson (2007) summarises a series of studies on individuals affected by crises with the statement that, during stays in enriched environments, namely, natural environments, *"an interaction takes place between sensory stimulation, emotions and logical thought – an interaction that leads to a new orientation and new ways of seeing one's self and one's resources"* (p. 64). Ottosson (2007) describes the importance of nature in buffering as well as in coping. Thus, it seems that the outdoors could be both a preventive resource (i.e., by its buffering effect) and a resource for processing (i.e., by its coping effect) and accordingly makes people less vulnerable to crises in two ways.

Furthermore, both Sahlin (2014) and Adevi (2012) conducted studies to increase the understanding of how natural environments support health and wellbeing in nature-based therapy for individuals with stress-related disorders.

Sahlin (2014), much in line with the work of Ottosson described above, identifies nature as an arena for the emergence of existential dimensions and reflections. Nature is described as having a mediating function that awakens participants' existential reflections, which in turn enhances their spiritual wellbeing and helps them gain acceptance of their situation. These existential reflections promoted by the natural environment are important in the participants' recovery process (Sahlin, 2014). Specific benefits that emerged in the study were that *"the participants saw themselves reflected (mirrored) in nature's processes"* and that they felt a *"kinship with nature in which they felt accepted as they were and could find a restoration of self"* (Sahlin et al., 2012, p. 15). The participants also expressed that their new understanding of nature's beauty and detailed interplay helped them to find meaning and coherence in life and existence.

The theory of gerotranscendence (Tornstam, 2005) indicates that outdoor environment involves a potential for personal development late in life as well. In this theory, older people's need for contemplative positive solitude and the

pleasure they derive from it are interpreted as signs of positive developmental change. This development, among other things, concerns a change in what gives joy in life, from more spectacular events (e.g. festivals or travelling the world), to small and commonplace things, often related to experiences of nature (Tornstam, 1997; 2005).

According to Adevi, there is an important link to the childhood landscape in terms of where people feel safe and at home as adults. Coast, forest, rolling hills and lakes, and agriculture are the Swedes' four preferred associations to landscape. The childhood landscape affects people's choices of where to settle and enjoy recreation later in life (Adevi, 2011). In addition, the bond to childhood landscapes creates a base for people's self-regulation processes (i.e., the salutogenic strategy where an individual attempts to improve his/her situation on the basis of his/her own experiences and background) (Adevi, 2012). Adevi refers to this person-environment relationship as nature attachment and suggests that knowledge of a person's nature attachment may be useful to influence his or her psychological wellbeing positively. Nature attachment draws from the concept of *place attachment*. Place attachment concerns the relationship with place and occurs for example when identity processes are linked with particular environments (Rubinstein & Parmelee, 1992). According to Rubinstein and Parmelee, place attachment is a process that may occur at any point in one's life. It seems likely that the outdoor environment could be a possible resource for the development of place attachment in residential and long-term care in particular, including nursing homes for the elderly.

Thus, it seems that the outdoor environment in healthcare has potential as a resource for personal development and for place attachment, in addition to being a restorative resource.

3 Evidence-based design of outdoor environments in healthcare

When intending to promote the development of the different resources of the outdoors in healthcare settings, *evidence-based design* is a useful concept. Evidence-based design has been defined as *"design decisions based on the best available information from credible research and evaluation of existing projects"* (Stankos & Schwartz, 2007, p. 1). In addition, as stated by Hamilton (2003), critical thinking by the designer is an essential factor since the research is rarely an exact fit with the design task.

According to Ulrich (2006), the scientific foundation for evidence-based health design is large and surprisingly robust. As for the outdoor environment, he mentions growing evidence that greater daylight exposure in a patient's room reduces depression and pain, and that views of nature lead to less experience of pain and stress. However, Stankos and Schwarz (2007) argue that, compared with evidence-based medicine, evidence-based design lacks supporting scientific evidence since post-occupancy evaluations in healthcare settings are scarce and there is no systematic review process for healthcare design.

In this contradictory situation, Fröst (2014) suggests that evidence should be used as a basis for dialogue, in collaboration between planners and healthcare staff, in each unique planning process. Such *participatory design processes* have also been identified as essential for creating successful outdoor environments in healthcare (Varni et al., 2004; Cooper Marcus & Sachs, 2014).

Thus, in the development of evidence-based design processes, evidence is highlighted to support discussions rather than as solutions to copy. One interesting aspect to highlight as regards the outdoors as a resource in healthcare is that, even if most of the studies have focused on gardens, there is also evidence for the importance of the view from inside a building, the transition zone between the indoors and the outdoors, and for the importance of the connection to the wider context of the neighbourhood, as will be further described below.

3.1 The view from inside a building

One of the first studies in this field, and possibly the first step towards evidence-based design, was conducted by Ulrich in 1984. Ulrich compared the outcomes of surgical patients with a window view of a bricked wall and patients with a window view of a natural setting. He found that the patients viewing nature had shorter postoperative hospital stays, fewer negative evaluative comments from nurses and took fewer moderate or high doses of analgesics. Ulrich himself

argues that these findings cannot be extended to all built views or to other patient groups.

Nonetheless, even though consideration of the difference between a view of a brick wall and a view of trees is far from describing detailed information for use in designing outdoor environments, from a wider perspective, Ulrich's study consolidates the assertion that an appropriate design of the outdoors is an indispensable resource in healthcare settings. The reason for this is that the study convincingly proves that the quality of the contact with the outdoor environment from inside a healthcare facility really matters.

In line with this, several studies point to the health benefits of viewing natural landscapes (Velaarde et al., 2007). For instance, Tang and Brown (2006) found that simply viewing a garden had a positive impact on the health of nursing home residents and Raanaas et al. (2012) found that an unobstructed bedroom view to natural surroundings supported patients' self-reported physical and mental health during cardiac and pulmonary rehabilitation. In addition, BaHamman (2006) found that reduced daylight exposure diminished patients' circadian rhythms and worsened their sleep at night and Walch et al. (2005) found that patients at a surgical ward that were exposed to a substantial amount of daylight took 22% less medication than patients in rooms with 46% less daylight.

A review by Ulrich et al. (2008) concludes that there is strong evidence that views of nature in healthcare facilities reduce patients' pain and stress. In addition, patients' depression and length of stay are reduced. Furthermore, views of nature support the satisfaction of patients as well as staff and visitors.

Other studies, investigating design characteristics of healthcare facilities, have therefore included the views from within a facility as an important aspect (Parker et al., 2004; Nordin et al., 2015), as well as the possibility of sensing variations in daylight and nature from inside a facility (Fröst et al., 2012, 2013).

Even if the evidence supporting the benefits of views of nature from healthcare facilities is convincing, it offers little guidance in relation to practical designs of the outdoors. As such, according to Velaarde et al. (2007), to enable future landscape design that benefits health and wellbeing, the identification of different environmental qualities of restorative environments is crucial.

3.2 The healthcare garden

Naturally, most research describing important environmental qualities in the outdoors of healthcare facilities focuses on parks and gardens in such settings

(Cooper Marcus & Barnes, 1999; Cooper Marcus & Sachs, 2014). In this context, *the supportive garden theory* (Ulrich, 1999) is fundamental.

3.2.1 The supportive garden theory

Basically, the supportive garden theory is an evidence-based model of supportive environments in healthcare settings that builds on psycho-evolutionary theory. According to Ulrich (1999), *stress* is a central concept to understand the relationship between people's physical wellbeing and their surroundings, but also to explain why gardens in healthcare settings affect medical outcomes. In the supportive garden theory, stress refers to the process of responding to events and environmental features that challenge wellbeing.

Stressful aspects in a healthcare context include pain, loss of control, loss of privacy and depersonalisation. Stress can also be a problem for family members and staff. Stress is central since it is a significant health outcome in itself and also affects many other health outcomes.

The theory of supportive gardens (Ulrich, 1999) builds upon the knowledge of the effectiveness of gardens for stress coping and restoration. It is grounded on evidence that overall describes four resources to reduce stress in patients and improve other health outcomes (i.e., 1. *Sense of control and access to privacy*, 2. *Social support*, 3. *Physical movement and exercise*, 4. *Access to nature and other positive distractions*). If these four resources are appropriately provided in gardens in healthcare settings, they will support stress coping and restoration of patients and staff (Ulrich, 1999). An inappropriately designed garden, on the other hand, can hinder stress recovery, and may even worsen other outcomes.

For instance, a predominance of hardscape, an appraised risk of insecurity, crowding and ambiguous design features are features that hinder recovery and aggravate stress (Ulrich, 1999).

The supportive garden theory builds upon existing evidence and adds specific design information in relation to the four restorative resources: sense of control and access to privacy, social support, physical movement and exercise, and access to nature and other positive distractions. Nonetheless, although Ulrich (1984, 1999) describes a dichotomy between short-term patients and long-term patients and their assumed different needs as regards the outdoors, the supportive garden theory offers little guidance in relation to different user needs.

At the same time, much of the research concerning gardens in healthcare has focused on specific groups of users, such as the frail elderly and people with dementia (Zeisel, 2007; Rodiek, 2008; Chalfont, 2008), individuals with stress-related disorders (Tenngart Ivarsson, 2011; Palsdottir, 2014; Stigsdotter, 2014)

and patients in hospitals/acute care hospitals (Whitehouse, 2001; Sherman et al., 2005; Cooper Marcus, 2007; Shukor, 2012).

Thus, there is a gap between the general theories and the user-specific evidence in the field. In this respect, a study by Grahn et al. (2010) could be used as a starting point to begin building a bridge to span this gap, as further explained in the following section.

3.2.2 Perceived sensory dimensions in healthcare gardens

Grahn et al. (2010) describe four phases of the healing process in nature-based rehabilitation for individuals with stress-related disorders. In phase one, just being in a safe and secure environment starts a process whereby the patients are able to make contact and relearn how to interact with the physical surroundings. In phase two, patients often come to realise that they are undergoing an existential crisis and start to re-evaluate their situation. In phase three, patients' physical and cognitive capacity improves together with their underlying mood. In phase four, patients start to come to terms with their situation and illness.

The authors relate the descriptions of these four phases to the supportive environment theory, described earlier (p. 16), and thus suggest a connection between different sensory dimensions (i.e., environmental qualities) and different phases of the healing process. For individuals with stress-related disorders, refuge is the most essential quality in the beginning of the process, together with wild nature and serene. Space, rich in species and prospect are important later on, and exposure to the environmental qualities culture and social seems to become acceptable at a very late stage of the healing process.

This application of the supportive environment theory by Grahn et al. (2010) presents a promising connection between specific environmental qualities and different levels of executive functioning in relation to the healing process.

However, the connection to other theories in the field can be further developed and the model can also be reconsidered in relation to the different needs of different groups of patients.

3.3 Transition zones

Most of the studies on the outdoors as a resource in healthcare focus on the view from inside a building or on the immediate surroundings (e.g., healthcare gardens). However, there is also evidence for the importance of the transition zone between the indoors and the outdoors and the connection to the wider neighbourhood.

For example, Chalfont and Rodiek (2005) presented a concept of *developed edge zones* to highlight the way in which transition zones might soften the disconnection between indoors and outdoors, physically and visually, and help patients suffering from dementia connect to the world around them.

Furthermore, a number of studies mention either the benefits of contact with the wider neighbourhood for certain groups of patients (Kellet et al., 2005; Kearney & Winterbottom, 2006) or the necessity of being closed off from the surrounding world for other groups of patients (Eriksson et al., 2011; Tenngart Ivarsson, 2011; Lygum et al., 2013; Pálsdóttir, 2014).

This last manifestation of different needs in relation to the wider neighbourhood implies that the triangle of supportive environments described by Grahn (2010) seems to apply to certain groups of patients and needs to be reconsidered with regard to others, as will be reflected in the discussion section.

3.4 Four zones of contact with the outdoors

The above cited research on the importance of the outdoors in healthcare settings includes greatly differing premises, but the studies together point to the importance of investigating environmental qualities of the outdoors in healthcare via a holistic approach in order to grasp all of the zones shown in Figure 2.

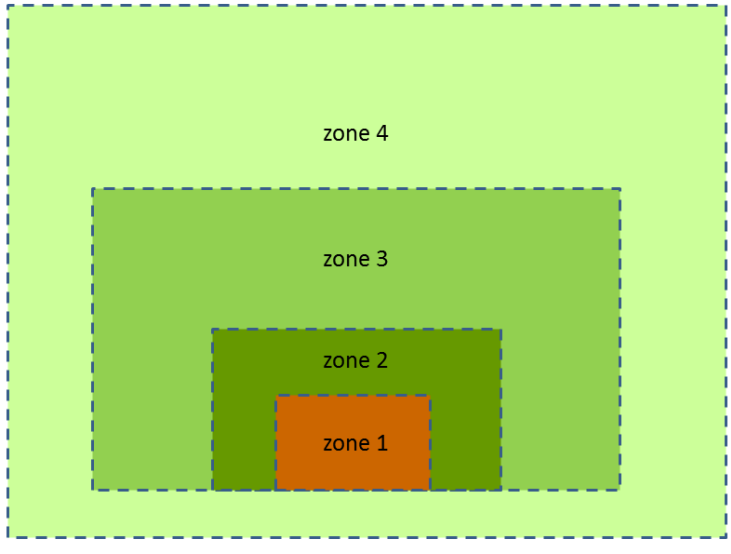

Figure 2. A principal model of *four zones of contact with the outdoors* in healthcare settings: zone 1, from inside a building; zone 2, transition zone; zone 3, immediate surroundings; and zone 4, the wider neighbourhood

Zone one corresponds to the possibility of having contact with the outdoors from inside a building, that is, through the windows. Zone two corresponds to transition zones between indoors and outdoors, for example, balconies, patios, conservatories and entrance areas. Zone three corresponds to the immediate surroundings, that is, ideally an associated garden or park. Zone four corresponds to the wider neighbourhood and whatever opportunities for outdoor experience and use it might encompass.

A principal model of the four zones of contact (Figure 2), could be used as a means to elucidate in what way differences in site planning and content in relation to the different zones would result in different experiences of contact with the outdoors, as will be shown in the method section.

4 Identified gaps in terms of design of the outdoors in healthcare settings

So far in this thesis, existing research in terms of the outdoors in healthcare settings has been described and related to a designer's perspective. The outdoor environment has been identified as a potential resource for health and wellbeing in healthcare contexts, for example, at nursing homes for the elderly.

Existing research provides a lot of useful information, but seen from a designer's perspective, it is mostly either very general or very specific. Theories have a more general approach in relation to different users' various wishes and needs, whereas evidence defining important environmental qualities is often very user-specific. Furthermore, a substantial amount of the obtained evidence focuses on specific zones of contact with the outdoors (e.g., the view from inside a building or a healthcare garden). Accordingly, in relation to the person-environment fit, there is a gap between the general and detailed level.

Thus, the present review of theories and previous research concerning outdoor environments in healthcare identifies gaps in terms of design issues. Altogether, this motivates research that:

1. describes environmental qualities with a *holistic approach* (i.e. assuming that the total is something more than the sum of the parts)
   - to cover a wide range of needs and preferences of a variety of users
   - to cover the total physical environment (i.e., the four zones of contact with the outdoors).
2. generates frameworks that link evidence and theories and thus increase the theoretical understanding of the field.

Furthermore, for research on outdoor environments in healthcare settings to be beneficial for the actual users (e.g., nursing home residents), earlier research points out the need for models and tools that facilitate the use of evidence in participatory design processes (Varni et al., 2004; Cooper Marcus & Sachs, 2014; Fröst, 2014). Thus, there is also a need for research generating:

3. models and tools useful in evidence-based and participatory design processes.

4.1 Aim of the thesis

The overall aim of this thesis is to explore experiences and uses of the outdoors in healthcare settings, particularly nursing homes, in order to be able to describe environmental qualities and formulate design concepts that could be useful in the processes of designing such environments.

On the basis of the wide range of needs and wishes displayed among nursing home residents, the intention is to generate findings that can support the development of the outdoors as a resource in healthcare contexts.

4.1.1 Specific aims of each paper (I-IV)

I To explore important factors for the use of the outdoor environment at nursing homes for older people by asking staff about the residents' uses and experiences of the outdoors. The study focused on factors that have implications for the design and content of the outdoor environment.

II To describe the experiences of residents and next of kin regarding which factors are important for residents' contact with the outdoors at nursing homes and in what way they are important.

III To investigate whether *the semantic environmental description* (i.e., the SMB method of Küller, 1991) can help to describe what characterises an ideal level of pleasantness and other SMB dimensions in the outdoor environment of nursing homes.

IV To compile and integrate theories and evidence that have implications for the process of designing outdoor environments in healthcare settings. In addition, to clarify the integration of theories and qualities, a preliminary outline of an evidence-based tool to be used in such design processes is presented.

5 Phenomenological case study

The basic conditions for the choice of methodology were: (1) to study environmental qualities in healthcare settings using a holistic approach on the physical environment and on the users' preferences and needs, (2) to generate frameworks that help clarify the connection between evidence (i.e. important environmental qualities) and theories, and based on this (3) to begin the development of a tool for use in designing outdoor environments in healthcare.

A methodology covering these three conditions needs to represent a way of finding knowledge that is useful for practical applications (in this case, in landscape design); as such, *case study research* is appropriate (Stake, 1995; Yin, 2003; Johansson, 2007), as is *empirical phenomenology* (Aspers, 2009). In addition, the approach of studying a phenomenon in its real-life context via people experiencing it is particularly relevant in phenomenology (Giorgi, 2009), as well as in case study research (Stake, 1995).

Therefore, in terms of methodology, the present work is defined as *a phenomenological case study*.

The phenomenon studied, *Contact with the outdoors in healthcare settings*, is unique and individual to each person experiencing it. There is substantial variation within the elderly population in terms of health and functional status, as well as attitude, goals and lifestyle. Thus, the same environment may pose different opportunities as well as difficulties for different people (Sugiyama et al., 2009). For example, at a nursing home, many people with different preferences and needs are dependent on one environment (Parker et al., 2004); thus, they can be a source of descriptions that are useful to obtain a holistic understanding of the phenomenon.

Therefore, nursing homes were considered to be useful study cases in the present methodology. The character of the study was *instrumental* (in contrast to *intrinsic*), as it studied a phenomenon of relevance to many people in many places (Stake, 1995). Thus, the cases play a supportive role in facilitating our understanding of the phenomenon (Stake, 2000). Furthermore, as is common in instrumental case studies (Stake, 1995), this approach was here used for the further development of theory.

Figure 3 illustrates the four phases of the present methodology and in which phase each of the papers contributes to the methodology (for an overview, see Table 2, p. 40). Papers I and II form the empirical phenomenological base of the methodology and mainly represent the first two phases, namely, *the empirical*

phase and *the analytical phase*. The main intention of these two phases is to describe the perspective of the users.

The interpretive phase is the third phase, in which the perspective of the users is elucidated by other relevant perspectives, for example, a designer's perspective. The interpretive phase begins to some extent in the discussion sections of Papers I and II, but it is mainly represented by Papers III and IV.

The theoretical phase is mainly presented in Paper IV. In this last of the four phases, *theory triangulation* is used to develop frameworks for design processes. Since Papers III and IV in particular contribute to the interpretive and the theoretical phases of the methodology, they have their own empirical and analytical implementations.

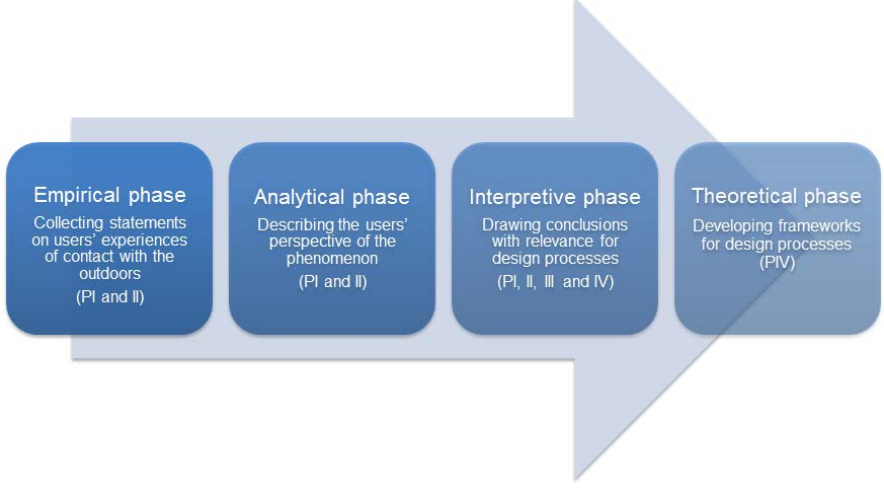

Figure 3. Illustration of the four phases of the phenomenological case study.

The papers were written in chronological order and, in the working process, they built on one another. Firstly, the same three cases were used as settings to collect empirical data for Papers I-III. All of the empirical data from the three cases were collected before the analytical process began. Paper I was published before the analysis of Paper II was finished and Paper II was published before the analysis of Paper III was finished, which gave the opportunity to refer to (and build on) the earlier papers. Thus, in Paper II, the results were discussed in relation to the results of Paper I and, in Paper III, the results were discussed in relation to the results of Papers I-II. The results of Papers I-III were all used in the development of frameworks for design in Paper IV. Details of the progression are presented in Table 4 (p. 54).

5.1 Empirical phase

In the present work, the focus on aspects of outdoor environments in healthcare settings with relevance to landscape architecture was clear from the start. However, after having visited several nursing homes and having conducted a few pilot interviews, it was clear that it was not possible simply to start asking questions about landscape design. Very few (if any) study participants with experience of the phenomenon of contact with the outdoors would have been able to communicate on such terms.

Instead, the studies began with an *open phenomenological approach* (Kvale & Brinkmann, 2009). In line with the phenomenological approach, the interviewer's scientific pre-understanding of the subject matter should be minimised during the interview in order to arrive at an unprejudiced description of the phenomenon (Giorgi, 1985, 2009; Kvale & Brinkmann, 2009).

One important starting point for the empirical phase was thus to realise that the researchers did not know what, among the experiences of contact with the outdoors at nursing homes, would in the end prove relevant to the aim of the research. Existing theories and research were therefore primarily used as schemes of reference (Aspers, 2009) for the holistic approach to study the phenomenon, both to cover a wide range in needs and preferences of different users and to cover the entire physical environment relevant to the phenomenon.

5.1.1 Selection of cases and data collection

To collect data in the empirical phase, three nursing homes in urban areas in southern Sweden were selected. These cases were used primarily to obtain richness and variety in the data and to reveal salient points, rather than to lead to concrete comparisons.

To achieve a holistic approach to the phenomenon, differences in set-up and content regarding the four zones of contact with the outdoors (1. from inside a building, 2. transition zone, 3. the immediate surroundings and 4. the wider neighbourhood) were used as criteria for selection of the study cases. The three cases thus represent three principally different relationships between the facility and the outdoor environment (for details, see Figure 2, Table 3 and Figures 4-6).

This is in line with Yin's statement (2003) that the case study method is particularly useful to cover contextual conditions that are pertinent to the studied phenomenon.

Table 1. *Descriptions of contact with the outdoor environment in zones 1-4 in the three cases. Photos of the three cases are shown in Figures 7-14.*

Outdoor contact	Case 1 (88 residents)	Case 2 (31 residents)	Case 3 (24 residents)
Zone 1	View of atriums, residential area or public park	View of residential area (detached houses) or the sea	View of residential area (tower blocks) or garden/public park from ground floor
Zone 2	Patios	Balconies, patio	Conservatory
Zone 3	A. Large unfenced park-like garden with the possibility to view zone 4 B. Atrium with no view of zone 4	Garden with wire fence with the possibility to view zone 4	Garden in part of courtyard fenced with wide planks; no view of zone 4
Zone 4	Residential area, flats and detached houses	Residential area, detached houses, close to the sea	Business, shopping and residential area, tower blocks

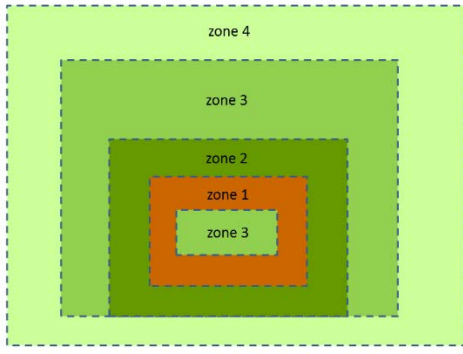

Figure 4. Principal model of the four zones of contact in case 1. For details see Table 1.

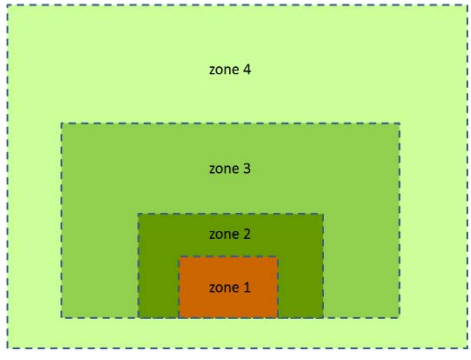

Figure 5. Principal model of the four zones of contact in case 2. For details see Table 1.

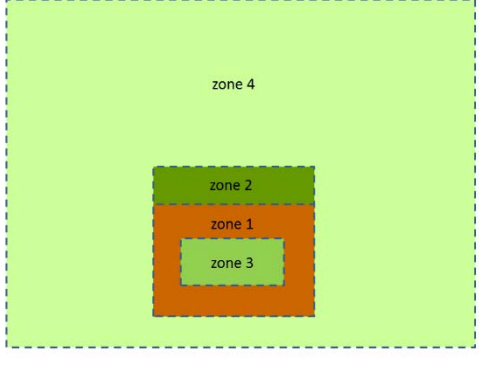

Figure 6. Principal model of the four zones of contact in case 3. For details see Table 1.

5.1.2 Triangulation of data

In the present study, different user perspectives were desired to obtain a holistic approach on the phenomenon. There is great variation in terms of the needs and preferences in relation to the physical environment for nursing home residents (Parker et al., 2004), so nursing home staff, residents and next of kin were all included as participants in this study. Staff, residents and next of kin all had their own lived experience of the phenomenon (i.e., nursing home residents' contact with the outdoors) and their perspectives were investigated via different interview methods.

This is all in line with case study research as well as phenomenology, since in both methodologies the selection of data sources is crucial to obtain rich and relevant information (Stake, 1995; Giorgi, 2009; Aspers, 2009). The use of multiple sources of information is desirable in order to be able to triangulate data (Yin, 2003; Johansson, 2007). In addition, since the multiple sources of evidence essentially provide multiple measures of the same phenomenon, data triangulation addresses the potential problem of construct validity in case study research (Yin, 2003; Johansson, 2007).

5.1.3 Qualitative interviews

Focus group interviews (Morgan, 1998) as well as *semi-structured life-world interviews* (Kvale & Brinkmann, 2009) were conducted to obtain qualitative data through open-ended questions. Both techniques were used to collect data about *the residents' experiences and use of the outdoors*. In line with an open phenomenological approach, one basic ambition in the interviews was for the interviewer to be open to and really try to see the participants' perspectives of the phenomenon. Another ambition was to strive to create a comfortable situation for the interviewees to be able to talk freely (Aspers, 2009; Kvale & Brinkmann, 2009).

At each nursing home, four to five staff members participated in one focus group. Altogether 14 research participants were included; all of them were women in the age range from 20 to 60 years. They had been working at one of the three nursing homes for a period from just a few months up to about 20 years, and all of them had particular experience of residents' use of the outdoors.

The participants in the semi-structured life-world interviews were nursing home residents who fairly frequently used the outdoors and next of kin who regularly assisted them. Altogether, 12 residents and 7 next of kin participated in 16 interviews. The residents were between 74 and 96 years of age (mean=86.0).

To achieve diversity in the participants' experiences, the chosen residents had various capacities in terms of mobility, balance, vision, hearing and cognition.

A few residents could walk using a walking stick, while others required a wheelchair and an assistant. Some also suffered from Alzheimer's disease and other cognitive difficulties; in these cases, next of kin participated in the study on behalf of the residents. The length of residence at one of the three nursing homes varied between six months and six years. Next of kin were between 50 and 83 years of age (mean=69.8). They were close family members or other relatives and visited their loved ones once to several times a week.

5.2 Analytical phase

The analytical phase started after all of the interviews had been conducted. The ambition was to describe the experience of contact with the outdoors from the users' perspective (i.e., staff, residents and next of kin). A corresponding step in Aspers' description of empirical phenomenology (2009, p. 6) is to *"study first-order constructs (and bracket the theories)"*. In the present work, first-order constructs refer to the description of the perspective of people with a lived experience of the phenomenon. Existing research was used as a frame of reference to guide the research to the right empirical domains (Aspers, 2009) and to obtain comprehensive information about the phenomenon but not to organise and structure the empirical material.

To describe the users' perspective completely as the first step, without interpreting the result in relation to other perspectives of the research (e.g. the designer's perspective), had advantages. It gave the possibility of seeing the whole picture of the users' perspective before starting the interpretation process.

Furthermore, the results of the analytical phase in itself could serve as a basis for reader-based analytical generalisation (Kvale & Brinkmann, 2009) or naturalistic generalisation (Stake, 1995), as it gives readers the possibility of interpreting the results in their own way based on their experience. Readers of Papers I and II are thus able to understand the users' perspective. This means that designers reading the results of Papers I and II could understand and develop sensitivity to the users' experience of contact with the outdoors and be able to use this understanding when designing outdoor environments in healthcare settings.

In addition, the descriptions of the users' perspectives could be of use for other professions besides designers, namely, those with the possibility of improving the options for going outdoors and/or the quality of the experience of being outdoors, for instance, healthcare staff, gardeners and decision-makers in healthcare contexts.

5.2.1 Meaning condensation

Meaning condensation, which is a method of analysing interviews according to the open phenomenological approach (Kvale & Brinkmann, 2009), was used for analysing transcripts from the interviews with nursing home staff, residents and next of kin (in Papers I and II). The analytical procedure can be presented in different steps (depending on the division and demarcation of the description). Giorgi (1985, 2009) presents four steps, whereas Kvale and Brinkmann (2009) present five steps for this process. The common intention is to describe the phenomenon from the interviewees' perspectives.

The steps presented here build upon the descriptions mentioned above, together with the experiences of analysing the interviews for Papers I and II. This presentation is more developed and richer in detail than the presentation in the actual papers. To increase the credibility of the research reported in Papers I and II, all steps were validated by the second author during the analysis.

1) *Sense of the whole*: Initially, all interview transcripts were read through to get a sense of the whole.

2) *Discriminating meaning units*: The interview transcripts were broken down to natural meaning units (using different colours). New meaning units were distinguished whenever there was a change of meaning in the situation that appeared to be relevant to the phenomenon studied.

3) *Explicating meaning units*: All meaning units were restated as simply as possible in relation to the phenomenon. The statements were screened by the removal of specific places and people in order to make them relevant to the phenomenon in a more general way.

4) *Synthesising meaning units into themes*: The meaning units were synthesised with the intention of arriving at general themes by building on the concrete expressions (and not by abstraction or formalisation). Each theme was used to compile the meaning units describing a certain aspect of the phenomenon. Each theme was presented with a description and illustrative quotes.

5) *Describing the phenomenon*: The themes were tied together into a descriptive statement of the phenomenon and its structure. This description was presented in the result sections of Papers I and II. All meaning units from step 3 were contained in the general description. The general description is intended as much as possible to depart from the specifics to communicate the most general meaning of the phenomenon.

However, in the present work, it was essential that details that could be of relevance in different contexts of outdoor environments, and thus for landscape design, were kept in the description.

6) *Interpretations and theoretical analyses:* The description of the phenomenon is interpreted from a research and design perspective. This step is presented in the discussion sections of Papers I and II. Since this step is part of the interpretive phase, it is described further in the next section.

The above-described steps were used in the analytical procedures of Papers I and II. The analysis of Paper I was completed first and, before completing the analysis of Paper II, the two resulting descriptions of the users' perspective were compared in order to avoid potentially confusing differences in the choices of words and expressions. The intention here was for similarities and differences concerning the phenomenon of contact with the outdoors expressed by the different users to emerge clearly.

5.3 Interpretive phase

The interpretive phase involves taking the step from the perspective of the users to other perspectives relevant to the research. To explore how the results of the analytical phase could be understood and used, the interpretive phase was employed, which discussed and related these results to research in the field; conclusions that were relevant to design were also suggested. These conclusions suggest overarching design concepts and principles in relation to specific environmental qualities.

Kvale and Brinkmann (2009, p. 205-208) similarly separate meaning condensation from meaning interpretation, and point out that, *"The interpretation of the meaning of interview texts goes beyond a structuring of the manifest meanings of what is said to deeper and more critical interpretations of the text"*.

Second-order constructs are the corresponding step in Aspers' (2009) description of empirical phenomenology. According to him, second-order constructs must communicate in two directions, that is, they need to connect to the users' perspective as well as to the scientific field. In this study, the intention was also to connect to the designers' perspective; this is particularly true for Paper IV, by the presentation of an outline of *the quality evaluation tool* (QET), a tool for use in evidence-based design processes.

In Papers I and II, the analytical phase was presented in the results sections whereas the interpretive phase was presented in the discussion sections. This distinction between the results of the analytical phase and the interpretive phase was intended to increase the transparency of the research and to allow the reader to make their own judgment on the adequacy of the interpretations, in other

words, to determine the degree to which they are grounded in the phenomenon studied and, at the same time, shed light on the field of research.

5.3.1 The SMB-method

Paper III contributed new perspectives in the interpretive phase of the methodology. As a contrast to the user perspective, a group of pensioners who were unfamiliar with the nursing homes in question were invited to assess them by means of *the semantic environmental description* (i.e., the SMB method by Küller, 1991).

Altogether 26 pensioners participated (20 women and 6 men; mean age = 72 years). All of them were above 60 years and still lived in their ordinary homes. The pensioners rated the outdoor environments of the three cases described in Table 1 and Figures 4-14. In case 1, two assessments were conducted since the outdoor environment consisted of two substantially different and physically separated entities, namely, an atrium that could only be reached from inside the building and a large, unfenced garden defined by the building on one side and by roads and pavements on the three other sides. Pensioners also rated an imagined ideal outdoor environment at a nursing home and a corresponding assessment of an imagined ideal environment was later also conducted by nursing home staff (25 women, 1 man; mean age = 47 years).

The SMB method is a standardised tool to describe the experience of the outdoors based on quantitative measures of data analysis. This method was used to describe and compare the outdoors in the three cases, and to compare them to an imagined ideal outdoor nursing home environment. This quantitative approach contrasts to the phenomenological approach used in Papers I and II. Thus, the SMB method was used to add new perspectives to the methodology as well as to the user perspective.

Furthermore, this means that the present work builds upon methodological triangulation by collecting information using a mixture of methods (i.e., focus group interview, semi-structured life-world interview and the SMB method). According to Johansson (2007), the strategy of combining several methods to illuminate cases from different perspectives is a major feature of case study research.

The interpretation phase reached the furthest in Paper IV, as the environmental qualities and design concepts from Papers I, II and III were integrated into it, along with other theories and evidence. In this phase, environmental qualities and design concepts were processed to allow the development of coherent descriptions intended to be useful in design practice.

5.4 Theoretical phase

The theoretical phase is the last phase of the methodology. In this phase, the environmental qualities and design concepts generated from the earlier phases were integrated with existing evidence and theories in order to create frameworks for design. This phase began to some extent in the discussion sections of Papers I, II and III, but the main part took place in Paper IV.
In Paper IV, theory triangulation (Patton, 2002; Johansson, 2007) was used to synthesise theories and evidence of relevance to the design and content of outdoor environments in healthcare settings. Theories and concepts with implications for the general design of outdoor environments in healthcare settings were examined. Then, the theory with the clearest implications for the general design of outdoor environments in healthcare was used as an underlying principle to which other theories and concepts were related in a set of models. This theoretical foundation was then used as a guide to integrate evidence on environmental qualities in outdoor environments in healthcare in order to create the frameworks. The environmental qualities included correspond to a wide range of needs ranging from basic human needs to more specific needs connected to impaired physical and/or cognitive functions as well as emotional disabilities and fatigue.

5.5 Ethical considerations

Ethical considerations have been addressed and reflected upon throughout this thesis. In all parts of the work associated with the participants, participation was voluntary. Prior to inclusion, information about the purpose of the study was provided and each person gave their informed consent to participate. If the individuals involved could not give their own consent to participate, next of kin were consulted.
It was important to perform the interviews at a place where the participants felt comfortable. Therefore, the participants were given the opportunity to choose the place for the interview. It was clear to the participants that they could decide what they wanted to share. The data were recorded, stored and anonymised to ensure that no unauthorised access was possible and that the individuals' identities were protected. The principles of the *Helsinki Declaration* (WMA, 1964) have been followed throughout this thesis.

Table 2. *Summary of methodology and methods in Papers I-IV.*

	Paper I	Paper II	Paper III	Paper IV
Main focus	Staff's view of residents' contact with the outdoors	Residents' and next of kin's view of contact with the outdoors	View of outdoor environments at nursing homes by people unfamiliar with them	Evidence-based design of outdoor environments in healthcare settings
Zones included	Zones 1-4	Zones 1-4	Mainly zone 3	Zones 1-4
Methodology	----------Phenomenological case study----------			
Methods of data collection	Focus group interviews	Semi-structured life-world interviews	Semantic environmental description (SMB method)	Research review
Methods of analysis	--Meaning condensation--		SMB profiles, cross-case analysis,	Theory triangulation
Settings	-------Three nursing homes (C1, C2, C3)-------			-
Participants	Staff members from C1, C2 and C3 (N=14)	Residents (N=12) and next of kin (N=7) from C1, C2 and C3	Pensioners (N=26) and nursing home staff (N=26) unfamiliar with C1, C2 and C3	-

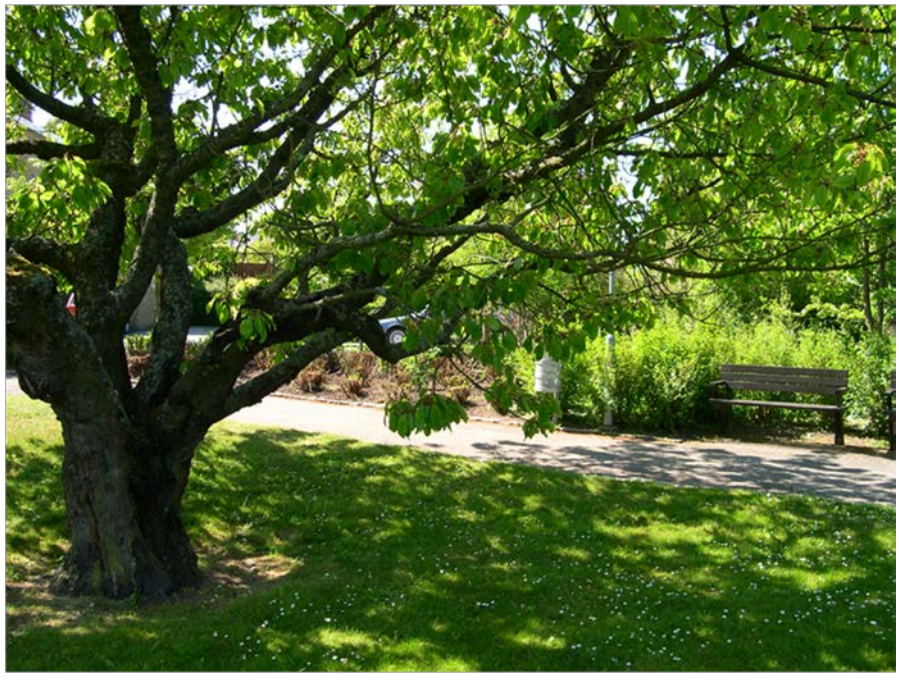

Figure 7. The large unfenced park-like garden in case 1.

Figure 8. Various planted areas and handrails along the walking paths in case 1.

Figure 9. The atrium in case 1.

Figure 10. Opportunities to socialize in the atrium in case 1.

Figure 11. The garden in case 2.

Figure 12. Balconies and large windows at the nursing home in case 2.

Figure 13. Garden in part of courtyard in case 3.

Figure 14. Opportunities to socialize in the garden in case 3.

6 Summaries of papers included in the thesis

This summary of papers presents the way in which the specifics of each paper contributed to the overall aim of the study and brought different perspectives on the phenomenon studied, namely, *contact with the outdoors in healthcare settings*. An overview of such specifics and results is presented in Tables 4 and 5 (pp. 44-45). The four papers included in the present thesis mainly share the same underlying theories and research, which are presented in the background section.

The above-described methodology, that is, an phenomenological case study, corresponds to the overall aim of the present thesis and the description also presents details of the different methods and the way in which each of them contributes to the methodology (for an overview, see Table 2, p. 40). Details regarding the method of data collection and data analysis that were not presented in the methodology section will be specifically described in the summaries.

6.1 Summary of Paper I

This study investigated staff's view of how the residents experienced and used the outdoors via focus group interviews. Many nursing homes accommodate people with diverse diagnoses, so the staff's insights were assumed to be particularly important since they obtain comprehensive knowledge of the users' wishes, needs and capacities in the environment.

Two main themes and ten sub-themes were identified when the focus group interviews were analysed. Theme one, *being comfortable in the outdoor environment*, describes the residents' special needs to be able to and dare to use the outdoors. The second main theme, *access to surrounding life*, describes the residents' needs for change and variety in their everyday situation.

The two themes counterbalance one another. On the one hand, the residents were reported to be very sensitive and needed a design that promoted security and safety and protected them from disturbance and negative impressions, namely, a *precautionary design*. Here, the immediate surroundings are of the highest priority since many of the residents are not able to go far from the nursing home. The close environment is secure, easily reached and provides elements that help the residents to feel at home and easily recognize the surroundings. The precautionary design includes places protected from wind and rain, places that cannot be viewed by outsiders, and places where you can be on your own.

Furthermore, the design is barrier-free and avoids doctored design solutions that clash with the homelike quality of the environment.

On the other hand, the residents also benefitted from a design that promoted stimulation of the senses and mind, that is, an *inspiring design*. This design provides views of colourful plants and traditional elements associated with the seasons and the residents' earlier lives. These views are available not only when using the outdoors but also from inside the building. The design gives opportunities to see people coming and going to the facility or persons, bicycles, dogs, etc., passing by. The design gives the possibility to get close to sweet-smelling vegetation, to touch leaves and branches, to hear sounds of water and other things that stimulate the senses. It is a flexible design that gives possibilities to meet and to socialize in large as well as in small groups. The sub-themes presented in Table 5 (p. 55) provide descriptions of environmental aspects essential to the two main themes.

The focus group interviews proved the staff's understanding and empathy with the residents; thus, the obtained results can have implications for design in terms of supporting and benefitting the residents, rather than the staff themselves. However, to explore the complexity of the phenomenon of contact with the outdoors further, the results need to be related to the perspectives of the residents as well as their next of kin.

6.2 Summary of Paper II

This study investigated the views of residents and next of kin on how the residents experienced and used the outdoors via qualitative interviews. A semi-structured life-world interview technique (Kvale & Brinkmann, 2009) was used since it was the participants' individual first-hand experiences of contact with the outdoors that were sought. Therefore, questions were asked chiefly to encourage participants to describe their own experiences; thus, the descriptions mainly originated from each individual's particular needs.

Whereas in paper I, staff summarised the experiences of a larger number of residents, in Paper II residents and next of kin instead described their own experiences with personal and emotional involvement, and the interviews provided more detailed and clearer examples than the interviews with staff did. Two main themes and twelve sub-themes were identified. The main themes – *access to nature and surrounding life* and *being comfortable in the outdoor* environment confirmed the results presented in Paper I.

However, whereas staff focused more on preconditions for residents to be comfortable in the outdoor environment, residents and next of kin emphasised

how access to nature and surrounding life led to positive impressions and stimulation. The main theme access to nature and surrounding life described how contact with the outdoors helped residents feel happy, free and alive and revealed several positive distractions that promoted wellbeing and quality of life. Furthermore, access to nature and surrounding life increased residents' awareness of their surroundings, and helped them feel at home and feel they were part of ordinary life.

The sub-themes presented in Table 5 (p. 55) provide descriptions of environmental aspects relevant to the two main themes. A few sub-themes were renamed in Paper II, in order to express their true meaning better. Precautionary design was renamed *comfortable design* since this latter term was considered to sound more positive. An overview of differences in terms of the results reported in the two papers is presented in Table 5 (p. 55).

In relation to the results reported in Paper I, the results of Paper II further developed the understanding of the two design concepts: *inspiring design* versus *precautionary/comfortable design*. To accomplish a general design that addresses users' different wishes and needs, it is useful to differentiate between the qualities of inspiring design and comfortable design. All participants in the present study expressed a need for both perspectives. Some residents were eager to get new impressions and meet new people, as expressed in the sub-theme 'impressions of life'. Still others were very sensitive to anything unknown, and for them familiarity was a necessity.

Thus, the results of Paper II indicate that comfortable design needs to be considered in the environment as a whole, whereas certain qualities of inspiring design need to be positioned deliberately so that residents can choose whether to benefit from them or not.

6.3 Summary of Paper III

In this study, *the semantic environmental description* (the SMB method developed by Küller, 1991), was used to compare the outdoor environment of the three cases and an imagined ideal outdoor environment at a nursing home. The semantic environmental description is a standardised tool intended to describe an environment systematically through the assessments of eight dimensions originating from groupings of 36 adjectives validated in a number of studies (Küller, 1991). Participants answer on a scale from 1 to 7 (1=slightly and 7=very) about how well each adjective agrees with their perception of the environment. Mean values are typically presented in a profile of the eight

dimensions of *pleasantness, complexity, unity, enclosedness, potency, social status, affection* and *originality*.

This study in particular contributed to the interpretive phase of the methodology. Whereas in Papers I and II, the three cases were used primarily to gain richness and variety in the data, in Paper III, they were used for concrete comparisons. Furthermore, as a contrast to the user perspective in Papers I and II, a group of pensioners who were unfamiliar with the particular nursing homes were invited to participate in this study.

The assessments of the different environments were compared in a cross-case analysis (Patton, 2002). Thus, similarities and differences were examined across cases and in relation to an imagined ideal environment. In the discussion, an interpretation of how to connect the assessments to design elements constituted the last phase of the cross-case analysis. Since the SMB does not include an explanation of how to connect the assessment to design elements (Küller, 1991; Karlsson et al., 2003), results from previous research were instead used to guide such an interpretation. In particular, themes and concepts from Papers I and II were used to gain a deeper understanding of the results reported.

Altogether, the interpretations led to the description of an ideal nursing home garden as being distinguished by:

- A spacious area with stimulating walks as well as inviting and safe places to spend time in, and overall a multitude of planted areas and views offering a variety of experiences.
- A delicate balance between different parts and the whole, so that the complexity fulfils the residents' need for variation and change, without outweighing unity with too many impressions, making it difficult for residents to orientate themselves and understand the environment. Planted areas that are functional all year round could be used to enhance the unity factor.
- Outer boundaries carefully designed to create a safe and secure environment and a feeling of being safely enclosed but not confined. These boundaries should be designed with special regard for the degree of safety needed by the particular users and for the qualities of the neighbourhood.
- A balanced design without extreme content and shapes that might be misinterpreted or give feelings of insecurity or being out of control.
- A well-kept and well-managed garden with various planted areas that are functional all year round. In addition, a garden design and content that support familiarity and recognition.
- Some exclusive and different features or elements for the residents to be proud of and to show off to visitors.

The environment that was the closest to the ideal environment according to the assessments was the unfenced garden in case 1. This park-like environment was larger than the other environments and had more variation in vegetation.

However, in a way, all of the points above highlight the delicate balance between inspiring and comforting qualities in the environment and, thus, Paper III clearly builds on the results reported in Papers I and II.

6.4 Summary of Paper IV

The main purpose of this paper was to compile and integrate theories and evidence with implications for the processes of designing outdoor environments in healthcare settings and to begin the construction of *the quality evaluation tool* (QET) for use in such processes. Theory triangulation (Patton, 2002) was used to integrate theories and evidence from selected research on people's health/wellbeing and the outdoor environment. The procedure comprised two steps.

In the first step, theories and models with implications either for general design or for constituents of outdoor environments in healthcare settings were integrated into frameworks for design. The triangle of supporting environments was used as the foundation (Figure 15), and other theories and concepts were then related to this theory using a set of models (Figure 16-19).

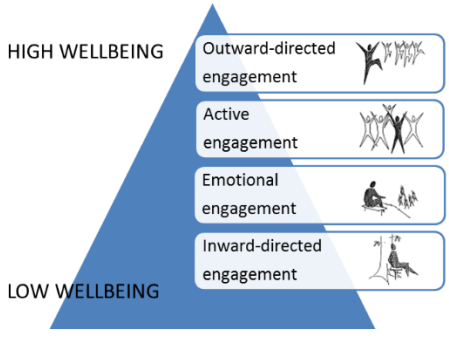

Figure 15. Triangle of supporting environments (from Bengtsson & Grahn, 2014)

In the first model (Figure 16), the triangle of supporting environments is related to the two kinds of attention in the attention restoration theory (Kaplan and Kaplan, 1989). In this model, it is suggested that individuals situated at the bottom of the triangle need environments offering soft fascination, whereas individuals situated at the top of the triangle can handle environments with higher demands on directed attention.

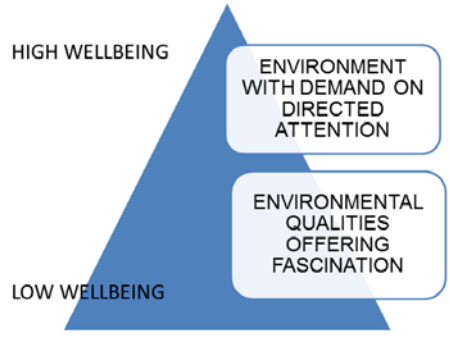

Figure 16. The triangle of supporting environments in relation to Kaplan's attention restoration theory (from Bengtsson & Grahn, 2014)

In the second model (Figure 17), this gradual increase in demands on attention in the environment is termed the gradient of challenge. The gradient of challenge illustrates that the garden needs to provide a continuum of environmental qualities offering everything from passive experiences of nature to active interaction with people and natural elements in order to support a wide range of needs and wishes.

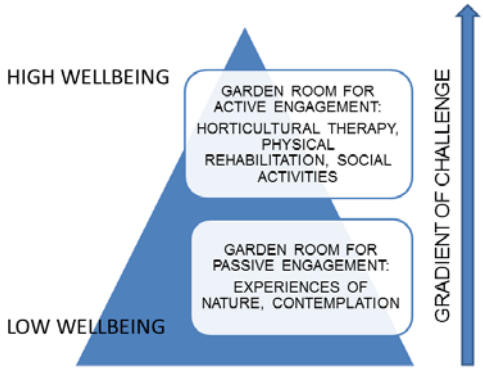

Figure 17. The triangle of supporting environments in relation to the gradient of challenge (from Bengtsson & Grahn, 2014)

In the third model (Figure 18), the order of the perceived sensory dimensions (described in the background on page 22) suggests a connection between different environmental qualities and different user needs that is in line with the gradient of challenge.

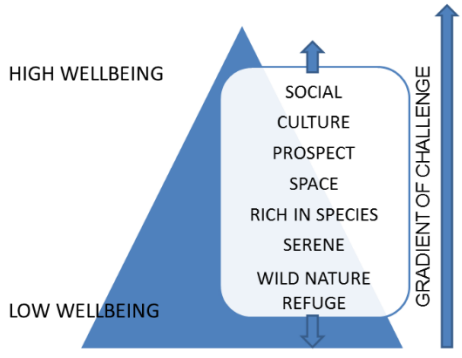

Figure 18. The triangle of supporting environments in relation to the eight perceived sensory dimensions (from Bengtsson & Grahn, 2014)

Finally, the design concepts developed in Papers I, II and III are added to the model in Figure 19. In line with the pathogenic strategies of avoiding risk factors, comfortable design needs to be considered in the environment as a whole so that everyone, irrespective of physical and cognitive condition, is able to use and experience the garden in its entirety. Inspiring design is in accordance with salutogenic strategies supporting salutary factors. The qualities of inspiring design should be placed according to the gradient of challenge so that users can choose whether or not they wish to confront the more challenging qualities.

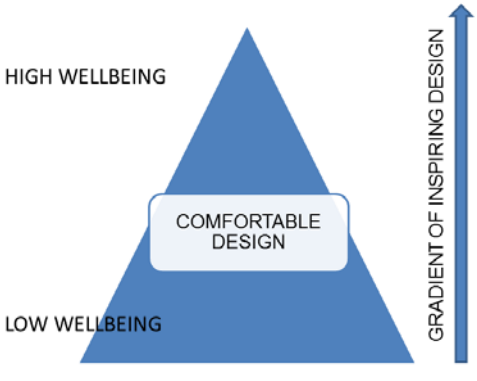

Figure 19. The triangle of supporting environments in relation to the general design concepts of comfortable design, inspiring design and gradient of challenge (from Bengtsson & Grahn, 2014)

In the second step, the models described above were used as a theoretical foundation to begin the practical construction of the quality evaluation tool (QET). Nineteen environmental qualities with implications for design were identified in the evidence-based literature and integrated into the frameworks, as illustrated in Figure 20.

The basic ambition was to encompass a wide range of needs: from basic human needs to the general needs of individuals in healthcare settings. All qualities were confirmed by multiple sources and originated either from international peer-reviewed journals or from acknowledged scientific anthologies. The theoretical principles were used as a guide to place the environmental qualities in a larger context, with the aim being to create a framework for use in design processes.

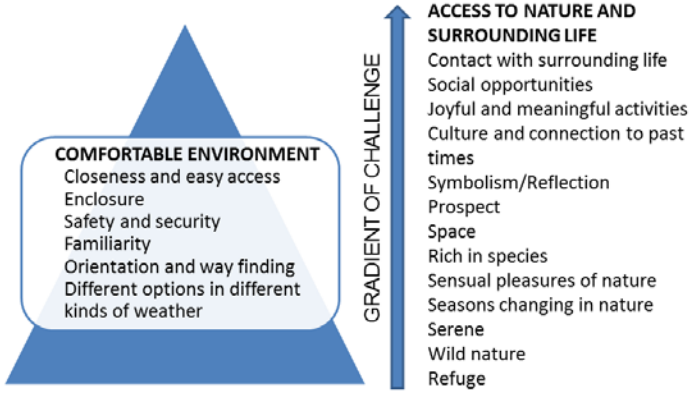

Figure 20. The triangle of supporting environments in relation to 19 evidence-based environmental qualities. Six qualities to support a comfortable environment and thirteen qualities to support access to nature and the surroundings

A preliminary layout for how to guide evidence into design solutions in participatory design processes was proposed by means of four columns (see Table 3, p. 53). In column 1, the 19 environmental qualities were listed in two sections. Section A describes aspects of how to be comfortable in the outdoor environment and lists six environmental qualities that are essential for people to have the potential, and to dare to go out.

Section B describes 13 environmental qualities of access to nature and surrounding life that provide for different possibilities to experience and use the outdoor environment. In Section B, the order of the qualities is based on the above-mentioned gradient of challenge. An extensive description of each of the 19 environmental qualities is presented in Paper IV.

Column 2 corresponds to the first step in the design process and involves an investigation of the qualities in the outdoor environment. In this step, every environmental quality in the target environment is to be investigated in relation to the four zones of contact (Figure 2, p. 25).

Column 3 corresponds to step two in the design process and involves an evaluation of each quality's importance to potential users. In this step, comments from staff, residents/patients and next of kin/visitors at the particular healthcare setting are essential.

Column 4 corresponds to the third step in the design process. Steps 1 and 2 are balanced to make an estimation of the measures needed to design or redesign the outdoor environment. These suggested measures should then be verified by the users before being used to create a master plan for the outdoor area.

Table 3. *Outline of the overall structure of the quality evaluation tool, QET.*

Environmental qualities	**Step 1.** Investigation of environmental qualities in the outdoor environment using the four zones of contact	**Step 2.** Evaluation of qualities' importance to potential users and in relation to the four zones of contact	**Step 3.** Suggested measures
Section A. Six environmental qualities allowing people to be comfortable in the outdoor environment			A. Suggested measures for comfortable design
Section B. Thirteen environmental qualities supporting people's access to nature and surrounding life			B. Suggested measures for inspiring design

Table 4. *Overview of papers and details of paper progression.*

	Paper I	**Paper II**	**Paper III**	**Paper IV**
Results: themes, dimensions and environmental qualities (i.e., evidence with implications for design processes). **For details see Table 5.**	Main theme 1: Being comfortable in the outdoor environment	Main theme 2[a]: Being comfortable in the outdoor environment	SMB dimensions	Six environmental qualities allowing people to be comfortable in the outdoor environment.
	Main theme 2: Access to surrounding life	Main theme 1: Access to nature and surrounding life		Thirteen environmental qualities supporting people's access to nature and surrounding life.
Results: design concepts	Precautionary design[b]/ Inspiring design	Comfortable design[b]/ Inspiring design	The results in terms of SMB dimensions further develop the under-standing of the two concepts: comfortable design and inspiring design, and how they interact.	Comfortable design, inspiring design and the gradient of challenge are used to build a framework to bridge the gap between theories and evidence.
Details on progression		Adding three more sub-themes and details regarding nine of the sub-themes from Paper I	Adding specific information concerning environmental qualities and design concepts	Integrating results from earlier papers with relevant theories and evidence

[a]*Main theme two is presented first to make comparison with the result of Paper I easier.* [b]*To express its actual meaning better, precautionary design was renamed comfortable design in the review process of Paper II.*

Table 5. *Overview of results reported in Paper I-IV.*

Results of Paper I	Results of Paper II	Results of Paper III	Results of Paper IV
Main theme 1: Being comfortable in the outdoor environment Four sub-themes: 1. Sensitivity to the weather 2. Familiarity 3. Security 4. Calmness	Main theme 2[a]: Being comfortable in the outdoor environment Four sub-themes: 1. Closeness and easy access 2. Safety and security 3. Familiarity 4. Different options in different kinds of weather	SMB factors: Pleasantness, Complexity, Unity, Enclosedness, Potency, Social status, Affection and Originality	Environmental qualities to be comfortable in the outdoor environment: 1. Closeness and easy access 2. Enclosure and entrance 3. Safety and security 4. Familiarity 5. Orientation and way finding 6. Different options in different kinds of weather
Main theme 2: Access to surrounding life Six sub-themes: 1. Capacity for outdoor activity 2. Sensual pleasures of nature 3. Following the rhythm of life in nature 4. Surroundings as a way to keep up to date 5. Surroundings as a source to relate to past times 6. Social potential of outdoor environments	Main theme 1: Access to nature and surrounding life Eight sub-themes: 1. Variation and change in daily life 2. Views, greenery and fresh air 3. Sensual pleasures of nature 4. Seasons changing in nature 5. Impressions of life 6. Connection to the past 7. Social opportunities 8. Joyful and meaningful activities		Environmental qualities supporting people's access to nature and surrounding life: 1. Joyful and meaningful activities 2. Contact with surrounding life 3. Social opportunities 4. Culture and connection to past times 5. Symbolism/ reflection 6. Prospect 7. Space 8. Rich in species 9. Sensual pleasures of nature 10. Seasons changing in nature 11. Serene 12. Wild nature 13. Refuge

[a]*Main theme two is presented first to make comparison with the result of Paper I easier.*

7 Discussion and future research

The overall aim of the present thesis is to explore experiences and uses of the outdoors in healthcare settings, particularly nursing homes, in order to describe environmental qualities and formulate design concepts that could be useful in the process of designing such environments. This thesis developed through the four phases that have previously been described as constituting *a phenomenological case study*, and is built upon the results of Papers I-IV.

Thus, Papers I-II in particular describes environmental qualities that covers a wide range of needs and preferences (i.e. from universal to user-specific needs and wishes) in relation to the outdoors. Environmental qualities that cover the total outdoor environment relevant to the users (i.e. the four zones of contact described in the background) are also described. Papers III and IV in particular involves the interpretation of the results in relation to design processes and the generation of frameworks that link evidence on environmental qualities with theories.

The final product of the present thesis is the 19 environmental qualities, the design concepts of *comfortable design, inspiring design* and *the gradient of challenge* together with *the four zones of contact*; all of which are included in the draft of *the quality evaluation tool* (QET) presented in Paper IV.

7.1 From outdoor environments at nursing homes to outdoor environments in healthcare settings

The results reported in Papers I-III focused on outdoor environments at nursing homes, although the QET presented in Paper IV is a tool for use in design processes in outdoor environments in healthcare settings in general. There were several reasons for this shift in focus. First and foremost, this shift depended on the empirical material in this thesis. To strive for rich descriptions of the experience of contact with the outdoors at nursing homes, all of the different needs, wishes and capacities displayed by the nursing home residents were to be included.

Furthermore, it was important to obtain information from all relevant sources (i.e., staff, residents and next of kin). Some of the participants had experienced the phenomenon of contact with the outdoors in healthcare settings only for a couple of months, while others had years of experience. Since the ambition was to describe the phenomenon in all its complexity and not only what was occurring in all of the interviews, the result was rather all-embracing.

This approach inevitably led to descriptions that to a great extent were relevant to outdoor environments in healthcare settings in general, not only

nursing homes. Particularly in the interpretive phase leading to the description of design concepts and environmental qualities, these descriptions corresponded to existing evidence on outdoor environments in healthcare settings in general (Ulrich, 1999; Cooper Marcus, 2007).

This was confirmed in the development of QET, where evidence from different sources was compiled to identify environmental qualities useful in design processes. All qualities were confirmed by multiple sources, and these sources originated from studies of different kinds of healthcare facilities. Thus, the shift from nursing home environments to healthcare environments was an effect of the empirical material feeding back to the schemes of reference of the study, as advocated by Aspers (2009).

However, this all-embracing approach does not imply that all environmental qualities are relevant in every healthcare environment. Rather, it serves as a base of evidence to be used in participatory design processes to decide which qualities to prioritise and where in the environment to place them. Such a design process is unique to each healthcare setting and depends on the specifics of the healthcare activity, the users and the physical environment. Thus, the design concepts of comfortable design, inspiring design, and the gradient of challenge, together with the principal model of the four zones of contact, are intended as means to guide the process.

These design concepts relate to design practice. Design practice is the second reason for the above-described shift in focus from nursing home environments to healthcare environments. In design processes, designers switch focus back and forth between the whole and the details in the search for appropriate design solutions (Birgerstam, 2000). They jump between scales to consider details in relation to context. Not until you are sure of the bigger picture is it possible to work at ease with the details. Then, something new occurs that needs to be considered in light of the whole; this process continues until the picture is clear. Maybe this process of constantly being aware of and relating to the bigger picture could be described as a search for the opposite of the lowest common denominator: a search for *the highest common denominator*. As described above, the empirical material fed back to the scheme of reference suggesting that the highest common denominator for the environmental qualities and design concepts obtained from Papers I-III, from a designer's perspective, appeared to be healthcare environments.

In the development of the QET, in paper IV, the environmental qualities reported in Papers I-III were therefore integrated with evidence from other research to be useful not only in nursing home contexts but in health care contexts in general. In addition, in the interpretive phase and in the theoretical

phase, it was useful to place environmental qualities and design concepts in a wider perspective in order to be able to develop understanding of them, of the way in which they relate to one another, and the way in which they relate to other evidence.

Furthermore, it seems that healthcare facilities in the future need to be flexible and able to meet the needs of very different user groups (Kobus, 2008; Berezecka-Figacz et al., 2011); thus, there is less reason for frameworks and tools for use in designing outdoor environments in healthcare to specialise in only one group of users.

Finally, the shift of focus from nursing home environments to healthcare facilities also relates to theory. The basic theories described in the background section, that is, theories of restorative environments, concern general person-environment relationships. Thus, a framework for design that connects evidence and theory needs to start from people's general needs and then relate these needs to the more specific needs of different groups of users.

Furthermore, the results of Paper II in particular point out the outdoor environment not only as a restorative resource but also as a resource for feeling at home and a resource for positive development. Obviously, these three resources of the outdoors are not only relevant for nursing home residents. The outdoors as a resource for *restoration*, *place attachment,* and *personal development* applies to everyone. Thus, information on ways the outdoors could be designed to support these resources is relevant to healthcare environments in general.

To conclude, the environmental qualities and design concepts described in Papers I-IV take into account the range of preferences and needs found in different people, in different phases of the healing process, and in people with chronic and non-chronic disorders or disabilities. Even if people in different healthcare settings have certain common needs in terms of the outdoors, it also seems that, in a healthcare situation, the outdoor environment has particular potential to represent the normal and ordinary.

Following on from this, the outdoor environment needs to correspond to human universal needs as well as the particular needs of people with poor health. Maybe the outdoor environment also provides something deeper, something original and essential that has to do with basic human needs, as reflected by the evolutionary theories on restorative environments (see sections 2.2.1 and 2.2.2)

7.2 Evidence-based research and generalisation issues

The environmental qualities and design concepts that emerged in Papers I and II and that were further developed in Papers III and IV are intended as frameworks that are meaningful in design processes, rather than leading to specific design solutions. It could perhaps seem contradictory that the present research is directed towards unique and individual experiences of the phenomenon and at the same time towards descriptions that could be used generally in design processes. However, according to Giorgi (2009), a phenomenological approach makes generalised findings particularly significant as it contributes to *meaningful structures* (i.e. frameworks for design) rather than to *identical conditions* (i.e. detailed design solutions) (Giorgi, 2009).

One weakness of the present work is the risk that environmental qualities are lacking that are relevant to design processes. Therefore, it is important to regard the quality evaluation tool (QET) as a tool in development and a tool for use in design processes, not as a tool for describing exact design solutions. QET is intended to be assessed and developed continuously in the future as it is used in different collaborations and in different contexts.

Thus, even if this work aims at general guidelines in terms of environmental qualities and design concepts in healthcare, the intention is quite the opposite from producing one-size-fits-all solutions. Rather, in line with the concept of *universal design*, this work strives for a common base that needs to be transformed and adapted to different user groups, different healthcare activities and different physical environments. Regarding these matters, each healthcare setting is unique, and in each healthcare setting, there is new knowledge to uncover.

7.2.1 Naturalistic generalisation

In the methodology section, the concept of a *naturalistic generalisation* was described as giving readers the possibility to interpret the results in their own way, based on their experience. According to Johansson (2007), designers commonly pursue naturalistic generalisations in their work, when they refer to their earlier repertoire of similar cases upon implementing a new design. One intention of this work is to enable designers to use evidence from research in a similar manner. Thus, every piece of knowledge could be useful and is therefore relevant to later design processes. Critical thinking by the designer is always necessary to convert evidence into practice (Hamilton, 2003).

Therefore, the most relevant difference between evidence-based medicine and evidence-based design may not concern the amount of evidence, as suggested by Stankos and Schwartz (2007), but rather in what way the evidence is put into practice. For instance, whereas to a medical practitioner as detailed

evidence as possible would be an advantage, to a design practitioner as detailed evidence as possible could lead to identical conditions (Giorgi, 2009); that is describing detailed design solutions giving the designer no room for creativity and freedom of choice.

7.2.2 Evidence-based design and creative freedom

Hamilton (2003, p. 18) points out the possibility that *"serious designers might be concerned that evidence-based design represents a challenge that could limit their creativity or freedom of choice"*, but then argues that this instead calls for an *"exceptionally creative and ever-changing interpretation of new data"*. Thus, evidence-based design is ever-changing and cannot lead to a single solution being used repeatedly.

Furthermore, the results of the present thesis show that evidence-based design in healthcare does not only concern design aspects with implications for health. Rather, a great variety of issues such as functionality, aesthetics, and physical and historical context interact as basic approaches to landscape design (Barnes & Cooper Marcus, 1999). Design regarding specific environmental qualities in the outdoors, particularly influencing health, has hardly been explored. Moreover, in line with universal design, design always needs to build upon holistic approaches. Usability and accessibility aspects in design, not least, indirectly support health and wellbeing. For instance, if a place cannot be accessed and used, it is not possible to benefit from its environmental qualities, which may have an impact on health.

Thus, from a designer perspective, it seems relevant to be aware that evidence-based design in healthcare needs to correspond to universal design. Accordingly, knowledge of specific environmental qualities and their impact on health and wellbeing in relation to different groups of users is one of several essential aspect that needs to be further investigated in order to achieve appropriate designs of outdoor environments in healthcare. Other emerging aspects concern, for example, place attachment and personal development, which will be reflected upon later in the discussion.

7.2.3 Participatory design processes

Earlier work separates general design guidelines relevant across different categories of healthcare facilities from particular therapeutic needs of specific patients or user groups (Cooper Marcus & Sachs, 2014; Cooper Marcus & Barnes, 1999). In line with universal design, the present work instead strives to produce one tool to cover evidence on common issues as well as on user-specific issues in terms of outdoor environments in healthcare. The intention is then to use this evidence in a *participatory design process* to tailor design solutions that

meet the needs of the particular users and the particular physical environment. Participatory design processes have been proved to be beneficial in healthcare architecture in general (Sanders & Stappers, 2008; Vischer & Zeisel, 2008; Fröst, 2014; Elf et al., 2015), as well as in terms of outdoor environments (Varni et al., 2004; Cooper Marcus & Sachs, 2014).

In particular, Fröst (2014) describes the way in which the awareness of what it is possible to achieve gradually emerges in participatory design processes, and how preferences and needs are identified hand in hand with spatial solutions. Unexpected aspects may occur in participatory design processes. For instance, a recent study pointed out that it is not unusual that the planners are the ones to introduce the patient-based perspective in such processes (Elf & Wijk, 2014).

Even though the present work aims at developing models and tools for use in design processes and is not intended to describe ideal design solutions, Paper III nonetheless describes environmental features that characterize an ideal nursing home garden. The results describing an ideal nursing home garden thus come closer to describing specific design solutions than Papers I, II and IV which particularly strive to create frameworks useful in design processes. This is an intentional and useful contradictoriness since it is not obvious at what point guidelines intended to present useful information instead turn into limitations, or are experienced as such. There is also a risk of the opposite: that too much interpretive freedom may cause insecurity as to whether the design solution actually lives up to evidence-based design or not.

In line with earlier research (by e.g. Tenngart Ivarsson & Hägerhäll, 2008; Björk et al., 2008) all papers included in the present thesis stress the importance of having enough outdoor space and enough outdoor vegetation to sufficiently meet the wishes and needs expressed by the users. Still, we don't know much about how to establish how much is enough. Particularly in Paper III, the interpretations of the results gave more concrete examples of these matters, since it was real and measurable nursing home gardens that were being compared to an imagined ideal nursing home garden. In times of limited resources, such information on quantities of greenery and outdoor space is essential to direct landscape design. In addition, frameworks for use in participatory design processes could enable design that makes the best of the physical conditions.

In the field of evidence-based design, it seems relevant to further investigate crucial matters such as of what quantities of space and vegetation are needed for the outdoors to meet the needs and wishes of the users. At the same time it is relevant to continue to develop frameworks describing qualities that do not

endanger artistic freedom and creativity, which are essential in order to devise superior design solutions.

In order to improve an instrument designed to assess the content and quality briefs in programs for new healthcare environments, Elf and Wijk (2014) studied a group of designers' perception of an instrument. Similar studies would be useful to explore designers' perceptions of the usefulness of different kinds of evidence, such as the environmental qualities and design concepts presented in the present thesis.

This could lead to an increased understanding of how to supply designers with evidence that give room for creativity and still ensure that the design meets with the wishes and needs of the users.

7.3 Phenomenology and hermeneutics

This work takes a *holistic approach* to the phenomenon under study as it starts from the viewpoint that the total is something more than the sum of the parts and that the parts need to be seen on the basis of the whole, rather than the opposite. Therefore, it was important to maintain a broad perspective starting from the four zones of contact during the interviews, to obtain a large amount of information on the phenomenon of contact with the outdoors in healthcare settings.

From a designer's point of view, it would have been relevant to obtain more information about each of the four zones of contact, for example, how to design in relation to these four zones and whether different environmental qualities are more or less important in different zones. However, this would have conflicted with the phenomenological research approach since the four zones of contact in the first place were used to gain a holistic description of the contact with the outdoors. Thus, the four zones of contact were not used for comparisons, and therefore they will have to be investigated specifically in future research instead. Furthermore, to obtain holistic information corresponding to a wide range of needs and wishes in relation to the outdoors in healthcare, the present work started with a focus on the lived experiences of staff, residents and next of kin at nursing homes. This is all in line with a *phenomenological approach*, in contrast to the *hermeneutic tradition*. For instance, whereas a hermeneutic approach involves interpretations of texts and the researcher's pre-understanding is central to the interpretations (Allwood & Erikson, 1999), phenomenology instead emphasises descriptions of experiences and the researcher's pre-understanding is minimised during data analysis (Kvale & Brinkmann, 2009; Aspers, 2009; Giorgi, 2009).

However, two aspects of this work are clearly connected to hermeneutics, besides the phenomenological tradition. In the analytical phase of Papers I and II, interview transcripts were transformed into descriptions of the contact with the outdoors in healthcare environments. The analytical process was characterised by veering back and forth from descriptions of individual parts (i.e., meaning units) to a description of the whole (i.e., describing the phenomenon). This is in line with *the hermeneutic circle*. According to Gadamer (1975), the movement of understanding goes from the whole to the parts and back to the whole, in a circle, and when all details are in harmony with the whole, understanding is achieved.

Furthermore, in line with a hermeneutic approach (Allwood & Erikson, 1999) as well as a phenomenological approach (Kvale & Brinkmann, 2009; Aspers, 2009), in the interpretive phase of this work, the description of the phenomenon was discussed and interpreted from both a designer's and a researcher's point of view.

7.4 Resources of the outdoors and unintended effects

One reason for conducting this study was the growing evidence of the possible positive impact on health of outdoor environments, because the environment is a *restorative resource* as described in the background. In the descriptions of the contact with the outdoors from residents and next of kin (reported in paper II), the outdoor environment appeared as a potential resource in two more ways, namely, for *place attachment* and for *personal development*.

For instance, in connection to place attachment the results showed that the outdoor environment helped the residents maintain contact with ordinary life and helped them to feel at home. In connection to personal development the results comprised descriptions of the contemplative values associated with residents' contact with the outdoor environment. Such contemplative experiences of nature are instorative and thus important to personal development (Hartig et al., 1996; Tornstam, 2005).

Few nursing home residents mentioned health, place attachment or personal development as reasons for going out or in other ways interacting with the outdoors. The most commonly mentioned reasons for going out were to experience fresh air and greenery and to socialise. Rather, they came to describe these aspects (of restoration, place attachment and personal development) while talking about how they felt after having interacted with the outdoors. This could be interpreted as consequences of interacting with the outdoors that the participants had not primarily anticipated (i.e. *unintended effects*). According to

Aspers (2009), unintended effects are a key point in the phenomenological approach.

However, the empirical phase of the present work was not directed at differentiating between intended and unintended effects. Instead, it aimed to describe as many aspects as possible of the phenomenon, and whether these aspects were intended or not was not crucial. An aspect that was intended for one participant could be unintended for another, and so on. The point was to find as many relevant aspects as possible.

Nonetheless, these two resources of the outdoors (i.e., place attachment and personal development), have also emerged in other studies investigating person-environment relationships in healthcare (e.g., Ottosson, 2007; Adevi, 2012; Sahlin, 2014) and might have further implications for design.

The results of Paper II in particular suggest *connection to the past*, *familiarity* and *joyful and meaningful activities* as specific outdoor qualities that have the potential to evoke memories connected to places and activities that were important earlier in life and thus have the potential to facilitate place attachment among nursing home residents. For instance, since nursing home residents living in more familiar homelike environments exhibit fewer dementia symptoms (Zeisel & Tyson, 1999) and experience higher wellbeing and quality of life (Lee et al., 2014) than nursing home residents living in larger institutional nursing homes, information on specific environmental qualities that could support place attachment is highly relevant to design appropriate outdoor environments in such settings.

Furthermore, in terms of personal development and existential reflections, Paper II pointed out that the sub-themes of *views, greenery and fresh air, sensual pleasures of nature, seasons changing in nature, impressions of life* and *connection to the past* seemed to have contemplative values to nursing home residents and thus could support personal development and existential reflections. Regarding existential reflections, Sahlin's work (2014) indicates that the two environmental qualities of *reflection* and *wild nature* are particularly important for individuals with stress-related disorders.

Thus, it seems that different environmental qualities connect to different resources of the outdoors. The environmental qualities described as important to place attachment (Adevi, 2012) and personal development (Sahlin, 2014) for individuals with stress-related disorders show great similarities with the corresponding results for residents at nursing homes.

However, in Paper II it was reported that different environmental qualities could connect to different resources differently for different groups of nursing home residents as will be discussed later. An increased knowledge of such

specific person-environment relationships would be useful when designing healthcare environments purposefully for different groups of users. The above-mentioned examples are therefore useful and suggest that, in addition to developing an understanding of the outdoors as a restorative resource, future research also needs to focus on the way in which the outdoors might support place attachment and personal development in different healthcare settings.

7.5 New ideas in terms of evidence-based design of the outdoors in healthcare

Paper IV, describing the quality evaluation tool (QET), suggested 19 evidence-based environmental qualities (see summary of Paper IV, pp. 49-53). These qualities were related to theories in the field by means of the triangle of supporting environments (see Figures 15-20, pp. 49-52). Six of the qualities were regarded as being in accordance with the pathogenic strategies, by providing security, safety and comfort through comfortable design. For everyone to be able to use and experience the outdoor environment in its entirety (i.e., universal design), the environmental qualities of comfortable design should be considered in the environment as a whole.

Thirteen environmental qualities were, on the other hand, regarded as being in accordance with the salutogenic strategies, by providing variation and change in life, the freedom to choose and stimulation of the senses and intellect by means of inspiring design. The order of these 13 environmental qualities is based on the gradient of challenge. This means that the more demanding qualities are placed close to the top of the triangle of supporting environments, whereas the non-demanding qualities are placed close to the base of the triangle, thus forming a gradient of challenge.

The design concept of the gradient of challenge builds upon the results of Papers I and II, among others. These results showed that, at nursing homes, some of the residents were eager to obtain new impressions and be stimulated (mainly individuals with physical limitations), whereas others were very sensitive to overstimulation and anything unknown (mainly individuals with cognitive limitations due to dementia).

This of course indicates the great range of needs and preferences of nursing home residents, but at the same time, it implies that there is a difference in terms of different user characteristics and the environmental qualities that are the most critical.

In line with this reasoning, Grahn and Stigsdotter (2010) found that different perceived sensory dimensions were preferred by the general public compared

with people experiencing stress. Furthermore, Ulrich (1983, 1986) stated that people may benefit most from visual encounters with nature when they are stressed or anxious. In addition, according to Ottosson and Grahn's studies of older people at nursing homes (2005, 2006), those people who are most sensitive (i.e., with the greatest psycho-physiological imbalance) are the ones who gain the most from time spent outdoors, in terms of recovery from stress and fatigue.

These circumstances are the underlying reason for the triangular shape illustrating the supportive environment theory, meaning that individuals close to the base (and thus experiencing low wellbeing) have the greatest need for environmental support.

Indeed, the more sensitive the group of users, the greater impact the environment has, but in addition, depending on the specific characteristics of the user group, different environmental qualities along the gradient of challenge will be the most crucial. To design environments that are most beneficial to users, it would thus be relevant in each case to clarify which environmental qualities represent the users' major sensitivities and which qualities represent their major strengths.

One such person-environment contradiction is described by Ulrich (1999) as regards long-term patients and short-term patients. Broadly describing emotional manifestations of patient stress, Ulrich (1999) points to anxiety as the salient emotion experienced by patients in non-chronic disease categories with shorter hospital stays. This contrasts with depression, which is the most serious emotional manifestation in persons with chronic diseases and undergoing long-term hospital stays (e.g. nursing home residents). Ulrich continues "*that patients in nursing homes and other long-term care contexts often suffer from depression and boredom related to social-physical environments that are chronically understimulating and hence stressful – rather than overstimulating and stressful*" (1999, p. 34).

This indicates that the design of outdoor environments in healthcare could differ between long-term users and short-term ones. The original shape of the triangle has its base at the bottom line, showing the person's sensitivity to overstimulating environments (e.g. in short-term care contexts). However, the shape of the triangle would be inverted in terms of persons sensitive to understimulating environments (e.g. in long-term care contexts), showing a greater need for more stimulating qualities in the environment, as shown in Figure 21.

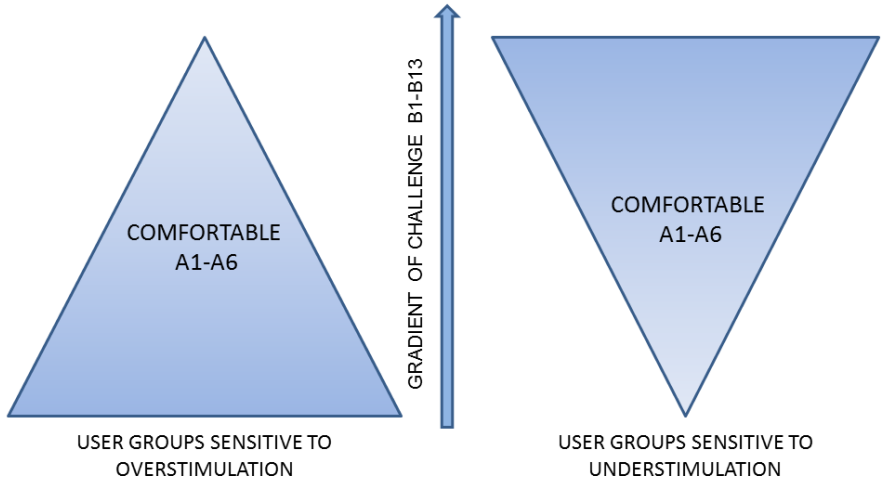

Figure 21. The triangle of supportive environments related to different user groups. A1-A6 correspond to the six environmental qualities necessary for a person to feel comfortable in the outdoors and B1-B13 correspond to the thirteen environmental qualities of access to nature and surrounding life.

Instead of relating to wellbeing, the triangle would then, by means of the gradient of challenge, illustrate which environmental qualities represent strengths and which environmental qualities represent sensitivities to a specific user group.

Each individual is unique and has a unique person-environment relationship manifested in a unique disposition of environmental qualities in relation to the triangle of the supporting environment, but broadly speaking, a conceptual idea of environmental qualities in relation to the gradient of challenge and the four zones of contact (described in the background section, p. 25) could be useful in participatory design processes to clarify meta-perspectives on the person-environment relationship of different user groups, as exemplified in Figure 22.

Figure 22 illustrates the hypothesis that in relation to different user groups' characteristics, the zones closer to the building need to concentrate on the environmental qualities corresponding to the user groups' major strengths. Furthermore, in line with the gradient of challenge, the zones farther away from the building may include environmental qualities more challenging to the users, so that they can choose whether or not they wish to confront them.

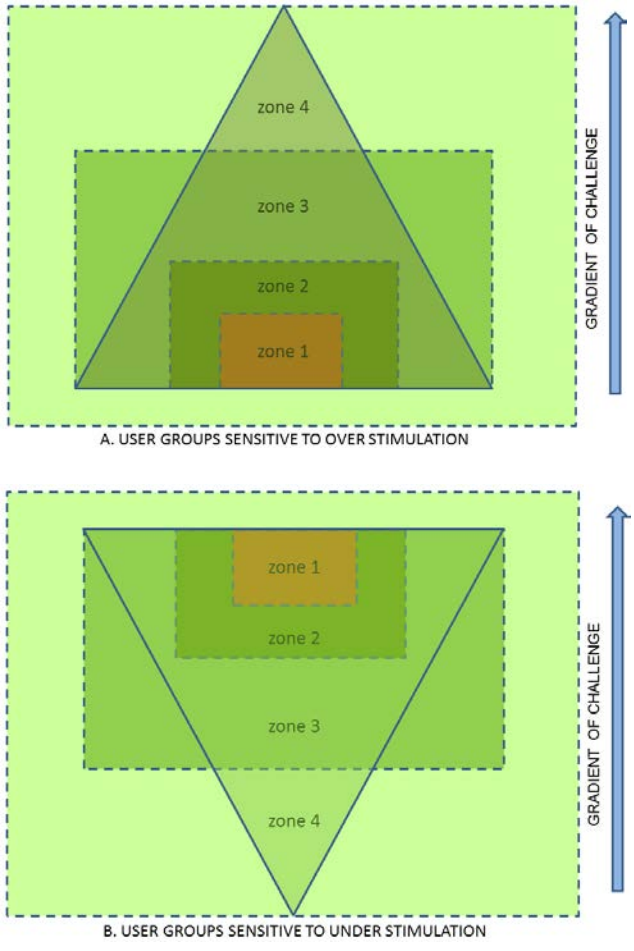

Figure 22. Illustration of inter-relationship between the triangle of supporting environments, the gradient of challenge and the four zones of contact.

The results of Papers I and II discussed above also point out the possibility of fundamental contradictory preferences and needs of different groups of users, in relation to the stimulating environmental qualities at one healthcare facility (i.e. nursing home). The two models A and B, presented in Figure 22, would then

help clarify such contradictions. Such models might be useful in participatory design processes to visualise different needs and to balance them as well as possible. Looking at Figure 22 again, one way of achieving this could be by joining the bases of the two triangles and imagining different design solutions on opposite sides of, for instance, a nursing home.

The contact with the outdoor environment could on one side of the building be designed to meet the needs and wishes of residents sensitive to overstimulation (e.g. residents with cognitive limitations due to dementia) and on the other side, the contact with the outdoor environment could be designed to meet the needs and wishes of residents sensitive to understimulation (e.g. residents with physical limitations), all in order to satisfy different groups of users' needs and wishes in terms of their contact with the outdoors in the most effective way.

7.5.1 The inverted triangle of supporting environments

The inverted triangle of supporting environments described in the previous section is suggested to be particularly relevant in relation to user groups sensitive to understimulation. The results of Papers I and II, for instance, point out nursing home residents' need for *impressions of life* and *social opportunities* in the environment. Thus, it seems that these individuals do not primarily need the restorative experiences of the outdoors. Instead, it seems that they seek experiences that could help them to thrive.

Furthermore, Paper II pointed out the contemplative values of environmental qualities such as *views, greenery and fresh air, sensual pleasures of nature, seasons changing in nature, impressions of life* and *connection to the past* as important to personal development. Overall, this describes the outdoor environment as a resource for instorative experiences (Hartig, 2007) and personal development (Tornstam, 2005).

Therefore, similar to how children´s play in green outdoors environments has the potential to strengthen their cognitive and affective functioning and enhance self-confidence (e.g., Mårtensson et al., 2009; Nordström, 2014), it seems that the outdoors as a resource for development is crucial in a variety of circumstances after childhood as well (Ottosson, 2007; Sahlin, 2014) and throughout life (Tornstam, 2005; Bengtsson & Carlsson, 2013).

Thus, in line with the reasoning of Hartig (2007), the results of this thesis point out the necessity for designers to be able to differentiate between the outdoors as a restorative resource and the outdoors as an instorative resource.

7.6 Concluding remarks

The main contribution of the present work has been to generate frameworks useful in design processes that correspond to users' wishes and needs in healthcare settings. *The quality evaluation tool* (QET), presented in Paper IV, is the final manifestation of these frameworks that were generated by means of the results reported in Papers I, II and III, together with other relevant evidence. All in all, these frameworks consist of 19 environmental qualities (see Figure 20, p. 52), three design concepts (i.e. *comfortable design*, *inspiring design* and *the gradient of challenge*) and the principal model of *the four zones of contact with the outdoors* (see Figure 2, p. 25).

The frameworks also offer explanations for the ways in which the 19 environmental qualities relate to theories on different resources of the outdoors using the three previously mentioned design concepts and a further development of the triangle of supporting environments. These frameworks are designed not to circumscribe the architect's experience of creative freedom and scope. Rather, they are designed to help designers to be comprehensive and aware in their work, and not to overlook important qualities and aspects of the outdoors in a healthcare context.

To reconnect to the three gaps in terms of design of the outdoors in healthcare settings described in the background (p. 27), each of them will be revisited one last time. First it was stated that there is a need for research that describes environmental qualities by taking a holistic approach to the physical environment and to a wide range of preferences and needs of a variety of users. The four zones of contact with the outdoors, described in the background (p. 25), were useful for collecting evidence that provided a holistic description of the phenomenon of contact with the outdoors in healthcare settings.

Furthermore, nursing homes for older people were useful cases to consider in order to begin describing environmental qualities answering a wide range of wishes and needs in healthcare situations and to start building hypotheses in relation to different user perspectives. However, in future research, these hypotheses need to be investigated among different groups of users. In addition, it will be essential to understand more of the way in which the different environmental qualities relate to the different zones in relation to different user groups. Such knowledge could be of general use in design processes for deciding which qualities to prioritise in particular zones.

Therefore, the QET is designed to be continuously developed as more evidence is accumulated. In addition, each time the QET is used in a design process, there is the possibility of collecting more information on the different environmental qualities in relation to different users and different zones.

Secondly, a need for research that generates frameworks that link evidence and theories and thus increases the theoretical understanding of the field was required. In this respect, the triangle of supporting environments was a useful model to start with.

However, in light of the results from Papers I, II and III, together with other evidence, it is clear that this model needs to be reconsidered in relation to different groups of users (e.g., in terms of users groups sensitive to understimulation versus user groups sensitive to overstimulation). In this regard, the present work has started the building of hypotheses that need to be explored in future research.

The results also suggest that future research on outdoor environments in healthcare setting needs to focus on the ways in which the outdoors might support the users by fostering place attachment and by personal development in addition to restoration.

Thirdly, research that might be useful in evidence-based and participatory design processes was required. The results of each of the four papers included in this thesis could separately be useful for such processes. However, there is a progression from Paper I to Paper IV, in which the results build on one another and gradually become more informative to practical applications.

Nonetheless, the QET, presented in Paper IV, needs to be further developed. In addition, it is important to further investigate matters such as of what quantities of space and vegetation are needed for the outdoors to meet the needs and wishes of the users, and how to assess such quantities in healthcare environments.

In future studies, there will be much to learn regarding how to develop the QET to meet the needs of design processes better, particularly for participatory design processes. This could lead to constantly improved design solutions that better meet the prerequisites of particular users, the healthcare activity and the particular physical environment.

Thus, there will never be a final version of the QET. Environments change, people’s needs and preferences change, and healthcare activities change, and so must design.

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