Supportive Nature – and Stress

Wellbeing in connection to our inner and outer landscape

Anna A Adevi

Faculty of Landscape Planning, Horticulture and Agricultural Science
Department of Work Science, Business Economics and Environmental Psychology
Alnarp

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Abstract

Many benefits are claimed for the interplay between humans and nature, such as nature's potentially positive effect on wellbeing and health. The main aim with the present work was to increase the understanding of how nature environments can support and contribute to health improvement from stress related experiences. Different landscape types' effect on stress was studied in Sweden. Single case-studies focused on factors considered being essential in the recovery process for people diagnosed with exhaustion disorder within a stress rehabilitation-program through garden therapy in Alnarp, Sweden. A simplified conclusion of the thesis would be that the childhood landscape seems to play a significant role affecting the choice of the adult's recreational setting - and recreational activity when stress is included. People feel more at home in the type of landscape they grew up in and more often chose to settle down in this type of landscape; even if they have moved from their childhood region. People also prefer qualities connected to their childhood landscape, but seem to attach more easily to qualities suggested having innate significance. The stress-recovery process within the garden therapy seems to be supported, hastened and deepened because of a multisensory change in awareness when contact with nature is combined with therapeutic interventions. Different psycho-physiological processes are discussed as well as the importance of self-chosen places in the garden based on present mood and the significance of the interaction between symbolic and concrete activities. The garden, the caregivers, and the group of participants together make up an arena which combines structure with freedom of action, in which the participants get the chance to regulate their needs and desires. Two hypotheses are presented, which might contribute to filling some current gaps in knowledge regarding the potential benefits of human interactions with nature.

Keywords: environmental psychology, supportive nature environments, stress, exhaustion disorder, garden therapy.

A*uthor's address:* Anna A Adevi, SLU, Department of Work Science, Business Economics and Environmental Psychology. P.O Box 88, SE 230 53 Alnarp, Sweden.
E-mail: anna.a.adevi@.slu.se

Dedication

To Philip & Sophia with my strongest motherly love.

You must not know too much, or be too precise or scientific about birds and trees and flowers and watercraft; a certain free margin, and even vagueness,… perhaps ignorance, credulity, - helps your enjoyment of these things.

Walt Whitman

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1. Interview guide in-depth (Paper III)
2. Interview guide focus-group (Paper III)
3. Informed consensus observations (Papers III & V)
4. Dates for observations (Papers III & V)
5. Interview guide in-depth (Paper IV)
6. The Board's definition of exhaustion disorder

List of Publications

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

I Adevi, A.A. & Grahn, P. (2011). Preferences for landscapes: A matter of cultural determinants or innate reflexes that point to our evolutionary background? *Landscape Research,* 37, pp. 1-23.

II Adevi, A.A. & Grahn, P. (2011). Attachment to certain natural environments. A basis for choice of recreational settings, activities and restoration from stress? *Environment and Natural Resources Research,* 1, pp. 36-52.

III Adevi, A.A. & Lieberg, M. (2012). Stress Rehabilitation through garden therapy. A caregiver perspective on factors considered most essential to the recovery process. *Urban Forestry & Urban Greening,* 11, 1, pp. 51-58.

IV Adevi, A.A. & Martensson, F. (2012). Stress Rehabilitation through Garden Therapy. The garden as a place in the recovery from stress. Submitted to *Urban Forestry & Urban Greening*.

V Adevi, A.A., Uvnas-Moberg, K., Lavesson, L., & Grahn, P. (2012). Specially designed rehabilitation garden induces distinct behavioural changes in patients suffering from stress-related mental illness. Submitted for publication.

Papers I-IV are reproduced with the permission of the publishers.

My contribution of the papers included in this thesis was as follows:

I & II: Together with the co-author the study was designed. The statistical analyses were done by the co-author, and the interpretations were done jointly. Took active part in writing the papers. I am the first and corresponding author in paper I. I am the first author in paper II. **III:** Planned the study and was responsible for data collection in collaboration with a colleague. Together with the co-author responsible for analysis of the data and writing the paper. I am the first and corresponding author. **IV:** Analysis of the data was done with the co-author. Responsible for writing the paper. I am the first and corresponding author. **V:** Planned the study and was responsible for data collection. Analysis of the data and writing the paper was done with co-authors. I am the first and corresponding author.

Introduction

The new illness

Like many other post-industrialized countries, the population in Sweden spends more and more time indoors performing everyday activities (Uddenberg, 2003). This indoor living often results in a sedentary lifestyle. Also, due to modern technology humans of today are more inclined to mix work and leisure time (Wahrborg, 2009), often creating an even more sedentary lifestyle.

Recently, a number of alarming reports have indicated an increase in people suffering from stress and a hectic life (WHO, 2008). Stress means the imbalance experienced between the demands on an individual and the resources accessible for managing those demands (European Agency for Safety and Health at Work, 2011). When a person is exposed to stressful situations without any refuge for rest, stress can result in mental and somatic diseases (Wahrborg, 2009). Mental health disorders, obesity and cardiovascular disease are predicted to become the greatest contributors to illness by the year 2020 (WHO, 2008). Stress is seen as probably the greatest factor causing health issues within people (Velarde et al., 2007) and WHO (2008) has identified pain and depression due to stress as one priority area. Nearly one in four workers is affected by work-related stress and it is one of the biggest European health and safety problems (European Agency for Safety and Health at Work, 2011). The most severe form of stress illness, exhaustion disorder, is one of the world's greatest public health problems and can cause death if allowed to progress without treatment (Velarde et al., 2007).

Depression, exhaustion disorder and reactions to stress represent the largest increase within psychiatric/mental health illness in Sweden

(Forsakringskassans officiella statistik, 2011). Thus, in December 2002, such illness was reported to represent the highest proportion of all reported types of illness among those registered unable to work due to a long-term illness. A decrease in stress related illness since 2002 has been reported (ibid). This does not necessarily mean that Swedes are healthier, but rather that people are not taking sick leave because the rules and regulations today are stricter. Today it is more difficult to receive long term sick leave. It seems like the system has lead individuals that are on extended sick leave to reapply for benefits; most returning or remaining on sick leave after new tests. Some people, of course, return to work. As a result of new regulations being introduced, many of those with a long-term malady are being reviewed, which means that the illness needs to be proven again. (The picture of the overall health situation portrayed in this has emerged over the years by periodically checking and tracking the websites of www.lakartidningen.se and www.forsakringskassan.se).

Holistic view of the human

This research is built upon a wish to prevent and rehabilitate from stress related illness. Defining rehabilitation from salutogenis allows me to describe factors that support and increase wellbeing and health, rather than on those that cause ill-health. This expanded outlook means that it applies to the entire life of the individual, not simply a few chosen aspects. The research studies, papers I-V, are mainly based upon the salutogenic theories of Sense of Coherence (SOC) and Supportive Environment Theory (SET) which are described below.

The salutogenic and health-promoting perspectives

As a whole, this thesis is derived from salutogenic (Antonovsky, 1996) and health-promoting (Ewles & Simnett, 2003) perspectives. The word 'salutogenesis' comes from the Latin *salus* = health and the Greek *genesis* = origin, and was coined to denote an approach focusing on factors that support human health and wellbeing, rather than on factors that cause disease. The 'salutogenic model' is supposed to describe the relationship between health, stress, and coping (Antonovsky, 1991). With a salutogenic perspective there is a focus on what develops health, where health is seen in interplay of physical, psychological and social factors. With this salutogenic view, health and disease can be considered as extremes on each end of a continuum, the continuum model (Antonovsky, 1996). The adoption of a

salutogenic orientation when engaged in health promotion, is useful within all health care fields (ibid).

While there is no consensus regarding what the concept of health actually entails, the present research adopts the conceptual level of the somewhat idealistic WHO definition: 'Health is a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity' (WHO, 1946). Today, health is generally regarded as a resource, with the humanistic viewpoint being based on man in his context (Folkhalsorapporten, 2005). Furthermore, wellbeing is also a concept which suits the idea of health. Diener et al. (1999) regard wellbeing as e.g. favorable thoughts and feelings as a positive evaluation of the life in general. Further, health promotion means 'the process of enabling people to increase control over their health and its determinants, and thereby improve their health' (WHO, 2005). With these terms, the intention is to base the concept of health on positive meanings (such as quality of life, identity development, wellbeing, trust and meaningfulness) (Theorell, 2003). The definition of mental health is according to WHO; 'a state of wellbeing in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community' (WHO, 2011). WHO emphasizes that mental wellbeing may have different connotations for different individuals, groups and cultures (ibid).

Sense of coherence

'Sense of coherence' (SOC) has been shown to be of great importance for how humans handle stress (Antonovsky, 1991). The concept refers to the ability of humans to manage what happens in life, and can be seen as one of the most decisive factors for how well Western society handles and develops health (ibid). The SOC concept implies that human beings constantly move along a continuum on which health is one endpoint and illness the other, their exact location at any time being determined by their SOC. SOC consists of three elements that are necessary for humans to thrive and feel happy: *meaningfulness*, which is the most central, *comprehensibility* and *manageability*.

The theory proposes that where an individual person is located on the scale between health and illness depends on whether that individual experiences a sense of context; in other words an individual may perceive him/herself as having good health but may simultaneously be suffering from ill-health (Antonovsky, 1991). The strength of an individual's SOC is a

significant factor in facilitating his/her movement toward health. With a stronger SOC the ability to handle everyday stress is better, so it can be classified as an approach or attitude rather than a state or personality trait (Naidoo & Wills, 2007). An individual with a strong SOC who is confronted with a stressor believes that confirmation gives motivation (=meaningfulness), that the challenge is understood (=comprehensibility) and that resources to cope are available (=manageability). A high SOC value means that the individual has a strong feeling of coherence, which in turn means a high ability to handle challenges.

In particular, three kinds of life experiences shape the strength of an individual's SOC; consistency, load balance and participation in socially valued decision-making. The individual is shaped through such experiences by his or her position in the social structure, culture, work (including housework), family structure, etc. This involves a number of other factors such as gender, ethnicity and genetics (Antonovsky, 1991).

Supportive environments, not least the importance of nature, play a significant role in this context.

Supporting Environment Theory

Supporting Environment Theory (SET) (also referred to as 'Scope of Meaning Theory'; Grahn, 1991, 1992, 2005; Grahn et al., 2010), is relevant for the discussions related to the results of Papers I-V. This theory has formed the basis for this research in terms of choice of study objects, research design, methods, analytical tools etc.

The theory relates to the human development over millions of years in a social, cultural and physical environment, where the physical environment mainly included nature. The social and cultural environment during the same period mostly included small groups of people and settlements. SET states that people need supportive environments for developing bodily (senses, muscles, motor functions) and psychologically (being able to feel and think) wellbeing. A supportive environment must be experienced as comprehensible, accessible and secure. The theory indicates that humans' need of supportive environments differs because of their physical and psychological ability and resources (Grahn et al., 2010). There is a degree of variation where both nature and humans can change meaning for the individual, depending on his/her psychological and physical resources at the time (ibid). The more pressure the individual feels, the greater is the need to find salutogenic environments that can support the recovery process. Each individual seeks environments experienced as supportive, if those are

available. The environments should offer possibilities to restore the function of the individual, which have parallels with the salutogenes.

After a long period of illness or trauma, people may have a feeling of lack of ability to interplay with and understand the features of the surroundings. The scope of meaning changes dramatically dependent on how the fragile individual can comprehend and manage other humans or the environment. There may then be a need for safe, non-demanding places which can support the self-recovery process (Grahn et al., 2010). The more mentally fragile and weak an individual is, the more he/she needs support from the surrounding environment. This is illustrated by the pyramid of supporting environments (Grahn, 1991; Figure 1).

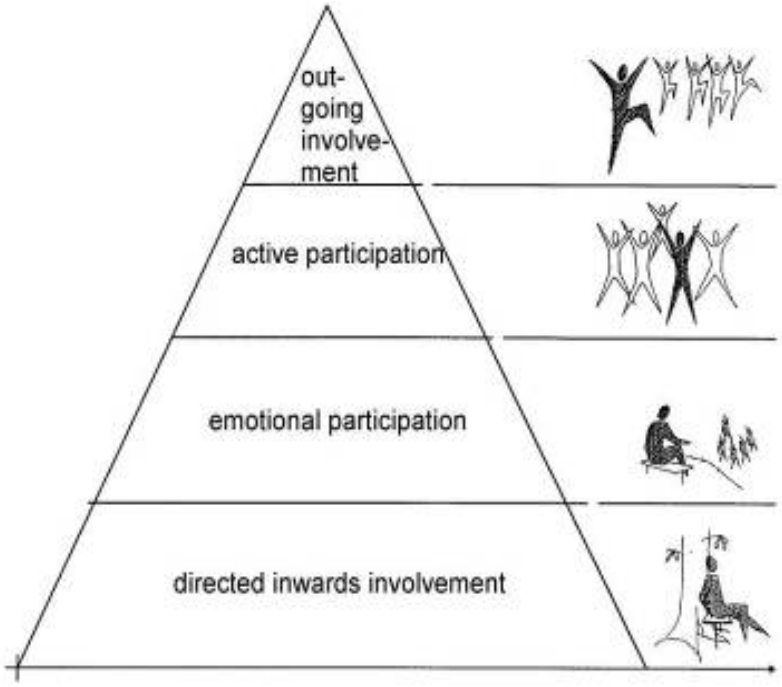

Figure 1

Participation and involvement in relation to the individual's mental health (Grahn, 1991)

Recreation and restoration

This research has focused on recreation in nature during leisure time, e.g. factors determining the choice of activities; and restoration, e.g. recovery factors within stress rehabilitation in a garden environment.

Recreation

To recreate (from the Latin *recreare* – give new life) means to renew, strengthen and refresh; to recover powers in body and soul. It can also mean to entertain and spend leisure time. A third meaning is re-birth (Svenska Akademiens Ordlista, 2010). Recreation in the general sense means regaining power through stays in a recreational environment (Nationalencyklopedin, 2011). For example, Virgil vividly described recreational trips from Rome to the countryside in 40-20 BC (Anagnostou-Laoutides, 2007). Even if nature may contain dangers, recreation has since then been increasingly connected to experiencing the beauties of nature. From the early 1960s there has been a wide variety of literature on recreational needs (e.g. De Grazia, 1962; Pieper, 1963; Csikszentmihalyi, 1975; Iso-Ahola, 1980; Kelly, 1982; Manning, 1999). Studies concerning outdoor recreational habits have been carried out by researchers from a number of disciplines, including e.g. landscape architecture, environmental psychology, leisure sciences and tourism research. These most often assume that recreation is something self-chosen, a pleasurable way of spending time that involves regaining power - spiritually and physically. Prominent among the theories is the notion that recreational activities and places should entail recreation from labor and stress, and moreover develop the personality of the individual, by involving and absorbing in something of great importance.

Restoration

Recovery through spending time in nature began to attract scientific attention in the 1980s. Studies indicated that places characterised as nature had a beneficial effect on health, they were found *'restorative'* (Bell et al., 2001). Restoration means primarily the recovery of mental powers and can thus be seen as a *sub-category* of recreation. Restoration thus means 'the result of a complex place experience, in which cognitive, affective, social and behavioral components are considered together with the physical aspects of the environment' (Scopelliti & Giuliani, 2004; p. 426). Hartig et al. (2011, p. 148) explain; 'the term restoration covers processes through which people recover resources they have diminished in their efforts to meet the demands of everyday life'.

Four central aspects are likely to contribute to a restorative environment (Kaplan, 2001): 1. 'Fascination' (an environment is holding one's attention effortlessly). 2. 'Being away' (a physically or conceptually distance in one's mind). 3. 'Extent' (an environment is allowing one to remain engaged; there is more to explore than is immediately evident). 4. 'Compatibility' (an environment supports what one wants to do, supports intended activities).

Concerning experiences of high levels of stress, it is assumed that there are restorative benefits of simply looking at nature in stress-related situations (Ulrich, 1999). Man 'understands' the natural environment, which means possibilities to regain resources and explore environments (Kaplan & Kaplan, 1989). Also attractive buildings with panoramic and historical characteristics (as restaurants, museums etc.) are to be found as including restorative qualities (Rosenbaum et al., 2009; Fornara, 2011).

Qualitites in nature and landscape environments

This section describes the appropriation of qualities in nature and landscape environments that are relevant between individuals and surrounding nature. Appropriation means the act of taking possession/assigning purpose to properties (or ideas). It derives from the Latin *ad proprius* (to make one's own, to take into use; Copyriot, 2008). The concept appropriation within this context, means taking possession of something mentally.

Research within restoration has been directed towards studying whether natural environments are good for recovery from stress and for improving concentration ability. Velarde et al. (2007) observed that the environment in these studies is classified as either 'nature' or 'urban'. They mean that there is a lack of studies which use subcategories to those main categories. The building of theories within this context often concerns how people through evolution have developed to function optimally in some kind of environments.

The concepts of nature and landscape

The concept of nature can be characterised in many ways. Since Cicero, nature has been divided into the *first nature* (wilderness) and the *second nature* (cultural landscapes), and from the 1500s gardens have been defined as the *third nature* (Bucht, 1998; Hunt, 2000). Wilderness, the first nature, can be described as the realm of the gods, and at the same time the raw material for the second nature. Gardens, the third nature, include more culture and symbolic elements, are more built and designed to a higher extent as compared to the first and the second nature, and can also be said to represent aspects of the first and the second nature (Hunt, 2000). As a simplification and an interpretation; *nature* stands for the wild, the 'non-disciplined', with a

natural dynamic and 'an unknown gardener', and here first nature dominates. A *garden* contains the cultivated and planned with the characteristics and design of 'a known gardener', and here third nature dominates.

According to Kaplan and Kaplan (1989) and Clayton (2007), people generally make a fundamental distinction between outdoor environments with and without green elements. The presence of green elements leads to the interpretation of the environment as being more 'nature'. However, birth, death, reproduction and relationships between species are also nature, i.e. 'an organic environment where the majority of ecosystem processes is present' (Maller et al., 2006, p. 46). Thus one meaning of 'nature' concerns the relationships of humans to nature and how nature appeals to human emotional, cognitive, aesthetic and spiritual growth (Konijnendijk, 2008). I will return to this kind of relationship in the chapter 'Shaping relationships with nature and landscapes'. However, in this chapter I use the same definition of nature as developed by Kaplan and Kaplan (1989); whereby, all kinds of everyday green outdoor environments, including more wild nature, urban trees, urban open spaces, parks and gardens are regarded as 'everyday nature'.

Furthermore, I use the super-ordinate concept of landscape. The concept *landscape* comes from an ancient Indo-European phrase and is used in most European languages today. Historically, it has been used to describe, and sometimes even to name, part of a geographical area that contains special features or characteristics (Jackson, 1984). In certain European countries, such as Sweden and Germany, it has also been used as an administrative unit (ibid.). However, since the 16th century, scientists from many disciplines have associated the landscape concept with spatiality, heterogeneity and relationships between natural and cultural processes. Today it is used to describe large-scale environments comprising nature objects, such as rolling hills and lakes, as well as areas clearly influenced by human activities, such as pasture land, arable land, buildings and roads. The concept of landscape includes morphological (the knowledge of shaping), functional and symbolic issues (Freitas, 2003). The European Landscape Convention defines landscape as; 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (European Landscape Convention, 2000). In this thesis, I follow this definition. Today, the European Landscape Convention regards landscape as a key factor in individual and social wellbeing (ibid).

Perceiving and preferring nature and landscape

In order to aid understanding of the status of knowledge within nature and health and the theories referred to therein, some definitions and theories are explained below. These include how we perceive nature and why certain parts of nature are more preferred than others. The aim with the section is to provide a comprehensive review of the research field and to position the present research within the area of environmental psychology. The theories presented can be identified as significant for an understanding of underlying factors believed to play a role in preferences for certain places.

Perceiving nature and landscape

The definition of perception is the process of acquiring, interpreting, selecting and organising sensory information. All human perception depends on the senses. The individual's attitude to the environment depends on how it is perceived with the senses and how he or she intellectually and emotionally receives it. Nature stimulates the whole sensory system, which in turn gives different experiences.

Bell (1999) has described the complexity of experiencing nature and the landscape. He noted the importance of sensory perception not only through sight and hearing, but also through moving in space, distance and close-up perception, feeling moisture and cold, actual physical movements, balance, distance and speed of movement (ibid).

Natural phenomena offer a mix of conformity and opposites, unity and variety, symmetry and change. The most powerful experience of nature is often perceived as sudden and without warning (Humphrey, 1980). People perceive that less is demanded from them in contact with nature. The most complex relationships that people have, are with other people and the least complex are with inanimate objects; stones, trees, etc. (Searles, 1960). Studies show that newborns have an early ability to recognize water as it sparkles. The visual features of water through the course of evolution have had adaptive significance for the individual's survival, expressed as success in detecting water (Coss et al., 2003).

Affordances

Actions and perceptions are closely linked together, and environments offer special forms of information concerning possibilities of action linked to different species and individual beings (Gibson, 1979). What Gibson responded to in terms of perception research were the remarkable ways in

which the experiments were conducted. According to him they were unnatural. For example, people were placed in front of 'an illusionary structure' and deceived using different techniques, but only when viewed from a specific angle. The eye functions and sees things as the body moves in an ecological context. Ecological means that the individual most often focuses on solving tasks and sees what is needed to do. An affordance is simply a commodity that can be used or provides an opportunity to solve the task and affordance is therefore usually translated as an 'environmental offer'. Though, affordances have since changed character, they do not need to be solely cognitive. Affordances can be emotional and involve other senses (besides vision) when, for example, there is an absence of noise and the tasks may involve a lot of play, recreation and rest. Gibson (1979), Norman (1988) and Heft (2010) and other affordance-scientists play a role in several of my studies.

Recently Heft (2010) defined affordances as 'the functional properties of an environmental feature for an individual' (p. 20). Various definitions of the concept have been developed in different fields. Affordance may be seen as the 'meaning potential', where meaning emerges via the interaction with the world; socially or physically in a mutual reinforcement of action, perception and interpretation (Halliday, 1978). The more threatened and stressed an individual feels, the more important it is to find solutions, in the form of the right offerings from the environment, i.e. affordances (Gibson, 1979). The concept of affordances refers to anything that is available to the individual, e.g., a stepping stone in a stream directly signals its relevance within the situation of an individual seeking to cross over (Van Lier, 2004). Affordances may also be seen as 'relationships' and interactions between the learner (organism, animal, human being) and its environment, filled with either opportunities or inhibitions of actions.

Norman (1988) widened the concept to mean that affordances of an environment have to be based on the individual's plans, values and prior experiences. When a child climbs a tree, the affordance is neither in the tree nor in the child, it is in the relationship between them, a mutual reinforcement of action, perception and interpretation (Heft, 1988). According to Heft (1997), affordances are mainly opportunities offering potential for action, but also learning and developing a skill.

Preferring nature and landscape

Preference means an evaluative judgement in the sense of liking or disliking an object (Scherer, 2005). The importance of the qualities of the recreational

setting – how people experience its aesthetic and functional value, beauty or importance – has been examined in several studies since the early 1970s (Knopp, 1972; Kaplan & Kaplan, 1989). Due to the evolutionary assumption, people still have adaptations to the kind of environment which was present in early human evolution (Hartig et al., 2011).

According to Humphrey (1980), the beauty of nature would not be experienced so strongly if comparisons were not made to discover similarities and differences in the nature. What is experienced as the 'beauty' of nature is an unexpected contact with a part of reality (Tuan, 1974). Discussions concerning beauty may not be a proper way of comparing preference, i.e., you may agree with someone that something may be considered beautiful or – even 'aesthetic' without liking it for that sake. Emotions may be a better way of expressing it.

In the following chapters, a number of theories will be presented that deal with preferences for different types of landscapes. I am aware that some criticism has been leveled at them, particularly the biophilia hypothesis (Joye & De Block, 2011). The critique mainly regards the lack of evidence and because of that the usefulness of it (ibid). I find biophilia as an expression very convenient, but substantially a bit unclear. Theories by the Kaplans' (1989) and Ulrich (1999) seem to have gained stronger scientific acknowledgement. However, in general, I prefer to include the theories being commonly used within this area, due to the fact that they have been influential as a theoretical constructs during many years.

The biophilia hypothesis

From an evolutionary perspective, human beings are fascinated by nature environments due to the process of selection. People generally seek and prefer rich environments where the resources needed for survival are better, thereby having an advantage and a higher rate of survival. This selection of rich habitats is known as the biophilia hypothesis, as one interpretation of the hypothesis. Thus, the biophilia hypothesis means that the human race has innate preferences and needs passions and attractions to other living organisms (Wilson, 1984; Kellert & Wilson, 1993). Further, the biophilia hypothesis means that humans are evolutionarily predisposed to a life close to nature - nature with especially rich prerequisites for survival and wellbeing and humans are responding psychologically and physiologically to such rich environments. Thus, attention and positive feelings are given to vegetation and natural features such as stones and water. According to this

theory, humans have an affiliation with nature and a bond to other living systems or, in other words, biophilia means the love of nature and living things (Sacks, 2009).

The savannah theory

The savannah theory also has an evolutionary perspective and is thereby related to the biophilia hypothesis (Orians, 1986). Within the savannah theory, humans are biological beings adapted to their original environment; the African savannah. The savannah-like properties of nature that humans prefer include the presence of water, scattered stands of large trees (short trunk, wide canopy), open spaces, green and varied vegetation, changes in elevation, winding trails, and bright glades preferably hidden by foliage in the foreground (Rabinowitz & Coughlin, 1970; Ulrich, 1973; Balling & Falk, 1982; Orians, 1986). Studies regarding the savannah theory show that adults in many countries prefer trees with large, wide crowns (Orians, 1980, 1986; Coss & Moore, 2002). These surroundings connect the body to the subconscious (Ulrich et al., 1991; Ulrich & Parsons, 1992; Ulrich et al., 1993; Parsons et al., 1994; Ulrich, 1999). The more open and bright the natural environment, the better (Ulrich, 1999). Natural settings such as savannahs and places containing water, are supposed to be stress-relieving and create an evolutionary advantage with their restorative effects (Ulrich et al., 1991). Though, the preference for the savannah-like environment becomes of less importance as the individual is getting older (Balling & Falk, 1982).

Prospect-refuge theory

Another theory with an evolutionary perspective, which can be related to the savannah theory and the biophilia hypothesis, is the prospect-refuge theory proposed by Appleton (1996). Appleton argues that when discovering risks and hazards, the opportunities for hiding and observing unseen are crucial for survival and that constant visual interpretation of the landscape is based on finding places for watching and for refuge (ibid). In this theory, the possibility of movement connected to the possibility of refuge is important, and the conclusion is that some landscape elements give aesthetic satisfaction, having connections to evolution.

Kaplan's preference matrix – a cognitive approach

Kaplan and Kaplan (1989) claim that preference for a scene is dependent upon the need to understand the environment and a desire to explore. The possibilities are assessed through immediately derived information from the environment or inferred information. The human need for information as important for survival is the basis behind a preference matrix, with humans seeming to be attracted to complex, coherent, mystery and legible scenes. Kaplan and Kaplan (1989, p. 53) refer to 'complexity' as 'the number of elements in a scene: how intricate the scene is; its richness'. When an environment provides involvement in the present it is considered 'complex'. 'Coherence' in a scene is defined as order and organization: 'the patterns of brightness, size, and texture'. The environment is considered as 'coherent' when it makes sense in the present, while 'mystery' refers to a scene's depth and its hidden qualities. 'Mystery' invites the observer to explore and draws them in. The environment is considered 'mysterious' when it suggests that it will provide involvement in the future. Meandering trails and glades bright with hidden foliage provide all the mystery that brings out the innate curiosity to explore. For understanding a scene or an environment, 'legibility' helps the observer to comprehend and to function effectively. This occurs when the environment provides assisting 'landmarks'. The balance between familiar and novel features of the environment is of great importance for those in an unknown or too well-known environment (Lawton, 1985). However, this does not mean that humans are attracted to scenes which involve a maximum of these characteristics. They are components which govern the preference, but having a lot of them gives a high preference. The four Kaplan variables ('complexity', 'coherence', 'mystery' and 'legibility') are sometimes called 'information variables' and represent information in the environment that humans have always used as a matter of survival in finding water, food and security (Stamps, 2004).

Kaplan and Kaplan (1982, p. 92) define familiarity as 'the relationship between an individual and something that the individual has had considerable experience with'. According to the Kaplans', repetition and frequency are critical antecedents for feeling familiar with something; they mean that comfort, prediction, effortlessness and speed, are the cognitive and emotional consequences of familiarity-experiences (Kaplan & Kaplan, 1982). The sense of familiarity is evoked by a scene or the ease of identifying what the scene is about - identifiability, legibility – and they mean that the extent to which the scene promises further information, is if the observer could walk deeper into it – 'mystery' (Herzog et al., 1982). In other words, they connect both 'legibility' and 'mystery' to their definition of familiarity.

Naturalness

The most significant factor appears to be whether the scene is natural or man-made (Purcell & Lamb, 1984; Herzog, 1985). Some studies have concluded that people are more agreed on how to estimate qualities in nature environments than qualities in the built environment (Kaplan & Kaplan, 1989; Stamps 1999). For example, studies show that irrespective of age and sex, people much prefer going out into nature than to looking at people and architecture (Ulrich, 1984). I return to the statement about people preferring nature in all conducted studies, not least in the two first papers.

Many natural forms are fractal and naturalness has been found to be an important predictor in preference research (Hagerhall et al., 2004). The pattern of self-similarity across different spatial scales is shown by natural forms; for instance in coastlines, snowflakes, plants, clouds (Mandelbrot, 1977; Mandelbrot & Blumen, 1989). Hagerhall et al. (2004) assume that because nature builds many of its patterns from fractals, the fractal dimension could help to identify the natural qualities, i.e. the naturalness of the pattern (ibid). This also deals with order and complexity, in that the pattern in nature is fascinating but also predictable.

Shaping ‘relationships’ with nature and landscapes

Nature as being charged, magical - having a spirit

Even in prehistoric times, some places in the landscape were considered particularly beautiful, charged, and magical: whereas, other places were connected to dangers and bad feelings. The ‘good’ spaces were usually ascribed religious and even of healing importance (Gerlach-Spriggs et al., 1998). During the Roman era these places were considered spiritual, as having a spirit guardian or genius loci (Norberg-Schulz, 1980). The early 18th century poet Alexander Pope (1688-1744) came up with this when his close friend Richard Boyle proposed significant changes to the landscape of his estate, such as creating parklands;

‘Consult the genius of the place in all/ That tells the waters or to rise, or fall/ Or helps th' ambitious hill the heav'ns to scale/ Or scoops in circling theatres the vale Calls in the country, catches opening glades/ Joins willing woods, and varies shades from shades/ Now breaks, or now directs, th' intending lines/ Paints as you plant, and, as you work, designs./ Still follow sense, of ev'ry art the soul/ Parts answ'ring parts shall slide into a whole/ Spontaneous beauties all around advance/ Start ev'n from difficulty, strike from chance;/ Nature shall join you; time shall make it grow’ (from Epistles to Several Persons 1731: Epistle IV to Richard Boyle, Earl of Burlington).

Pope’s main idea of landscape architecture was that the chief proof of landscape design is to follow nature. This epistle made a strong impression on the whole perspective on landscape design among architects. During the late 20th century, Norberg-Schulz (1980) wrote that the genius loci of a place contains a certain atmosphere which has to be preserved and developed. Questions arise concerning how the spirit of the place arises and

which characteristics in the landscape are most important in defining the atmosphere of a place. Some researchers argue that in these places there are strong impressions of nature and culture facing and affecting each other, where myths, religion, fairytales and activities are connected to the place (Swan & Swan, 1996). Tuan (1974) suggests that the spirit of a place contains a love of a place, named topophilia, which is based on a certain phenomenon: that some kind of identity to the place is created. With that, the identity of the person and the identity and distinctive character of the place, are connected. In addition to topophilia, studies in environmental psychology recognize bonds with the place, mentioned as place identity (Prohansky et al., 1983), place attachment (Altman & Low, 1992) (more about place attachment will follow), sense of place (Chawla, 1992) and favorite place (Korpela & Hartig, 1996) etc.

Parr (2007, p. 539) identifies environments as 'living entities' intimately involved with humans and sees nature as an 'actively shaping force'. Whether we respond to a place, depends on how much we know about the place, the feelings we have for it, how it is experienced and how it is (Werne, 1987).

Imprinting and attachment

When experiencing nature surroundings, humans have various opportunities to feel connected – and the background can be found in the terms of imprinting and attachment. Place attachment (Altman & Low, 1992) is largely based on imprinting and attachment-theories; and the ecological self (Naess, 1989) is based on an identification with the living-nature, plants and animals. Transformational objects have further implications due to this research' results with its connection to the childhood nature.

Imprinting

Within psychology, imprinting means any kind of phase-sensitive learning (phase as a particular age or life stage), independent of the consequences of the behavior. After learning the characteristics of a special stimulus, the animal or the person is 'imprinted' onto the subject, as when a baby learns who its parents are (Kisilevsky et al., 2003). (Though, imprinting is not usual to use in modern times within psychology, imprinting concerns pure learning psychology instead. The imprinting concept has changed concerning humans and is used within the genetic research and also mentioned in programming).

Research related to imprinting mainly concerns animals (e.g. Bowlby, 1969; Sluckin, 1972; Berk, 1994). Ward and Styles (2007) write 'the lack of studies investigating imprinting in humans has meant that the role of evolutionary processes underlying human development has largely been ignored' (ibid, p. 323). Innate learning mechanisms are seen as similar to the mechanisms of imprinting (Baron-Cohen & Swettenham, 1996). Ward and Styles (2007) describe imprinting like a process of exploration where the child 'maps' both the physical as well as the geographical environment during childhood. Experiences of explorations may 'include characteristics of the environment, such as the smell, touch, color, and sounds of both animate and inanimate objects' (ibid, p. 323). These experiences are gathered as information during critical timeframes or periods of the child's life, also in connection with attachments to meaningful events in the same environment. This information then results as being imprinted on the child, becoming a part of the self and because of this, lasting during the whole life span (Ward & Styles, 2007). Ward and Styles write; 'wherever a person is born, the physical, social, and cultural aspects of the land can imprint on the psyche' (ibid, p. 323)….. 'the country and people from whom a person originates can imprint so deeply and acutely that the emotional bond cannot be erased over time' (ibid).

Konrad Lorenz was the first to describe the concept of imprinting in 1937, in which he supported ethological ideas of attachment (Shaffer et al., 2002). Lorenz, who studied birds, found that imprinting happens automatically, does not need to be learned, happens within a critical period and is irreversible. For ducklings, imprinting behavior is evident already by the end of the first day after hatching and makes the duckling follow a subject of a certain size because its brain registers the first object it sees (Lorenz, 1965). A flight-behavior also develops and is released by objects dissimilar to the imprinted object. This is species-imprinting. In a different case, salmon that have lived many years in the ocean always return to the place where they were born to spawn. They have to have learned special characteristics about the coast - that stream, that brook, that tributary during a short period of time during the first year of life. This is place-imprinting. Migrating young birds not only have an innate behavior which makes them find home again, they also return to the place where they were born to nest. In other words, during the first months of life the bird has learned special signals from the place, stored the knowledge and retained it in memory for the rest of the year while in a totally different place in the world (Hjort, 1983). (From birds to humans; the psychologist Harlow conducted

controversial, but pioneering studies with apes and surrogate-mothers - for further reading e.g. Harlow & Harlow, 1965).

Attachment

Attachment means an emotional connection, which involves being dependent on someone or something - emotionally, mentally or/and physically. The attachment between the parent (the caregiver) and the child, which is based on trust or non-trust, has major importance throughout life (Bowlby, 1969, 1973, 1980; Ainsworth et al., 1978). Bowlby was inspired by ethological theories concerning the imprinting of animals. He proposed that parent and child are biologically predetermined to shape attachment bands and this resulted in his well-known attachment theory which emphasizes the role of human interaction in the formation of self and emotional regulation (Fogany et al., 2002). It is also central for the infant's development of emotional stability (Main, 2000). The attachment theory concerns secure or insecure attachment (avoidant, preoccupied and disorganized), based on observations of how children are affected by the environment in which they live and particularly the interpersonal relationship with parents (Bowlby, 1969, 1973, 1980). The parent's emotional response to the child is critical not only in unfamiliar social situations, but also when the infant discovers the non-human world such as animals, plants, dirt and rocks (Spitzform, 2001).

The basis of the Bowlby theory is that the human has a goal-directed and instinctive behavior - the attachment system. This system can be adjusted more or less after changes in the environment; in other words, if these changes do not differ too much from the environment where the system was developed. Neurobiological processes are of significance concerning the attachment system, which have been shown in many studies where animals, especially rats, have been studied (for further reading e.g. Kendrick, 2000). It is the warmth-regulation, the milk supply and the tactile stimulation which is of importance concerning the early contact between the mother and the baby (Hofer, 2003). Hofer explains how the ways the little one regulates its biological system, and becomes an adaptation to the kind of care it gets. This regulation is occurring through hormones and signal substances as serotonin and dopamine etc., and sends impulses between different brain structures (ibid). The neurohormone oxytocin is central concerning the care of children, the attachment between the child and the parent and the love in relationships (e.g. Liebowitz, 1983; Kendrick, 2000). The effects of oxytocin are intertwined with each other and involve complex interactions. What we

do know is that the release of oxytocin is occurring in close physical contact and the behavioral consequences are calmness, harmony and positive feelings, and an uncritical state of mind against the individual the physical contact is shared with. Oxytocin is also released from good relationships- it does not have to concern intimate relationships, it may concern group belonging with others, or a relationship with an animal, as a cat or a dog (Uvnas-Moberg, 2000, 2009).

Place attachment

Over a lifetime, various changes and movements are made in which the non-human environment changes; e.g., physical property and outdoor and indoor locations associated with various homes the individual has lived in. On a mental plane, the human being carries around previous physical property that retains an emotional string in the individual which may come to life when least expected (Bollas, 1992). Several aspects need to be considered concerning an individual's feelings, bonds and attachment to a place. An intertwining of the individual's perceptions, attitudes, values and world view, gives a place its meaning. Other important factors are the biological heritage, the characteristics of the place viewed from a cultural and social viewpoint, upbringing, education and occupation (Tuan, 1974). The definition of place attachment by Scopelliti and Tiberio (2010, p. 337) is 'a complex construct that accounts for a person's affective bonds to place'. Time spent and experiences in a place are seen as significant factors creating possibilities for deepening the meaning and emotional ties connected with the person-place relationship (Altman & Low, 1992). An long-term (ibid) and enduring (Smaldone, 2007) relationship with a special environment may result in place attachment rather than 'only' experiencing the beauty of the place. Place attachment is a useful way of studying place (Kyle et al., 2005), and can also be seen as an integral part of human identity (Stewart et al., 2004) or as forming the identity. Place attachment can help shape and sustain the identity of a person, group or culture (Altman & Low, 1992). It can serve as a defense against identity crises in transition periods between different stages of development (Hay, 1998). Response to place, largely arises from cognitive, affective, social and behavior factors (Scopelliti & Giuliani, 2004). People's choice of recreation, and especially their satisfaction with the recreational experience, depends on place attachment (Gross & Brown, 2008).

The childhood nature

Historically, nature has acted as a model for better interpretation and management of tensions or uncertainties originating from childhood (Carson, 1998). Dovey (1985) believes that it is strong memories from childhood which form the adult's approach to the surroundings. For children, Sebba (1991) suggests the natural world as an unfailing source of stimulation and continues: 'the stimuli of the natural environment…assault the senses at an uncontrolled strength' (ibid, p. 416). Sebba claims that it is the child exploring the place with both body and senses which results in memories being retained in adult age (ibid). The child uses the senses through observations and use of the outdoor environment, as well as through emotional interplay with the surroundings (Martensson, 2004). The experiences can be so strong that places can be remembered as childhood favorites even in old age (Sandberg, 2002). With special feelings for one or two places during childhood, a tendency is developed to shape a secure attachment to new places as an adult (Twigger-Ross et al., 2003). Simplicity, stability and coherency are often missing in the human world; 'the non-human environment is relatively simple and stable, rather than overwhelmingly complex and ever shifting… and generally available rather than walled off by parental injunctions' (Searles, 1960; p. 117).

Studies have shown that people moving to a new area or place may still have preferences relating to the region in which they grew up (Conzen, 1990; Ward & Styles, 2007). People can deeply mourn their childhood landscape for a long time after they have moved away (Ward & Styles, 2007). For example, Finnish emigrants who moved to the United States in the 19th century, settled in areas with great coniferous forests, many lakes and cold Nordic weather, despite the fact that they could have doubled their crop yields if they had settled in the more fertile southern areas which were also available. In addition, those who had to settle in an area very different from that in which they had grown up often began to change the landscape of the new area so that it resembled their former area (van Cleef, 1918; Paasi, 1999).

The home as a place, and especially the childhood home or the native district, may have a calming effect on humans (Uvnas-Moberg, 2000). The missing mother is not the answer in this, but the positive experiences of calmness, safety and security which have been connected to the own home during the years of childhood. Older people often return to their childhood area. Sometimes they need to separate from the used home area as an old and sick individual, which often impoverishes the health condition (ibid).

Transformational objects

All objects produce different effects in their characteristics that structure the individual's inner experience (Bollas, 1992). According to Winnicot the mother is the first transformational object (Winnicot, 1960). Through the concept of transformational objects, Bollas cites non-verbal memories of motherly care that causes negative effects in the child to stop, so the child is transformed from a state of distress into one of contentment. Based on the fact that the mother has an overwhelming role during the first year of the child's life, Bollas states that all later feelings about the self and the world are built upon experiences from the mother-child relationship (Bollas, 1992). The transformational object is a process in which we seek transformational objects in adult life, to transform something inside. For instance, in therapy the therapist becomes the transformational object (Bollas, 1987). Later in life, when the individual counteracts negative physical and emotional conditions through contact with nature, and thus makes the self more coherent, there is a direct correlation between what nature does in the present and what the mother did for the baby. This recreates the feeling of being protected and nurtured as a child, which Bollas (1992) refers to as entering a mood.

Ecological self

The ecological self is a kind of 'relationship' being shaped between human and nature; the self feeling empathy for the non-human environment.

Self formed in interaction with the physical environment that is non-human is called the ecological self (Neisser, 1991). This was originally a concept by Naess (1989), who regarded environmentally responsible conscious behavior as a form of altruism, by the ability to familiarize one self with other living creatures and share an experience. Naess (ibid) argues that the ecological self is a privately held way to interact with nature that reaches deep into man's primitive elements in an almost imperceptible way. Close contact between man and nature is considered to be both important and useful. There are parallels here to the biophilia hypothesis; 'people possess an inherent inclination to affiliate with natural processes and diversity, and this affinity continues to be instrumental in humans' physical and mental development' (Kellert & Derr, 1998, p. 63).

A 'human' tree in the park of Alnarp

When people perceive the ecological self, it is a kind of spiritual 'relationship' with all other living things around, with a touch of responsibility too. The ecological self is continuous in its development through all life's interactions with animals, plants and places and nature as a whole. It is not something static, but a collaborative process in the development of the self throughout life. Although the self in relation to the non-human is not fully understood, it points out an inner satisfaction and security (Spitzform, 2001). Furthermore, psychological and emotional health should include the ecological self, Myers states (1998). Many people have developed 'an ambivalence to the non-human environment though which they ignore its importance, which results in problems concerning

psychological wellbeing' (Searles, 1960, p.6). With a good emotional attachment to both the human and non-human world, good mental health and stable adjustment are promoted (Spitzform, 2001). Ecological self seems to have close links with the connection to the caregiver/custodian in the first year of life (ibid).

Being empathetic (having an awareness of another's feelings and acting according to this) is an outward act because it is about communicating the experience of understanding. Sharing the feelings of others is the basis for helping others and countless other behaviors, in which the individual contributes positive behavior in interaction with others (Eisenberg & Fabes, 1998). Empathy in its usual sense refers to another human being. The willingness and ability to function empathically is a vital factor that 'should' be present, not only the human social sphere, but also the non-human realm. When an animal or a plant has been injured, the human is using his/her empathy when feeling compassion and responsibility for it. Humans can become acquainted with the animal or the plant, experiencing an identification of oneself and also a sort of identification with all living things. The individual is experiencing ecological identity, which may deeply touch all the senses (ibid).

Theories concerning psychological restoration

Studies have shown a strong relationship between perceived restorativeness and preference (Purcell et al., 2001; Van den Berg et al., 2003; Tenngart Ivarsson & Hagerhall, 2008; Nordh et al., 2009). The most prominent explanations of restorative effects are described through the two established theories, Attention Restoration Theory (Kaplan & Kaplan, 1989) and the Aesthetic Affective Theory (Ulrich et al., 1991) - both having a huge impact on the scientific discipline of environmental psychology. The theories have their origin in the tradition of natural environments' psychological values, but are also closely connected to theories of stress and mental fatigue (what exhaustion disorder was called earlier). The two theories appear to complement each other with regard to the antecedent condition from which one is restored (Hartig et al., 2003).

Based upon the findings in the restoration (rehabilitation) studies (Papers III-V), I also would like to involve the Sensory Integration Theory (Ayres, 1983) with emphasize on the sensory organs role within psychological restoration in nature.

Attention Restoration Theory

The Attention Restoration Theory (ART) was among the first theory relating to the importance of restorative experiences in nature to recover from attention fatigue. According to the ART there are two types of attention; directed attention and soft fascination. Directed attention (Kaplan, 1995; originally designated voluntary attention by James, 1962), is applied when a human performs activities that require sustained attention (Herzog et al., 2003). The mechanism designated 'directed attention capacity' is limited. Exhaustion is supposed to be the result of a period of prolonged use of

strong directed attention, leading to reduced and finally no capacity to ward off distractions. A constant and intensive use of directed attention decreases the ability of the individual to re-direct attention and to suppress competing stimuli (Kaplan & Kaplan, 1989). The concentration used in directed attention is focused on a task, for instance driving a car. This concentration tires relatively quickly, and is something people should care for and not waste.

Soft fascination (Kaplan, 1995; originally called involuntary attention by James, 1962), is attention which does not require any effort. James (ibid, p. 231) describes involuntary attention as being stimulated by 'strange things, moving things, wild animals, bright things, pretty things, etc'. The most central part of the ART is the idea that soft fascination restores the ability of directed attention. The ART has been evaluated in relation to nature's restorative effect on humans and found of relevance in several studies (Tennessen & Cimprich, 1995; Korpela et al., 2001; Hartig et al., 2003; Herzog et al., 2003). The empirical support the theory has gained is mainly within quasi-experimental studies, where individuals' cognitive competence has significantly increased by regular visits to nature (Hartig et al., 1991; Tennessen & Cimprich, 1995; Wells, 2000; Hartig et al., 2003).

Aesthetic Affective Theory

Ulrich's well-known evolution-based theory; the Theory of Aesthetic and Affective Responses to Natural Environments and Stress Recovery (AAT) (Ulrich; 1983; Ulrich et al., 1991) differs from ART in its focus on psychological and affective reactions, rather than cognitive ones (Ulrich, 1983). Ulrich means that these reactions are assumed to have evolved from visual stimuli, typical for any environment. The main factor for nature's health effects is the stress reduction, due to this theory. According to AAT, humans are biologically adapted to live in natural environments and the stress-recovery response occurs when people perceive certain patterns in the environment (Ulrich, 1983; 1984). Being in nature offers an abundance of sensory impressions where all senses are more involved. Ulrich means that humans have an innate emotional response to nature environments that determines our behavioral strategy, which may either be approach or avoidance. Thereafter, a physiological response is required to carry out this behavioral strategy (Ulrich et al., 1993). In an artificial environment, which can be experienced as an indoor environment, we may not listen to our instinctive signals, e.g., to relax when a danger is over (Ulrich, 1993). This

may lead to stress and appear as different physical reactions, such as a change in blood pressure and respiration (Ulrich, 1983).

Certain characteristics in nature may lead to specific reactions causing emotions and particularly primitive impulses to flee, freeze, etc. These types of reactions have been important for the survival of the human race. We may also find signals within the nature making it possible to rest. Stressed people often react strongly through negative categorical effects, such as feelings of fear or anger. An upset individual interprets the surrounding environment through feelings of un-safety or insecurity. However, within a sound reaction, the negative effect disappears when the threat is gone. Feelings that the landscape arouses are based on instincts derived from a will to survive, combined with genetic and learned responses (Ulrich, 1999). The sensory inputs from being exposed to the landscape are the consequence of what has been occured. According to the AAT, we have the means to react and rely on our unconscious reflections of the natural surroundings. The AAT refers to the savannah-theory (Orians, 1980), the biophilia-hypothesis (Wilson, 1984) and prospect-refuge theory (Appleton, 1996). The evolutionary perspective on the stress-regulating effects of certain natural surroundings like the AAT, have been tested in several studies and shared by others (e.g. Ulrich, 1979; Ulrich, 1981; Ulrich et al., 1991; Hartig et al., 2003); the main-findings from those studies show; after a stressful task, a visit in a built environment gives continuously high blood pressure, but a calm nature environment restore it.

Sensory Integration Theory

Sensory impressions and interactions with the physical environment have impacts on human development. The coordination between the senses and the brain is described in sensory integration theory, which concerns how the brain processes and collates information from the sensory organs (Ayres, 1983). According to this theory, coordination of sensory impressions and experiences occurs gradually for the individual through important activities and environments, and is significant when interpreting and experiencing the surroundings. In addition to the five common senses –vision, hearing, touch, taste, flavor- Ayres includes movement and positioning. All development within the individual concerns sensory integration, as it is very satisfying to put sensory impressions in order and be able to react to these with a constantly refined adjustment and more complicated behavior. Sensory integration is the ability of the central nervous system to organize two or more sensory impressions so that the information can be processed in a

meaningful way. The meaningfulness shapes a satisfaction, which in turn promotes the development of the brain. This is the reason why we naturally seek sensory impressions which promote brain organization (Ayres, 1983).

Stress

Definitions of stress

Stress is a central term as related to the importance of nature for health and wellbeing. Stress is not a static condition that can be captured through objective measurements or easily described. A number of physiological measurements are, however, commonly used to measure stress, such as cortisol in saliva, pulse rate, blood pressure, skin conductance, self assessment tests such as Melamed etc., or clinical assessments based on diagnostic criteria. Today, stress is defined as any stimulus that results in bodily function changes (Wahrborg, 2009). An extension of the concept of stress includes the individual in terms of his/her perception, motivation and interpretation of external and internal events determining the final reaction (Sterling & Eyer, 1988). An individual's interpretation of a situation determines the reaction of the specific individual (Krauklis & Schenstrom, 2003). An individual's particular stress reaction depends on heredity, environment and previous experiences. For most people, the acute stress response is not associated with any adverse effect on health, as the stress hormones automatically return to their original levels when the stress situation has passed. I would like to emphasize that stress sometimes is needed in order to perform well, and is in its origin something positive, or as Asberg et al. (2010) express it; 'stress is no disease'.

Physically, stress reactions include increased blood pressure, breathlessness, muscular tension and hormonal responses that mobilize the individual to cope with the situation. These reactions are the result of stress hormones (adrenaline, norepinephrine and cortisol) secreted into the bloodstream. The physical change happens first in the sympathetic nervous system through the immediate reaction to stress via the hormone adrenaline,

which causes increased blood pressure, rapid heartbeat, sweating, enhanced blood coagulation, decreased sensitivity to pain, dilated pupils and improved concentration (Dahlgren, 2006).

Demanding and stressful events in the surrounding environment are designated as stressors. Antonovsky (1990, p. 74) defines a stressor as a 'stimulus which poses a demand to which one has no ready-made, immediately available and adequate, response'. The interplay between a stressor/s and the individual is supposed to result in physiological responses to stress (Wahrborg, 2009). The underlying feeling associated with stress is anxiety (when the individual is making the assessment that he/she has resources to overcome the stressor), and threat (when the individual is making the assessment that he/she does not have enough resources or when faced with a trauma that has already occurred) (Lazarus & Folkman, 1984). Stress arises in the collision between the individual's expectations and what is happening right now, which prevents them from meeting these expectations. Stress is a physical response to a challenge, which often involves some kinds of changes. A fear of new situations can sometimes cause people to choose to live with their problems instead of trying to find new paths to solve them. Anxiety is often closely related to a feeling of powerlessness and a lack of control over a situation. Social and economic factors, health practices, biological vulnerability, environmental factors and lifestyle are also of great significance. Often, the individual has personality features such as indulgence, anxiety over a difficulty in setting limits, impatience and intolerance, low self-esteem and general uncertainty (Maslach et al., 2001). After 45 years of age one's susceptibility to stress begins to decrease, perhaps due to a general aging of the cells leading to less working capacity of the cells as compared to in younger age. Maslach argues that the clear link between age and stress could be explained by the fact that the individual over time becomes more stable and mature, with a more balanced perspective on life (ibid).

Work-related stress

Present life and life style entails an immeasurable number of decisions in the form of choices, including choosing TV channel packages, banking and saving for retirement, etc. The need to take a standpoint on many parameters contributes to a basic level of stress; probably resulting in a diminished ability to satisfactorily manage the stress of a demanding career (Krauklis & Schenstrom, 2003). Different stressors at work are reported as being more frequent than stressors associated with other roles people have

(Mazzola et al., 2011). It is usually highly ambitious people making great contributions and investments in their jobs who are afflicted by severe stress ill-health, as they base their self-esteem and identity on what they achieve at work (Socialstyrelsen, 2003). A combination of high demands with few opportunities to influence one's work situation creates conditions for stress reactions (Karasek & Theorell, 1990). One example taken from the working life; - After firing 39 employees and simultaneously hiring 46 new employees, the human resources manager Erik Kjaer at Saxo Bank explained in a newspaper interview, being published some years ago; (….to be a success in Saxo Bank is….) '….to have initiative, ambition, independence. Will to burn through with your personality in the job you are doing. It is an agenda set by us, and there are a lot of people who are super-happy with it' (Politiken, 2007.10.20).

Among high-paid female white-collar workers, stress-related disease and depression are the most common afflictions (Renstig & Sandmark, 2005). An unsatisfactory psychosocial work environment and poor leadership are regarded as problem factors, and there is evidence that bad supervisors are a significant problem. Women can be considered to be especially hindered from succeeding career-wise due to common female behavior patterns, thought processes and expectations that are not always relevant in working life, which can thus threaten a woman's career development (ibid).

Feeling empathy for another human being is not always positive but may instead be experienced as a strain for the truly devoted. It is said that people who are deeply involved in other people's lives, such as those in professions demanding great use of one's empathetic side, run a higher risk of depression, fatigue and professional identity crisis. Occupations in health care are known to be stressful because they usually involve a combination of lack of control, a congestion of demanding responsibilities, shift work, stressful events in life and death (e.g. Coffey et al., 1988; Foxall et al., 1990).

Performance-based self-esteem

A recent study shows the tendency to be dependent on performance and success in the job, in order to maintain a high self-esteem (self-esteem= a person's overall evaluation of his or her own worth), being of importance for the development of cognitive stress symptoms (Albertsen et al., 2009). Performance-based self-esteem means self-esteem contingent on how well one performs in roles that are of vital significance for one's self-realization (Hallsten et al., 2005). A feeling of not being good enough, accompanied with a lack of power and strength, can destroy a person's self-image (Jenner

& Svensson, 2003). A person's self-image is the mental picture of oneself, often being resistant to change. A short explanation of self-image is the individual's own answer to the question 'What do you believe people think about you?' An individual who needs to be seen as clever in order to be considered good enough, a performance-based self-esteem, carries a greater risk of suffering from stress-related ill-health (Hallsten, 1993; Hallsten et al., 2002). Persons with high self-esteem tend to experience a lower stress level (O'Donnell et al., 2008). There is a strong association between low self-esteem and depression (Orth et al., 2008).

A negative self-image can complicate an individual's existence even if the individual is not aware of it (Cullberg Weston, 2007). Some individuals lack a fundamental level of self-esteem, which may be because of them having been let down by adults in their younger years (Perski, 2006). Love, caring eye-contact and touch during childhood from parents and others in the immediate surroundings, help to create a good self-image, whereas ignoring a childs' needs for closeness and safety might lead to development of permanent inner defects when becoming an adult (Cullberg Weston, 2007). Someone with performance-based self-esteem strives to perform as well as possible to compensate, and thereby achieve the self-esteem lacking since childhood (Hallsten et al., 2002). Such individuals base their self-evaluation above all on factors such as success, perfection (Johnson & Blom, 2007), appearance and responsibility-taking (Arbetslivsinstitutet, 2007). There are indications that with low fundamental self-esteem and high performance-based self-esteem, there is a tactical drive for perfection with the purpose of protecting and strengthening the weak self-esteem (Koivula et al., 2002). Perfectionism can be divided into negative and positive (Bieling et al., 2004), by which the negative correlates with depression, worry/anxiety and stress (Koivula et al., 2002; Bieling et al., 2004). The positive is regarded as normal, healthy and motivational, and is considered to act as protection from the fear of failure (Flett & Hewitt, 2006).

Factors that contribute to a higher risk of performance-based self-esteem are being female, young and having higher education carries. If an individual lacks a fundamental level of self-esteem, he or she will often instead attempt to find self-esteem through action; e.g., by choosing a demanding career to garner recognition and confirms their cleverness (Perski, 2006). 'Good girl syndrome' (Fezler, 1987) involves women seeking confirmation based on how they perform (Renstig & Sandmark, 2005). Women with this syndrome usually want everyone to like them, which cause them to avoid conflict and have trouble saying no. They strive for perfection throughout their lives – as a child and as a grown woman –

because since childhood they have often heard that they were clever after having achieved something good, or that they were a 'good girl' because they conformed and did not cause any trouble. The adult 'good girl' strives to have the perfect job, the perfect home and the perfect family, and her self acts as perfectly as possible to make everyone happy (ibid).

Exhaustion disorder

Stress can challenge, stifle and threaten an individual's health and well-being – with a life containing a vicious circle of stress posing a serious threat. Stress becomes dangerous when we feel that the demands made on us are too great or too small compared with what we are physically and mentally capable of. In Sweden, 'burnout' is regarded as a mild form of a disorder and thus, not a disease. The 'burnout' is described as problems associated with difficulties controlling one's life situation (Asberg et al., 2010). The individual does not realize the scope of the problematic situation, and thus cannot remove him or herself from it. During severe long-term stress without recovery, the normal reactions within the individual become dysfunctional, and might end with serious health problems, and affect all vital organs (Aldwin, 2007). Prolonged stress reactions may often result in depression or fatigue. Fatigue often appears late, and is preceded by non-specific somatic symptoms of stress such as body aches, digestive problems and sleep disturbance (Wahrborg, 2009). Exhaustion disorder is a brain injury and an existential crisis. What today is called exhaustion disorder, has had numerous other names over the years as including mental fatigue, vital exhaustion, etc.

It is the process of the crisis that creates exhaustion disorder, which has three phases: absorbing engagement, frustration and 'burnout' (Hallsten et al., 2002). The process often involves vulnerability in a specific work situation, and is also associated with feelings of failing to achieve one's own highly ambitious goals. Commonly, a critical event functions as a trigger, leading to the feelings of resignation and a lack of energy. The crisis process is lengthy (ibid). Well-known symptoms for exhaustion disorder are a general feeling of being chased, harassed and stressed, fatigue, irritability, lack of ability to concentrate, insomnia, muscular tension, body ache, stomach trouble, hypersensitivity to sound and light, itches, dizziness, chest pains, impaired short-term memory and general anxiety and depression (Maslach et al., 2001; Klingberg-Larsson, 2000). Fatigue is the dominant symptom and concerns emotional, intellectual, physical, social and existential ability (Klingberg-Larson, 2000). Cognitive symptoms of memory impairment and attention deficit appear later in the course of events, before

the final stage of fatigue, guilt, anxiety and depression (Wahrborg, 2009). The needs and expectations of others are often experienced as demanding (Maslach et al., 2001). The ability for interaction with the environment is often lost (Klingberg-Larson, 2000). The individual is generally disorganized and finds it hard to cope with the usual social contacts. It is common for an exhausted individual to isolate him or herself more and more. Those in the individual's surroundings often note that he or she has undergone personality changes and has become more self-centered (ibid).

Long-term stress causes reductions in the functions of the entire informational apparatus including senses, emotions and cognitions (Ayres, 1983). The reduced functions lead to feelings of insecurity, causing even more additional stress. Stress contributes to increased control by affects, since stress influences the cognitive brain to become less active (Ayres, 1983; Ulrich, 1999). Emotional exhaustion is of the greatest significance in exhaustion disorder (Peterson et al., 2008).

Cognitive problems often remain longer than other symptoms, which can create hindrances to returning to work. A fully developed exhaustion disorder is classified as a difficult and long-term condition that entails a long period of reduced ability to work (Asberg et al., 2010). Rehabilitation can be successful even after extremely long periods of illness, though an increased sensitivity to stress often remains, and many who have suffered from the condition continue to work only part-time after rehabilitation (ibid).

An uprooted tree in the park of Alnarp. A citation from a student; 'Is the support weak and the strain huge, whoever may fall to the ground' (Sinnett, 2011.11.10).

SALUTOGENIC STRATEGIES

Self-regulation

Self-regulation is a salutogenic strategy where the individual on the basis of his/her own experiences and background, tries to improve his/her situation. It concerns behavior and thoughts, but also choice of surrounding/environment. Self-regulation has been described as 'altering and developing one's own behavior and own traits without the guidance of parents, teachers, institutions and therapists' (Egidius, 2002; p. 494).

Damasio (2003) defines several types of communication systems. One of the most basic, which can be found in most animals, is the pain and pleasure system. This system deals with withdrawing the organism from unpleasant places and finding more pleasant ones, e.g. withdrawing from too hot or cold places to places with a better temperature. A more developed system involves instincts, concerning, e.g., hunger, thirst, fight and flight. These systems together can be said to concern our basic instincts of self-preservation (ibid). Higher developed forms are emotions and thoughts, where pleasantness is very important for the human being.

A process occurs when maintaining a balance between pleasant and unpleasant emotions, where self-regulation proceeds with the use of environmental, mental, physical and social strategies (Korpela, 1989; Epstein, 1991). This means that listening to the signals from the body about how to avoid stress and ill-health is a salutogenic strategy that requires appropriate environments (often in nature), rest when it is needed and exercise. It concerns a kind of salutogenic self-adjustment or self-correction. Self-regulation involves changing the patterns of thoughts and the change starts by self-observation (Franken, 2002). Korpela (1989) asserts that attachment to a place supports self-regulation when the positive emotions are changed

and the renewal of cognitive capacities is processed. Harris et al. (1996) also write that possibilities for 'private regulation' are related to place attachment, which Korpela et al. (2002) link to self-regulation occurring e.g. in favorite childhood-places. Contact with nature has psychological positive outcomes by affecting self-regulation and restorative healing experiences (Korpela et al., 2001; Korpela & Ylen, 2007; Van den Berg et al., 2007) – a natural environment may be seen as a place for personal growth, changes in self-concept, self-esteem or body image (Hartig et al., 2011).

Coping strategies

Health becomes a question of capacity to adapt to current circumstances and environment (Giacaman et al., 2009); and due to that the concept of 'coping' is important to include as it is one form of self-regulation. Through the ability of active self-regulation, different coping strategies can be learned and used to take control over the life situation (Metcalfe & Mischel, 1999). 'Coping' is often used within stress-related issues. For example, during the 1960s Lazarus introduced cognitive coping strategies so that an individual could affect his or her thoughts in the perceived world (Lazaruz & Folkman, 1984; Lazarus, 1966). The definition of coping is 'the cognitive and behavioral efforts made to master, tolerate, or reduce external and internal demands and conflicts among them' (Folkman & Lazarus, 1980, p. 223). Coping actions can attempt to change person-environment realities behind negative emotions or stress (problem-focused coping) or relate to internal attempts to change the appraisal of a demanding situation (emotion-focused coping) (Lazarus & Folkman, 1984).

The feeling of powerlessness when being in front of other people is a well-known feature of stress illness and personal crisis. The connection with powerlessness in front of oneself is though seldom emphasized. This powerlessness in front of oneself is felt when the individual feels the world is collapsing when the demands of the individual become too difficult to handle. Thus, much of recovery and rehabilitation of individuals with exhaustion disorders, involve learning useful coping tools. A person's coping skills can also influence the tendency for stress and stress reactions (Wahrborg, 2009).

Research so far

- The Supporting Environment Theory (SET) (Grahn, 1991) shows the more pressure the individual feels, the greater is the need to find salutogenic environments that can support the recovery process.
- Actions and perceptions are closely linked together and environments offer special forms of information concerning possibilities of action link (Gibson, 1979).
- Exhaustion is supposed to be the result of a period of prolonged use of strong directed attention, leading to reduced and finally no capacity to ward off distractions. In the Attention Restoration Theory (ART) (Kaplan & Kaplan, 1989) soft fascination is an attention which does not require any effort, as often being experienced when in contact with nature.
- Due to the Aesthetic Affective Theory (AAT) (Ulrich, 1983) the main factor for nature's health effects is the stress reduction. According to AAT, humans are biologically adapted to live in natural environments and the stress-recovery response occurs when we perceive certain patterns in the environment.
- According to the Sensory Integration Theory (Ayres, 1983), co-ordination of sensory impressions and experiences occurs gradually for the individual through important activities and environments and is significant when interpreting and experiencing the surroundings.
- Positive emotional states (Faber Taylor et al., 2002) and positive effects on mood (Van den Berg et al., 2003) can be achieved through contact with nature.
- Attachment to a place supports self-regulation when the positive emotions are changed and the renewal of cognitive capacities is processed (Korpela, 1989).

Aim and objective

The emphasis of the thesis is based on a behavioral science perspective. The different investigations included examine two aspects of human contact with nature; spending leisure time outdoors in recreational settings and rehabilitation from exhaustion disorder through garden therapy.

The main aim was to increase the understanding how natural environments can support and contribute to improvement in health- and wellbeing concerning stress related issues. The overarching objective was to formulate an explanation of the operating processes working between an individual and the surrounding nature environment.

More specifically, the research questions have been formulated as:

- Which qualities and activities in natural environments are more likely to restore people from stress?
- Which kind of natural environment can function as supporting?
- What kind of 'relationship' between an individual and nature constitutes a supporting environment, and how does it occur?
- Which factors are considered most essential to the stress-recovery process within the garden therapy being conducted in Alnarp?

In the included papers, health and well-being have been measured as stress levels (Paper II) or been described as increased capacity (Papers III-V).

A brief introduction to garden therapy

Concerning the restoration studies, I especially chose to study garden therapy in Alnarp which has its origins in horticultural therapy; 'Horticultural therapy is the use of plants by a professional as a medium

through which certain clinically defined goals may be met (Sempik et al., 2003, p. 3).

In the oldest original writing being found – the Gilgamesh-epic (circa 2000 B.C.E) – it is described how the king Gilgamesh visited the garden Dilmur giving him power, strength and an eternity of life. In the Dilmur garden there were several Gods but no illnesses, nor death – and this garden became connected with health (Kramer, 1958; Grahn & Ottosson, 2010). The ancestor of the medical art, Hippocrates (460-370 B.C.E), was probably the first garden therapist (Grahn & Ottosson, 2010); and his knowledge is still essential after more than two thousand years. Healing gardens in connections to hospitals have been used in European landscapes since mediaeval times (Gerlach-Spriggs et al., 1998). The spa-culture was spread in Europe – and came to Sweden in the late 1600s (Jakobsson, 2009). The American doctor Benjamin Rush (1745-1813) was one of the first to write about garden activities and its healing effects concerning treatments of psychologically ill people (Rush, 1812). He mainly emphasized how beneficial it was against depression and different states of anxiety, as well as self omission (ibid). In Sweden, the doctor Ernst Westerlund (1839-1924) was one of the first spokesmen concerning the healing impact of nature and garden. His treatments often involved hard work and exercise in nature and gardens - he meant that this gave the patients distance to themselves and their lifes (Grahn, 2005). During and after the WW I, soldiers returning home and suffering from neuroses from the war and posttraumatic stress syndrome, were successfully treated with garden therapeutic activities (Gerlach-Spriggs et al., 1998). In the beginning of 1940's, horticultural therapy became a study-subject within schools of occupational therapy in the United States. During the 1970's the first professor was nominated within horticultural therapy at the Kansas State University (USA). Since that time, the American Horticultural Therapy Association (AHTA) (from the beginning mentioned as the National Council for Therapy and Rehabilitation through Horticulture, NCTRH) has been certifying garden therapists. In England the counterpart is the Thrive-organization (from the beginning mentioned as Society of Horticultural Therapy and Rural Training) which started some years afterwards (Davis, 1998; Schneiter-Ulmann, 2010). Today many different groups of patients are treated with garden therapy; for instance, people suffering from neurological diseases, people being exposed for abuse (Grahn & Ottosson, 2010).

The Alnarp Rehabilitation Garden (ARG)
Description of the site

In Alnarp 'garden therapy' as a term is used. Sempik et al. (2010, p. 46) recently wrote; 'The terms used in relation to green care in different countries and the context in which they are used provide some information on the state of development of the different approaches in those countries'… 'the terms used may reflect the structure and organisation of green care in that country' (ibid). In ARG it is not mainly the cultivation which is the focus, it is rather the occupational therapy originating from the horticultural therapy (Shoemaker, 2002). In Sweden this is considerably extended in the design of the garden as such, so its restorative value has great importance. To be accurate, it can be stated that in ART a 'multimodal garden therapy' is conducted. In the United States and United Kingdom the concept of 'healing garden' is often used. 'Healing garden' is used as an umbrella term for all kinds of gardens being designed to have a health-function. In ARG the term 'health garden' is preferred. A health garden is designed for a specific user-group and includes both restorative as well as areas for activities for horticultural therapy. A rehabilitation garden can be described as a health garden just for rehabilitation.

ARG (Figure 2) is located on approximately 5 acres (2-hectare) area of the SLU campus in Alnarp, southern Sweden. The garden is designed to have restorative and contemplative qualities and to provide opportunities for physical activities. The variation and contrasts in the design provide a number of garden rooms for different purposes and activities. The basic intention in the design was originally to let the vegetation form the core. The garden contains nature-like areas with restorative characteristics and traditional garden areas with flowerbeds that focus on more demanding activities. The nature-like areas include a small wooded area, a grove of fruit trees and a couple of meadows. The cultivation area contains one area more modern and built (less nature-like), and traditional horticultural areas, and a wood-like garden room (Stigsdotter & Grahn, 2003). The different rooms are intended to range from the non-demanding (rest) to the more demanding (activities). When the participants enter the garden, they are offered the option of choosing a place that fits their needs. The garden is ergonomically designed with opportunities to exercise physical, sensory and cognitive functions (Abramsson & Tenngart, 2003). This is of significance for an individual suffering from exhaustion disorder being very sensitive to different impressions from the environment. The garden is mainly designed from a sensory perspective, focusing on the senses, safety and soft fascination. The garden rooms are surrounded by rows of trees (whitebeam, rowan,

etc.), hedges in different forms and levels and fruit trees. Decisions concerning the garden, such as changing the plants and color composition, are continuously made by the researchers in consultation with the staff (Grahn et al., 2010).

Figure 2

Plan of the rehabilitation-garden in Alnarp (Illustration: Karin Sunde-Persson)

The Alnarp Rehabilitation Garden including the surroundings.

(Photo: Pekka Karppa, AB05)

A lush entrance to the Alnarp Rehabilitation Garden.

A place for relaxation-exercises in the garden (as presented in Paper IV). In the background one of the favorite places being chosen by participants (as presented in Paper III; 'the importance of self-chosen place based on present mood').

Description of the therapy program

Garden therapy at Alnarp aims to strengthen the exhausted individual's possibilities to return to work with newly acquired skills, tools and coping strategies to use in stressful situations. The rehabilitation program is built upon disciplined daily routines and encounters with like-minded people struggling with similar challenges in a nature environment, with professional caregivers to take care of the individual in an accepting, calm and positive way. Coping strategies communicated to participants with exhaustion disorders can involve placing wishes before duty, doing one thing at a time, avoiding trying to do everything, stopping immediately when feelings of

tiredness arise, and thinking differently so that negative feelings are changed, etc. The therapeutic activities in the garden are built on methods and approaches originating from the traditional healthcare sector. A treatment team (mentioned as 'the caregivers') is present in the garden, consisting of a number of professionals from diverse disciplines, who use the garden as an essential part in their work on rehabilitation. The caregivers work together on problems, exchanging knowledge and experiences about developing garden therapy. The professions include an occupational therapist, a curative educational teacher, a physiotherapist, a psychotherapist and a gardener. The caregivers have 'knowledge of both horticulture and the care of vulnerable people' (as Sempik et al., 2010 describe 'horticultural therapists'). A maximum of eight individuals per group are rehabilitated over a twelve-week program comprising 4.5 hours per day, four days per week (ten weeks four days per week, and two weeks containing one day during the first week and one day during the last week). In Alnarp, patients are called participants with the intention of strengthening their image of themselves as non-patients. The participants have been referred to the rehabilitation program from hospitals, social insurance offices, insurance companies, the industrial health service and the Skane Regional Council. The activity in the garden is studied by a cross-scientific research team, where researchers with different specializations study the effect of different factors for the rehabilitation process regarding long-term stress-related sick leave. Since July 2002 approximately 200 participants have been rehabilitated in ARG. The environment and the activities provided are built upon theories that are evaluated and further developed through experience (Tenngart Ivarsson & Hagerhall, 2008; Grahn et al., 2010; Tenngart Ivarsson & Grahn, 2010).

Material and methods

View of knowledge and the scientific approach

My prior understanding is based on a psychological perspective, on behavioral science theory, in which I have my primary degree. The phenomenon of recovery and stress relief in nature appeared to be a suitable study object that combined my interests in nature environments with wellbeing as a whole.

Interpretation is required when there is something we wish to understand (Odman, 2001). The general reason for an interpretation to be started is a tension between not understanding and a desire to understand (ibid, p. 45). Interpretation of the individual researcher is inescapably influenced by his or her past experience, education and perceptions of the research object. When dealing with solving problems either in everyday situations or when carrying out research, it is impossible for individuals to free themselves from their own prejudices and to be completely objective (Holme & Solvang, 1997, p. 95). An awareness of these circumstances was involved through the work of the thesis, which has been resulting in a research design comprising quantitative as well as qualitative research.

When carrying out both quantitative and qualitative research, a number of different methods and traditions can be applied. For the studies of the present thesis, a combination of methods primarily based on hermeneutics and ethnography was used. Hermeneutics is based on interpretation and aims to create understanding and meaning of the parts and integrate them through a holistic approach (Weber, 1983; Odman, 2001). The hermeneutic perspective is often used for interpretation of possibly meaningful phenomena when there is no absolute truth (Gilje & Grimen, 2004). The researcher is forced to relate to a world that has already been interpreted by

the social actors within it (ibid). The hermeneutic approach was used in papers III-V and there was a need to interpret the understanding. With the hermeneutic theoretical perspective the researcher strives unprejudiced to understand a situation/a text. The use of this tradition deals with trying to understand the meaning of the 'phenomena' in the context it exists in.

Within ethnography, participant observation is a frequently occurring data collection method, with the researcher often visiting or living among the study population for long periods of time (Blumer, 1969; Geertz, 2000). Ethnography can also include shorter periods of participant observation in combination with in-depth interviews (Sjoberg, 2004), which has been referred to as micro ethnography (Bryman, 2008). The data collection process in this thesis was to some extent micro ethnographical (Papers III), since similar combinations of different techniques, for instance on-site observations and interviews, is common within ethnography. The ethnographical approach and participant observation produce knowledge and experiences rather than facts and figures. Meaning and significance are sought rather than absolute truth (Kvale, 1997). Apart from being relevant for the studies being conducted, ethnographical observations appealed to me as those constitute a unique within-perspective via its procedures - capturing tacit knowledge (Polanyi, 1966). Tacit knowledge is knowledge that is difficult to transfer to another person by writing it down or verbalizing it (ibid). The method enables to constantly challenge the observed phenomena, which can offer specific patterns to theorize from (Lieberg, 2004).

A combination of quantitative and qualitative approaches

To answer the research questions, a combination of quantitative and qualitative methods and approaches were used. Both method triangulation and theory triangulation (Stake, 1995; Denzin & Lincoln, 2005; Bryman, 2008) have been used to strengthen the studies. Triangulation is sometimes a preferred strategy within the social sciences (Gorard & Taylor, 2004). It involves the use of more than one approach, with the explicit aim to enhance the validity of theories and findings. Method triangulation means using more than one method for collecting and analyzing research data; including quantitative as well as qualitative sources. Theory triangulation means using a combination of theoretical perspectives within the interpreting-process (Denzin & Lincoln, 2005); as has been used in the present thesis, and especially in the frame work letting the different theories interact with each other.

The advantage of using triangulation is the insights that are gained (Risjord et al., 2002). When getting answers that support each other, it can help to understand the solution of the problem. Risjord et al. (2002) mean that if independent and different methods lead to the same conclusion or converge toward the same kind of explanation, the results are to be seen as reinforced. Risjord et al continue; the researcher is not limited by the respective weaknesses of the methods/theories, it instead benefits from each strength – or as Williamson (2005) express it – they can give the explanatory model more depth and breadth. Through the use of multiple sources of evidence, the strengths and weaknesses of these sources are highlighted and it is also possible to determine which of them complement each other (Merriam, 1994).

Case study research

Case study methodology is often used when there is a need for studying a complex phenomenon (Stake, 1995; Yin, 2003). It is possible to generalize from a few cases, and the concrete and contextual knowledge of the case may be more valuable than the search for general theories (Flyvbjerg, 1991, p. 165). Wallén (1996) explains that case study methodology means a detailed and intense studying of one or many cases in which the process is in focus. Within most case studies, different kinds of interviews are combined (Merriam, 1994), as within this case study research. The benefits and disadvantages of case studies according to Wallén (1996, p. 115); 'The primary advantage of case studies is in being able to study what happens under real conditions. A further advantage is the ability to gain detailed knowledge of an ongoing process. Through the studied case, we know that a phenomenon does exist, that a particular activity, process, etc., is at work. However, we do not know if what is studied, is common and the conditions generalizable to other organizations.'

Gained knowledge about the factors that operate in a case, allows researchers greater opportunities for theoretical and empirical generalization. Wallén believes that generalizations about procedures and outlines of the process are possible through case studies, while results specific to individual cases are not (Wallén, 1996, p. 118-119). What can be generalized by my results is the essence of the 'phenomenon' and the processes associated with the same. According to Gillham (2000) this is; if the results converge, there can be a reasonably confidence concerning the true picture of the case is described.

In case study methodology it is important to begin constructing a preliminary theory before conducting the data collection (Yin, 2003). Yin explains this as of significance being able to establish the case's boundaries and ensure that the data collected, will be relevant. The only preliminary theory in this case was assumed that the factors considered most essential to the recovery process, had something to do connected with nature.

Selection of case study: ARG as study object

A substantial proportion of the data material (Papers III-V) came from ARG as a single case. ARG serves as an example of a Swedish rehabilitation garden contributing to rehabilitation from stress disorders through its sensory experiences. The garden with it's rehabilitation concept has from the start been designed for a special target group; the outdoor environment is designed and the activities tailored to treat patients with exhaustion disorder. Alnarp may be viewed as a prototype for the behavioral setting (relationship between individuals and the environment; Barker, 1968), as it was designed on the basis of a given theory (Stigsdotter & Grahn, 2003) - with given theory means different garden rooms, different activities, etc.

ARG is seen as 'unique' (Tenngart Ivarsson, 2011, p. 41) compared with other rehabilitation gardens, due to the combination of conducting horticultural therapy (=activity-based as being common in e.g. United Kingdom) in a healing garden (=a restorative environment as being common in the United States). ARG was an interesting case to study, as it was the first of its kind in Sweden when it opened in the early 2000s. ARG developed a new school, a Swedish type of garden therapy, which has been spread via courses, study visits etc. It is also a breeding ground for new activities in Sweden, and in some extent also in Denmark and Finland. The range of training programs/courses located in ARG has given others knowledge and opportunities to open their own practices. Alnarp was also a convenient place for me as a researcher due to its geographical location.

Methods of data collection

Table 1 shows the primary data collection and analysis methods used in the studies carried out within this thesis work, as well as how they are related to the papers included.

Table 1. Data collection methods and analysis

Methods of data collection	Years	Number of participants	Analysis methods	Papers
Questionnaires	2004	1325	Quantitative	I & II
In-depth Interviews	2004	5	Qualitative	IV
In-depth Interviews	2008	5	Qualitative	III
Focus Group Interview	2008	5	Qualitative	III
On-site Observations	2009	5	Qualitative	III & V
	2010	8	Qualitative	III & V
Semi-structured Surveys	2008	19	Qualitative	I

Questionnaires

The questionnaire consisted of a post mailed questionnaire with 44 pre-coded questions, most often with multiple-choice options as well as the opportunity to make individual remarks. Statistics Sweden did the randomization (to a random sample of Swedish citizens in the age range 18-100 years) and it turned out that there was a satisfactory correspondence between the gender, age and socio-economic grouping for the persons answering the questionnaire and people in Sweden in general. In total, 2000 questionnaires were sent out and 1988 were delivered successfully. Two reminders were sent out. A total of 1325 completed, or nearly completed, questionnaires were returned, giving a response rate of 66.6%. The oldest respondent was 93 years old, the youngest 18. Drop out analysis was carried out (Paper I) and no significant deviations were found. Statistics Sweden also provided important census data from the Swedish Population and Address Register (SPAR) concerning the participants' addresses. The questionnaire was created as a part of a contract research at SLU, ordered by The National Board of Health and Welfare, Swedish National Institute of Public Health, Swedish National Heritage Board, Swedish Forest Agency, Swedish Board of Agriculture, Swedish Environmental Protection Agency. This contract research was run by Professor Patrik Grahn, Dr Christina Axelsson-Lindgren and PhD-student Anna Bengtsson at SLU, who pieced the questionnaire together, at the request from each of the mandators that certain questions had to be included.

In-depth interviews

Altogether, ten semi-structured in-depth interviews were conducted (five former participants; Paper IV and five caregivers; Paper III). Each interview lasted for one hour. The expected time for the interviews was stated before each interview. According to Lantz (1993) asking questions often is an easy way to obtain information concerning an individual's experiences about a phenomenon. Structure and lay-out of the interviews was based on the Grounded Theory (GT) method (Glaser & Strauss, 1967; Strauss & Corbin, 1990; Bryman, 2008), which works as a systematic methodology in the social sciences. According to grounded theory (ibid), the interviews were performed with great openness. When the informants wanted to reflect and discuss personal issues, they were allowed to do so as long as the discussion remained, within the theme areas of the interview guide. The interview guide used for the interviews with the caregivers (see appendix 1) contained a number of themes apart from paper III's focus on the recovery process such as the working model, the definition of the rehabilitation form, the research link, etc. Due to this, there is a rather huge collection of research material being left for further research. The interviews with former participants contained several medical aspects as well as factors considered essential for the recovery process. The interviews with the former participants in the rehabilitation program were conducted by Dr. Clara Ossiansson and those with the caregivers by Anna-María Pálsdóttir and my self. All interviews were documented by audio recording and were transcribed.

Focus group interview

In order to obtain an even wider understanding of garden therapy, a focus group interview was conducted in connection to the in-depth interviews (Paper III) with the same group of caregivers. When focus group interviews are used within qualitative research, a group of individuals is asked about their opinions, beliefs and attitudes, for example, towards a special concept or idea (Henderson, 2009). This method corresponds to that used at dialogue seminars (Goranzon et al., 1988) and takes an interactive research approach, whereby knowledge is developed in the meeting and the dialogue between researcher and practitioner (Svensson et al., 2002; Lieberg, 2004). As questions were asked, participants were free to talk and discuss with each other during the session. Within social science, working with a focus group allows the interviewers to study the relationship between the participants in a group and how different opinions and approaches may have an impact in a group-dynamic situation. The focus group interview was intended to give a

greater understanding of the interplay within the group. One other advantage is that focus group interviews offer results relatively quickly (Marshall & Rossman, 1999).

The reason for making a focus group interview was mainly to confirm the significance of interactions and discussions between the informants - all according to Wilkinson (1998) and Bryman (2008). In the focus group interview, the caregivers were offered opportunities to probe each other's reasons for holding a special view and to qualify or modify a view, or voice agreement with new ideas they may not have thought of without being exposed to the impressions of others. This allowed studying the ways in which the caregivers collectively discussed issues. An interview guide was used for the focus group interview (see appendix 2). The focus group interviews were led by Anna-María Pálsdóttir and my self, and were documented by audio recording and were transcribed.

On-site observations

The observations being conducted are called on-site observations or participant observations (Kvale, 1997; Denzin & Lincoln, 2005; Bryman, 2008) and the term 'participatory action research' (Cornwall & Jewkes, 1995) is also used.

The observations took place during a total of 14 days in summer 2009; and a total of 11 days in summer 2010 (see appendix 5). The design of the study was similar in the second summer, regarding my handling of the participants as an observer, to make conditions as comparable as possible. The two groups consisted of 13 participants in total, one man and 12 women. The participants consisted of people aged 35-65 years who had been on sick leave from 0.5 to 7 years, all diagnosed with exhaustion disorder as defined in the Swedish version of ICD (klassifikation av sjukdomar och halsoproblem KSH) in 2005 (Socialstyrelsen, 2005); ICD-10 F43.8A. The code F43 assignes to stress-related psychological ill-health, which contains four subgroups: various adjustment disorders, acute stress reaction, post-traumatic stress disorder and finally exhaustion disorder (Asberg et al., 2010).

I did not participate as a participant within the rehabilitation program as such, I was present in the close nearby surrounding. As an observer I did not conduct activities, relaxation exercises, etc. together with the participants or follow the program as a participant. The informants knew about me being the researcher/the observer in the same person (see the inform consensus in appendix 3 and 4), but no specific details were revealed about what kind of factors were being specifically examined. There was no 'template' for the

observations; they began with an open mind. In presenting myself to the participants, I stated that I would not be interacting with them on my own initiative, but if they wanted to make contact with me I would of course respond. The recommendations are that what the researcher will be studying are open rather than withheld (Gillham, 2000). In this case though, a transparency was considered as a 'risk', maybe affecting the results. The reason for conducting the observations was an attempt to try to *observe* possible factors being essential within the recovery process. Due to this these observations also corresponded to what is called 'shadowing' (Johansson, 1998), as it was considered necessary to avoid observing the participants in a too obvious way. All participants being asked chose to participate in the two studies.

I spent approximately four hours per day during the days when two of the therapists (the physiotherapist and the psychotherapist) were working, which became one or two days per week during the participants' rehabilitation-periods. As earlier mentioned, the entrance for conducting the observations was to observe without any prerequisites, but after a very short period, approximately after two weeks, a changed behavior within the participants was observed. The frequency of how much I would observe was decided between me and my main supervisor in the beginning of the observations; because of very strong indications of an observed changed behavior in the participants only seen in connection to the therapy-sessions conducted by the physiotherapist and the psychotherapist. I especially focused and noted the observed behavior after therapy sessions had been conducted for each individual participant. I followed each participant independently with special interest, and tried not to be too obvious in my observations. I noted everything that possibly could be of interest in connection to his/her changed behavior, what others around said and did as well. Facial expressions, body language and interpersonal interactions attracted attention and were of significant interest. The heading in my field notes were: The coded participants' number, notes in relation to the participants' visit to the physiotherapist, notes in relation to the participants' visit to the psychotherapist. Diary-like field notes (Kvale, 1997, p. 100) of the observations and experiences were made after each observation occasion and sometimes during the actual time of observation to avoid omitting any important aspect. I made notes in a notebook I kept in the pocket. I strained to only write when no one was around me. I transferred the notes into the PC the same afternoon the observations had been conducted.

Through this access to the environment, it was possible to learn more about the operations taking place there; or as Gillham (2000) writes; 'there is a well-known and common discrepancy between what people say and what they actually do'. Further, according to what Kullberg (1996) finds of importance within these circumstances; in my notes I tried to operate through introspection and constantly questioning what had been observed and written down. It was easier for me doing so, using 'thick description' (Geertz, 1973; Gillham, 2000); which means a description of a human behavior that explains, not just the behavior in itself, but its context as well, making the behavior more understandable and meaningful to an outsider.

Semi-structured surveys

A smaller qualitative study with 19 persons, employees at the Swedish University of Agricultural Sciences (SLU) – were asked a written question: 'Do you identify yourself as a coast person or a forest person? Please mention the ten primary reasons why you belong to this category.' (Presented as a 'pilot study' in Paper I). No clues were given; it was an open question where the informants were given the opportunity to answer through their own formulation. The material was coded and was analyzed according to grounded theory.

Official documents

Printed sources used as complements included organization plans, maps, illustrations, photographs, brochures, annual reports and correspondence, drawings and planning material. These sources were used to broaden the understanding of garden therapy during the work. However, these sources did not offer any direct reflection or re-coupling regarding the research questions and were, therefore, of complementary, rather than primary, significance.

Processing and analysis of quantitative material

The main hypothesis and idea was to analyze the answering respondents related to their preferences for different landscape types and see whether there were differences between 'feeling at home' in different landscape types and their preferences for different landscape characteristics and their habits concerning outdoor recreation (choice of place and choice of outdoor activity). The most common categorization was done by the question whether they felt at home in different landscape types; but another

important question was whether the level of stress (defined in Paper II) could be associated with different activities and outdoor places.

The questionnaire contained 43 questions such as: 'What is your preference for open vistas?' This type of question was followed by five alternatives on a Likert scale, from 'Do not like at all' to 'Like very much'. In order to make the interpretation easier, multivariate analyses such as cluster analysis or factor analysis were used to combine questions expressing the same concept. This was done partly to reduce the amount of variables, partly to identify underlying phenomena that may explain why variables coincide in different clusters or factors. This idea to combine questions expressing the same concept is a technique in environmental psychology, used for example to find the eight Sensory Perceived Dimensions (e.g. Grahn & Stigsdotter, 2010) or the Semantic Environmental Description (Kuller, 1991). For example, from questionnaire data, a factor analysis showed that the six landscape types used in the questionnaire could be reduced to four types by clustering Rolling hills and Lake into one type and Agricultural plains and Pasture and grazing land into another type. In the same manner, the 20 questions related to preferences for different qualities in nature environments were reduced to eight factors. In Paper II, cluster analysis was used in the same manner to reduce 60 different outdoor activities into 10 groups.

The motive for using methods like T-test, ANOVA and Chi-square analysis was to test if it could be determined whether there are any statistical relationships between factors like preferences for green outdoor qualities and people's background. The standard statistical method to compare two groups is to do a T-test for continuous observations and the Chi-square test for grouped data and these methods are used when there are no confounding variables. When you have confounding variables like gender, age and socio-economic grouping and/or you have more than two groups, you have to use more advanced statistical procedures to do the analysis. In general, Analysis of Variance (ANOVA) was used but if the outcome was a yes/no or 0/1, specialized models were used for this situation (GLIMMIX and similar procedures in SAS; SAS Statistics, 2009).

When you have a lot of independent variables, one method to find the most important ones is to use stepwise procedure in regression. This means that you enter the independent variables one by one until the additions of new variables don't significantly improve the model. The R-square procedure was used. This analysis builds models and shows measures of fit for all possible models. That is; the best one- variable model, the best two-variable model and so forth. R-square fits all possible combinations of a list

of variables specified in a model statement. The procedure is useful when you want to find a best-fit model among several possible.

The questionnaire also contained questions about the perceived health and in order to get an estimate of the Level of Stress (LS) for a person, principal components analysis was used to combine the answers about irritation, fatigue and stress in the most effective way. To ensure that these three variables weighed fairly in the new variable LS, the values were multiplied by the principal component value (PCA) according to the formula (PCAirritation x irritation) + (PCAfatigue x fatigue) + (PCAstress x stress) = LS (Manly, 1994). In the analysis, the PCA values for irritation, stress and fatigue were 0.77, 0.75 and 0.78, respectively. It was found that LS was associated with ten different activity types and the landscape types people feel at home in.

Processing and analysis of qualitative material

The material collected in the case studies amounted to:

- 7 hours or 137 pages of transcribed text concerning the in-depth-interviews and the focus-group-interview with the caregivers.
- 5 hours or 68 pages of transcribed text concerning former participants and the in-depth-interviews with them.
- 112,5 hours or 30 pages of transcribed text concerning the participants and the observations of them.

'Qualitative researchers are interested in understanding the meaning people have constructed, that is, how they make sense of their world and the experiences they have in the world' (Merriam, 1998, p. 6).

The processing of analyzing concerning the qualitative studies (Papers III-V) were, as mentioned before, based on GT (Glaser & Strauss, 1967). The first step while using GT method is to mark from the collected data key points with a series of codes, concepts and categories being extracted from the text and as the last step finalize and create a theory (Bryman, 2008). The qualitative material was coded already during the data collection phase by highlighting parts of interviews and observation notes regarded as being of particular interest. This inductive method approach (ibid, p. 11) requires that the researcher starts from the collected material and tries to draw more general and theoretical conclusions. With this inductive approach, the importance of an empirical approach is further developed in theoretical examination, analyses and interpretation (Starrin et al., 1991). All interviews were transcribed in their entirety, with the transcription performed by hired help. Difficulties associated with a researcher electing not to transcribe

certain material (Kvale, 1999) were thus avoided through having a transcriber who transcribed spoken words as well as pauses, hesitations, etc., based on the instructions given.

At certain stages of the analysis process it was deemed necessary for me to also listen to the recorded material, as the printed form did not lend itself satisfactorily to interpretation. This work proved to be time-consuming, so work via re-listening was done with careful filtering. However, listening to and re-reading the empirical material gave opportunities for discovering further new dimensions. The analytical work involved a large amount of material, which became a long and laborious process. Both open and selective coding was used. The data is encoded by summarizing or labelling text. When the label is associated with a specific problem or theme, it is called open coding. Open coding was used as necessary in certain sections to examine the material line by line, word by word, in order to grasp and interpret what the interviewee actually said. Afterwards, the labels were compared with each other and those that repeated were coded. The codes represented latent patterns in the data. After the 'core variables' were found, data that was thought to be important was coded by what Glaser and Strauss (1967) call 'selective coding'. Other sections were obvious candidates for selective coding, as it was immediately possible to clearly distinguish a main variable, which the content of the text was then consistently read against.

The material was initially examined from a relatively open, rather than a predefined narrow interpretation model, as recommended by Starrin et al. (1991). With this approach, new themes and aspects gradually emerged as the material was re-examined and given a preliminary coding. This proceeded to saturation point; 'in GT, the point when emerging concepts have been fully explored and no new insights are being generated' (Bryman, 2008, p. 700), where the essential factors had been identified and no new themes or aspects arose. During the final coding, it was examined for common denominators among the initial codes and these were regrouped into categories associated with properties 'which are important since they represent the side shoots and branches whereby the categories can be interwoven together to form one category' (Alvesson & Skoldberg, 1994, p. 86). Finally, some themes originating from the overall research questions were selected for further in-depth analysis after repeated reviews of the empirical material. The material from transcribed interviews and notes from observations were used for a combined contextual understanding. In the creation of categories, insights into the variations between these categories are important (Larsson, 1986, p. 23). Describing and interpreting existing

themes from the informants' point of view has been seen as the entire point of the qualitative research interview (Kvale, 1997).

Through qualitative analysis, more theories can be generated (Ekerwald & Johansson, 1989). The use of so-called theoretical crystallization, in which different theories are set in contrast to each other, is advantageous in this context. This use of different methods from different angles, highlighting different research questions within the same area, is a type of 'diamond honing' - the key word being convergence. If a number of different methods point to a common point or phenomenon, this is made more apparent through the use of multiple approaches. The context of discovery is followed, as opposed to the context of justification, through the use of an open and explorative research method (Starrin et al., 1991, p. 9-22).

The material underwent episodic analysis, which is recommended for dividing conversations into sequences (Korolija & Linell, 1996; Korolija, 1998). This is a preferred method when a multi-party discussion is being analysed and episodes are identified through a primary division into episodes, topics, content and qualities. In the present case, when the topics and themes had been established, the group interactions and the participants' different conceptions and values were looked at more closely. The qualities of actual statements in the interviews were examined first, and then what was said between the lines. This way of working is reminiscent of GT in many aspects, as theories are systematically extracted from collected data and can arise at any time during the entire research process. In the different steps of reflections and interpretations in the process, hypotheses slowly emerged through comparing data and applying theories from various scientific fields.

Scientific validity

The triangulation-process within this thesis has been used in attempts of reaching scientific validity. It has been important to collect empirical material with huge variation. According to Larsson (1993) the trustworthiness can be estimated with a direct connection to the reader. With this he means to what extent the interpretations are seen as a reasonable recognition of the activity being studied and that the study is useful. This means that there is an interest concerning how useful the interpretation is, not how true it is (Burr, 1995) - the meaningfulness is of importance. A clarification to the reader is that the results are exemplified, for instance, through attesting via quotation – and simultaneously show eventually deviant cases in the analysis process. All of the qualitative studies are exemplified through quotations.

Validity concerns the relevance of the chosen methods – with a starting point on what originally ought to be studied – as well as if it is possible to trust the conclusions in the conducted studies. In the quantitative studies there is a guarantee through using methods that enables replications. Within qualitative studies it is not possible due to the acknowledgement of the participation of the subject and the impact on the study (Holme & Solvang, 1997; Kvale, 1997). With this statement it does not mean that the validity on the qualitative results is lower. What it does mean is that the reasoning has to be in a way where it is obvious in what way, under which circumstances and in which context the results are valid.

In qualitative research, the concept of trustworthiness, together with authenticity, is to be seen as an alternative to validity and reliability (Bryman, 2008). Naturalistic generalization is seen as appropriate in single case studies (Stake, 1995). Naturalistic generalizations mean that people form naturalistic generalizations from a mix of their own experience and explicated generalizations they receive form others (ibid) - assumingly being relevant within these qualitative studies as well. Flyvbjerg (2006) concludes his statement concerning how possible it is to generalize through a single case; 'the force of example' is underestimated (ibid, p. 228).

A post-reflection on methodology

In the quantitative studies, the research questions and statistical methods were assembled based entirely on the explorative questions formulated in advance. Even though the focus on the quantitative material was not within behavioral science originally, the material was given a behavioral science touch by being developed into explorative questions, which hopefully formulated another degree of definition. Thus, the original intention of developing more precise and detailed questions throughout the thesis-process was done. Though, with a flashback on the conducted studies, I now afterwards can wish that the two research-tracks more ought to have been discussed and argued – been more put against each other. If that should have been the case, another main-research-question could have been 'Is the preference for childhood environments one of the important reasons for the success of the garden therapy? Do those with the urban or coastal background benefit less than participants with forest-background from garden therapy taking place in green settings?'

Further, there may have been bias in the pilot recreation study, as the participants, who were members of staff at an agricultural university, could

be expected to have a more pronounced 'relationship' with nature than people in general.

The clear hypotheses formulated in Papers I and II allowed for a quantitative approach and the results contributed with insights that were then used in the qualitative studies, for instance regarding attachment. The conclusions and discussions encompassed the role of nature as a space in a stress prevention and rehabilitation context.

I am aware that the interviews and observations entailed an important interplay between my self as a researcher and the informants. People assume different roles, which creates either openness or distance, affecting everyone involved. Within the on-site-observations I have been watchful for response bias; if the respondents were acting in a way they thought I, as an observer, wanted them to do. Sometimes I noticed that the participants being observed talked in a way they believed was 'expected' and sometimes they delivered 'good answers'. I have taken those situations into considerations when analyzing the material.

I believe that the complexity in the interview material increased my understanding during the observations. It is difficult to envision how I could have avoided using on-site observations - a method seemingly being especially suited for studying associations between nature and man, and the therapeutic interplay between participant, nature and caregiver.

I had to set aside or even completely abandon a number of drafts, and assume an actor-orientated perspective when attempting to interpret reality through the others' eyes (Ehn & Lofgren, 1982).

Instead of specifically discussing concepts such as nature, landscape and gardens, I focused on 'communication' between the individual and the natural environment (or rather the sensory perceptions of the individual resulting from signals sent by nature). I mainly examined supportive environments in nature and attachment processes (without overlooking biological heritage, bodily needs and human instincts). I am aware that other factors in connection with access to nature are beneficial for health and wellbeing, and can help improve concentration and decrease stress symptoms, for instance - sustained and better effect from physical activity (Thompson Coon et al., 2011), the fact that daylight reduces depression (Benedetti et al., 2001; Golden et al., 2005) - but such factors were not the focus of this work. I studied outdoor environments in order to identify important factors in the process of inducing wellbeing in stressed individuals. It should be pointed out that nature and landscapes are not always seen in a positive, nostalgic, and romantic way, but may also have aspects of insecurity

and fear, as well as connotations of loneliness, solitude, crying, frustration, etc.

For a Swedish person presenting material in the English language, there may be a risk of nuances of meaning, being lost in translation. While I took particular care with some concepts and also consulted a professional translator, some statements made by interviewees may still have acquired incorrect connotations.

Ethical issues

All studies were approved by an ethical committee. As ethical decisions must be attended to throughout the research process (Kvale, 1997), the main requirements within humanistic and social science research (Vetenskapsradet, 1990) and how they were fulfilled in this thesis are described below. There are three basic requirements for the protection of the individual: information, confidentiality and utilization. The information requirement was met as informants consented to participate in the studies. The informants were told that their identities would not be recorded anywhere, thus fulfilling the confidentiality requirement (this applies to the questionnaire and the garden therapy participants). The utilization requirement was also met, as all information collected, has only been used for research purposes.

Discussion

The discussion-chapter ought to be seen as a comprehensive chapter involving the results of the studies being conducted, and therein, being discussed. The results are interpreted mainly from a psychological angle, using e.g. the attachment theory by Bowlby (1969) and Supportive Environment Theory (SET) by Grahn (1991) in the first hypothesis. In addition, in the second hypothesis, I have also interpreted the results inspired from research in the intersection of cognitive science, affective science, neuroscience, body awareness, psychotherapy and psychology (e.g. Bucci, 2003, 2007; Damasio, 2003, Kabat-Zinn, 1990; Lundvik Gyllensten et al., 2010; Mehling et al., 2011; Uvnas-Moberg, 2009; 2011). The intention with the discussion-chapter is to give a deeper description of experiences from supportive nature environments when stress parameters are included. Though, before the results will be discussed through the nature attachment hypothesis and the hypothesis of Natherpia, numinous experiences in nature in connection with stress, are reflected upon.

Before the discussion starts

According to the early 19th century philosopher Soren Kierkegaard, the individual is solely responsible for giving his/her own life meaning – with emphasis for living in a passionately and sincerely way (Lowrie, 1968; Watts, 2003) despite other existential obstacles as e.g. despair and boredom (Corrigan, 2008). The existential side is innate but something we acknowledge to differing extents and need to be able to develop in order to feel well. The importance of reflecting upon existential questions seems to be greatly underestimated. Existential here refers to the human condition and thus includes various issues regarding the meaning of life and the living conditions of individuals. How to reach a meaningful life content constantly

needs to be given space so that we can develop and be self-fulfilled; all with clear parallels to the meaning of Sense of Coherence (SOC) by Antonovsky (1991). Via our attempts through existential thinking, we seek to see the overall perspective and understand the meaning and scope of life (ibid).

According to Uddenberg (1995), the Swedes when surveyed, denied regarding nature as sacred, but natural environments were seen to provide strong existential experiences, although *reverence* was a better word than sacred or divine - contact with a more powerful and durable force than mankind, appeared to be of importance. Women had a greater interest in the existential experience of nature than men, and more often spent time in nature because of this kind of life contact (ibid). A conviction of women that recovery in a great extent comes from existential thoughts when being in close contact with nature, is also seen in this thesis' results, with the majority of women being rehabilitated through garden therapy in Alnarp (Paper III).

The word 'numinous' is in my point of view a word describing existential reflections with an even stronger and deeper emphasis, including the reverence-dimension. A numinous experience occurs when an individual is aware of his or her own insignificance in the face of something bigger, overwhelming and indescribable. The numinous experience is a unique experience dimension in which form and content are part of the human being (Otto, 1924). In the early 1900s, Otto described facing a power greater than ourselves, which he mentioned as feelings of humility (ibid). According to Otto, religious experiences entail an innate predisposition, and he defined numinous as something sublime, simultaneously experienced as frightening and attractive. The numinous is not something that can be learned through study; it requires personal experience (ibid). Otto did not directly connect the numinous experience with nature experiences, but Uddenberg (1995) opted to do so. Now I in turn, would like to connect numinous experiences, when stress-recovery taking place in nature is discussed. Although Otto (1924) and Wilson (1984) worked within different disciplines, Uddenberg connected Otto's concept of the numinous with Wilson's biophilia hypothesis to show the coherence between these regarding outdoor experiences and humans' longing for contact with other life forms, with feelings of reverence for nature (Uddenberg, 1995). I find this related to the experiences of when the self and place 'attune' with each other – being of significance when there is a need of stress-recovery. Through the numinous experience in nature, the self-regulation and self-recovery process seem to be facilitated.

The nature attachment hypothesis

The nature attachment hypothesis – further being mentioned as the NA-hypothesis - concerns stress-reduction and applies irrespective of whether the situation involves recently developed stress symptoms or severe stress syndrome. The NA-hypothesis is built on the summary of the results of all five papers (Papers I-V) within this thesis. *With the NA-hypothesis, I mean an inner process having strong tendencies of promoting stress-recovery via a numinous experienced self-regulation process when it takes place in the individuals' childhood landscape environment.*

The results from the recreation studies (Papers I and II), demonstrate an important link to the childhood landscape according to where an individual feels at home as an adult. The papers show that an attraction to the childhood landscape causes people to settle in similar areas. People feel more at home in the type of landscape they grew up in and this affects their choice of recreational setting and recreational activity. An association was found between people with lower levels of general life stress and frequency of nature-based activities, particularly in natural recreation settings where they feel most at home. For Swedes there are four preferable different associations to landscape-nature: coast, forest, rolling hills and lakes, and agriculture, with the first two being the most legible and typical (Paper I). In the continuing discussion, coast and forest are therefore used as references. Feeling drawn to a specific landscape acts as a reminder of a place where the individual feels safe and at home. Further, the restoration-studies (Papers III-V) show the importance of experiencing the surrounding nature/garden environment as safe and supportive, being able of managing stress-recovery. Experiences of secure, safe and supportive nature/landscape/garden environments in relation to stress-issues, is the main result, which summarize all the conducted studies.

Paper I indicates that we as humans have strong, innate preparedness, which is developed during childhood through responding to a certain landscape and its unique landscape elements. I consider the nature attachment as a basic part of the individual self, much connected to what ecological self stands for (Paper I). I consider the NA-hypothesis to be an extension of the ecological self. The assumption is that nature attachment is an innate process coupled with a learning process developed during childhood, and that this process creates a base for numinous experiences and self-regulation processes. My suggestion is that knowledge about the individual nature attachment, may have an impact in reaching stress-recovery and establishing psychological wellbeing. The NA-hypothesis conforms to findings about the personal bond that develops with certain

places and landscapes, because earlier behavior and experiences there shape their meaning for the individual (e.g. Stedman, 2003).

Paper I describes how the childhood landscape has created a safe bond with parallels to the mother-child-bond (the attachment theory; Bowlby, 1969, 1973, 1980), which later in life affects people's choice of living environment when it comes to nature/landscape surroundings to a greater extent than previously thought. The feeling of being protected and nurtured as a child involves the security-aspect, as Bowlby (1969) describes. The NA-hypothesis includes the restorative experience (Paper II) with emphasis on the security aspect. There are different reasons why favorite places are experienced as restorative; they often involve a safe and comforting environment that allows the individual to enter a self-healing process, as well as are seen as stress reducing and can divert attention to problem-solving and self-reflection (Korpela, 1989; Scannell & Gifford, 2010) -simply having the opportunity to reflect in an undisturbed environment with calming conditions and a positive atmosphere resulting from solitude (Korpela et al., 2001).

In papers I and II the main factors that mediate a feeling of security, are identified. In the recreation area, the perceived security means doing things there (Paper II) or just being there (Paper I). The main concept connecting the first paper (I) to the last paper (V) is a *sense of security* (the Swedish word *trygghet)*. The definition I wish to communicate is the individual's own sense of security through a conviction of trust and confidence, which can take a long time to develop. The NA-hypothesis involves familiarity – resulting in an experienced security in knowing how to relate to the nature environment. The NA-hypothesis expands on how a sense of home can play a role in stress reduction in the individually selected and preferred nature environment.

According to Hjort (1983), people evaluate the world according to a pattern that is both innate and learned in a process similar to imprinting. He claims that the process involves imprinting of preferences for characteristics from the childhood landscape. The attachment theory (Bowlby, 1969) mainly compares security with lack of security, so the term nature attachment hypothesis is here chosen over nature imprinting hypothesis. The results in Paper I 'confirm' conclusions by Hjort (1983), although a different research method was used (he read texts and discussed his experiences as a human being and his profession as an architect). If environmental preferences are founded on past experience, they are an aesthetic phenomenon, according to Hjort (ibid). The individuals' sense of security and recognition from the childhood landscape seems to strongly

influence individual preferences (Paper I, although 'aesthetic experience' is not mentioned specifically).

According to the attachment theory, the dynamics of long-term relationships is described. The innate 'biophilic relationship' the child develops for nature, tends to have associations with the type of relationship between mother and child (Paper I). Bowlby (1969) and Ainsworth et al. (1978) emphasize the importance of security within the attachment theory, and the NA- hypothesis is also strongly connected to security. The perceptions of security based on love and care is reflected in the name Mother Earth (Mother Gaia; Palaeolexicon, 2011), and that parks appear being female (Sarap, 1991). Mother Earth and the female park are more rooted in the world of poetry and emotion, than in science, nevertheless, it is the common denominator in experienced 'motherly' security/care which is the interesting part in this context. The attachment theory shows the importance of dependence and a functional first 'love relationship' with the mother (or other first caregiver) for psychological wellbeing, and later in life also having impact in different relationships, as love relationships. Actually both of these two attachments concern the first 'love relationship' the infant/child has, in form of the essential human interaction for survival (Bowlby's attachment theory), and the essential environmental interaction (the NA-hypothesis) – here being recommended being used for stress-recovery later in life. The ecological self (Naess, 1989) concerns the childs' contact with non-human life, and the NA-hypothesis adds the significance of the preferred landscape, the childhood landscape. The attachment theory (considered interpersonal relationships) is especially noticeable when feelings of insecurity are experienced. The 'insecurity' from the original attachment theory may be changed to involve factors of stress concerning the NA-hypothesis instead (see table 2).

Table 2. A table illustrating 'the similarities' of the original attachment theory and the NA-hypothesis.

The original attachment theory:	The NA-hypothesis:
Security versus insecurity	Well-being versus stress

An ambivalent, insecure attachment in human relationships causes the individual to create protection mechanisms for reducing the fear of hurt or abandonment (Bowlby, 1969, 1973, 1980). However, a secure attachment in human relationships provides a strong base that promotes self-esteem and self-confidence (ibid). An identified nature attachment according to the NA-hypothesis may facilitate wellbeing with support from the SET (Grahn, 1991). SET indicates that humans' need of supportive environments differs because of their physical and psychological ability and resources (Grahn et al., 2010). With an identified nature attachment (e.g. the person has an attachment to coastal environments), inner confidence about the landscape and its characteristics, may act as a distinct supporting environment in a particular fragile state, as when being fragile due to stress. The intention with the NA-hypothesis is to suggest that when the individual experiences stress and has needs to recover, he or she probably more easily can initiate the self-regulation process in the landscape of his/her childhood.

According to Bollas (1987, 1992), there is a direct correlation between what nature does in the present and what the mother did for the child. Both NA-hypothesis and Bollas' transformational objects result in entering a mood. The motherly care 'from' nature versus mother, involves a re-creation of the feeling of being protected and nurtured as a child. Maybe this feeling, the mood- which prompt non-verbal memories of maternal care and an associated feeling of contentment- is one of the reasons people feel at home in their childhood landscape.

The more mentally fragile and weak the individual, the more help he/she can probably gain from using the individual nature attachment and relate to it in stressful situations. SET is the basis for understanding the NA-hypothesis in its whole extent, due to the fact that SET explains an aspect that concerns the self's 'communication' with the external environment (Grahn, 2005; Ottosson, 2007). SET explains where the individual feels safe, secure and welcome, a kind of 'communication' regarding senses, emotions and cognition takes place on a more basic and deep level and that this affects feelings, different roles related to different people and situations (Grahn et al., 2010). Some qualities in nature environments seem to be more connected to the individual's self than others; the external environment seems to be tied to the individual's ego, to the identity (ibid). Sensory impressions in calm surroundings can give rise to positive, primitive feelings of joy and curiosity, which in turn start a reflective, constructive thought process, as the self-regulation process being described in paper IV. After this, the individual can then seek more complex environments which in turn

mean more complex significances and demands, according to the SET (see Figure 1).

Raising individual awareness of the nature attachment may bring benefits; the salutogenic endeavor in self-regulation processes would probably be even greater if these were carried out in the well-known, safe and familiar childhood landscape. The perspective agrees with that of Korpela (1989) regarding how place attachment promotes self-regulation when positive feelings are encouraged and cognitive capacity is renewed. Paper II indicates that those who often visit the environment they are feeling home in, as well as how often they are spending time in activities they prefer there, have lower stress levels. Factors stated by those with a nature attachment to coast or forest as belonging to 'their' landscape may be interpreted as entrances to initiate self-regulation processes (Paper I; the pilot study). For the coast attached individual, experiences of open views and the horizon may lead the individual to recognize the importance of feeling freedom in life and from there maybe continue the self-regulation process (as e.g. 'What have I achieved in life?'). A citation from paper I; 'The ocean is a temperamental individual; from sun to storm'. Comparing the ocean to an individual makes a statement both regarding the ecological self and regarding self-regulation where as 'from sun to storm' is comparable with different human moods such as joy to anxiety.

The nature attachment to a landscape naturally imparts an advantage for the one dealing with the surrounding environment and tends to make it easier to process. An individual who has had no prolonged contact with a landscape probably takes longer to acclimate before the environment becomes familiar in different seasons and weathers; e.g. lack of acclimation to the environment may bring surprises or fears. Having developed an attachment to the landscape, there ought to be scope for relaxation and faster initiation of the self-regulation process. An awareness of the kind of nature attachment to which the individual belongs, may be classified as a close therapeutic 'relationship' with nature.

The individuals' nature attachment tends to play a significant role for the experience of Sense of Coherence (SOC; Antonovsky, 1991). The nature environment which is experienced as safe and well-known, is better understood and its characteristics and shapes are recognized, which creates clarity (Paper I). This in turn ought to create a feeling of engagement, action and involvement (Paper II) compared with environments experienced as new and unknown. Based on the results (Papers I & II), the understanding is that the individual then instinctively knows what kind of expectations to have on the nature environment; e.g., when it is time to avoid it, the season

or time of day that offers what is needed– in other words to 'catch' the best affordances (Gibson, 1979) (this goes beyond knowing for example, the best hunting time, the best mushroom picking time etc.) I interpret good predictability and the possibility to control as important factors within this context. People's perceptions affect their functioning in a given environment (Gibson, 1977), which helps explain the NA-hypothesis and its relatedness to feelings of security. An individual who is attached to coast, for example, relaxes in that environment and feels in control of the situation because it is familiar, but may find it harder to interpret the complexity and unpredictability that may arise in a deep forest. With control, it is easier to manage surprising events. There may be 'new' impressions to adjust to, for instance in the forest, especially in a situation which contains anxiety or danger, for the coast-attached person (not lions in Scandinavia, but maybe darkness, loneliness and 'snakes'). For a person without a pronounced attachment to forest, it can still be fantastic to visit, as long as the conditions are favorable. However, when the conditions change due to weather, daylight, etc., it is probably not as easy to adjust and stay calm – it may affect the positive feelings elicited by the environment. Those with an attachment to forest have more learned insights into such changes in 'their' environment– their control is greater. 'The forest is inviting in all weather' one respondent wrote (Paper I; the pilot study), but a coast-attached individual should probably disagree. However, the coast-attached individual has corresponding insights that give a feeling of control in his/her coast environment. This is reflected in the kind of activity chosen in the preferred nature environment (Paper II). An individual with 'deep' attachment to the coast is probably not likely to avoid particular weather when planning a coastal walk (walking being the preferred form of activity for all respondents in Paper II). Learned knowledge from childhood of coastal rain, cold, storms, wind, etc. gives a security. The open coast landscape provides no shelter, but this doesn't always need to be an obstacle for those with an identified attachment to coast.

The two most prominent landscapes, coast and forest, may be viewed in a symbolic way concerning SOC's meaningfulness, comprehensibility and manageability versus the self-regulation process. Forest attachment may for instance be interpreted as 'embrace' and coast attachment as 'freedom'. The reason for this speculation is that those with an attachment to forest prefer richness in (wild) animals, species richness, the familiar in terms of 'old-fashioned impressions' and refuges, as well as other factors mentioned in Paper I. The 'embrace' due to many species and the familiar, may create a feeling of security and opportunities for refuge. Coast attachment brings

prospects, views with clear horizons, allowing the individual to monitor the surroundings or situations. Grassy plains are also easy to monitor. It is of importance for those with a coast attachment that the area feels large and free. Preparedness for change as a theme for the coast-attached individual may be associated with a need to feel freedom as a preference for an environment that is devoid of impressions, and may be connected with the need for simplicity.

According to Kaplan and Kaplan (1989) 'compatibility' is a fit between one's needs, one's capacities and what the environment offers. They mean that familiarity is of importance for explaining preferences, but they do not connect it to the childhood specifically. They describe that familiarity often increases the possibilities for high preferences, not to mention 'compatibility', but they mention that the connection between familiarity and preference is complex. In the matrix between familiarity and preference (Kaplan & Kaplan, 1982), high familiarity and high preference can give a 'home feeling', but high familiarity can also give a feeling of finding an environment as too well-known and due to that, dull. Further, low familiarity can give high preference because it tempts to curiosity. Both familiarity and preference can be estimated as low. Nevertheless, for a *stressed* individual, environments having low familiarity - environments the individual does not really 'understand' how to use and/or behave in - are not the environments most often being visited (Papers I & II). Preferred places may instead be those environments offering 'being away' in a well-known nature environment – where the understanding of how the environment can be used, is higher - in this sense a high compatibility. Kaplan and Kaplan (1989, p. 114) write; 'there are times when exploration is exciting, and there are times when one wants to be sure the ground beneath one's feet is firm and safe with as little excitements as possible' – in other words different needs during different moods and periods. Kaplan and Kaplan (1989) describe 'being away' when the individual is distant - physically or conceptually from the everyday environment. The connection between a restorative experience and especially 'fascination' is considered as being the most important aspect according to Kaplan and Kaplan (ibid). The other aspects as 'being away', 'extent' and 'compatibility' are also seen as of significance, but more additional compared to 'fascination'. They mean that 'fascination' enhances the aspect of 'being away'. I consider 'being away' as of special great significance for a stressed individual.

If a visit to a certain environment fulfils the individuals' expectation, the compatibility is also high. From another perspective, this then means that a place where the individual is feeling at home, may make him/her very

disappointed. This is strengthened by studies; for instance; when tourists thought they would come to an un-occupied bush territory and there were other tourists - not many, but still - they experienced crowding (Stankey & Manning, 1986). In other words, expectation may be significant in explaining experiences of security in a place with a 'home feeling'.

Can for instance, coast-environments, even though they may be considered structurally simple, be rated with a high degree of 'complexity' by a stressed coast-attached individual as compared to people who are not primarily attached to coastal environments? And what about 'mystery'? 'Mystery' concerns the expectation of finding new and exciting elements. In most cases in environments that are new to the individual, but still a familiar type of environment, 'mystery' might work at a different level of perception. Studies show that when people use an area often (like parks - Berggren-Barring & Grahn, 1995; forests - Norman et al., 2010; the rehabilitation garden in Alnarp - Tenngart Ivarsson & Grahn, 2010) they experience many more qualities than the one visiting the place for the first time. In other words; the more visits and use of an area, the more qualities the individual experiences, at least up to a point. 'Mystery' in a park or forest, may concern discovering chanterelles in the same place as the year before (Berggren-Barring & Grahn, 1995), or checking if the bulbs being planted during the rehabilitation period have grown since last time the participant checked (Tenngart Ivarsson & Grahn, 2010). The 'mystery' in finding new and exciting elements in the well-known coast-landscape for the coast-attached, can involve looking at the movements of the waves, noticing the changes of the coast strip – maybe even more needs for it when experiences of stress are involved for the coast-attached.

Experiences of high 'complexity' and 'mystery' for the stressed coast-attached individual even if it is considered structural simple. A coast strip in Skanor.

The first steps to the hypothesis of Natherpia

This thesis has resulted in another hypothesis concerning the recovery-process within garden therapy as being conducted in Alnarp, called the hypothesis of Natherpia.

NA = Nature
THER = Therapeutic
PIA = Devotion (Latin pia = devout)

The restoration studies indicated that a significant part of the stress-recovery process arose in *the combination* of therapy and nature (Papers III, IV & V). Natherpia is built upon my interpretations concerning how essential especially three extended awarenesses (bodily, emotionally, existentially) are to 'pass', being able to recover from severe stress ill health. With Natherpia,

the intention is to draw attention to severe stress that has taken complete control over the individual.

Deliberately I am not writing about how effective the garden therapy in ARG may be, because that is not the intention with Natherpia. But of course, I am totally convinced that stress-recovery is affected by garden therapy as it is conducted in Alnarp, otherwise I would not have been fascinated in the first place. Unfortunately, there are no studies showing the rehabilitation results in figures, but a report will be published; the participants in ARG during the years between 2002-2008 seem to significantly decrease their consumption of medical care, compared with control groups (Wahrborg et al., in manuscript).

The hypothesis of Natherpia is my contribution on what Sempik et al. (2010) recently wrote; they confirm that there is a need to: …'describe the processes involved in order to define the intervention; to show how the different dimensions and processes are related; and to show how the different approaches within green care are interconnected and how they all relate to existing theories and frameworks' (ibid, p. 11). Sempik et al. (2010) mentions green care, being broader than garden therapy; 'Green care is an inclusive term for many complex interventions, such as care farming, animal-assisted therapy, therapeutic horticulture and others. What links this diverse set of interventions is their use of nature and the natural environment as a framework in which to create these approaches' (ibid, p. 11). I would like to emphasize my comprehension concerning what Hartig et al. (2011) discuss; the difficulty being able to state and understand the beneficial effects of the nature experience per se, how difficult it is to evaluate the possibly salutary influences of caregivers, and activities or other factors involved. Sempik et al. (2010) also discuss the great challenge to research; 'It is likely that several mechanisms may be operating, either simultaneously or sequentially, representing different ways in which nature positively impacts on human health and well-being (ibid, p. 71). I am aware of the need of being precautious when it comes to new hypotheses-building between human beings and the surrounding nature environment. However, I find it necessary to continue the discussions within the field and try taking the discussions further. I wish this discussion to be considered as a resource, being possible for further scientific refinements.

A salutogenic opening-up process seems to occur when several multi-sensory impressions from nature meet up and respond to reflections originating from a therapeutic context. The stress-recovery process seems to be supported, hastened and deepened because of a multisensory change in awareness. I consider this takes place

through distinct ways in interaction with each other –bodily, emotionally and existentially.

- 'Body awareness is used as an overall concept for experience and use of the body, representing body consciousness, body management and deepened body experience' (Roxendal, 1985, p.11). Roxendal and Winberg (2002) write about body awareness in physiotherapy; (1) the experience of the body (i.e., the experience dimension) and (2) the actions and behavior in movements and activities (i.e., the movement dimension). Lundvik Gyllensten (2010) have another definition; 'body awareness in the physiotherapy context is the treatment directed toward an awareness of how the body is used in terms of body function, behavior, and interaction with self and others' (ibid, p. 439). Body awareness is mainly discussed in Paper V.
- Since emotional exhaustion is of the greatest significance in exhaustion disorder (Peterson et al., 2008), an extended emotional awareness ought to be of importance to 'pass through' in the stress recovery process. Emotional awareness may be described as overcoming the obstacles to psychological balance. With an emotional awareness, the individual has access to a 'self core' were he/she may use his/her coping-abilities or adaptive resources. Visits in the garden and in nature often mirror strong emotional experiences. The wholeness in nature and the sensory aspect of a garden contribute to an emotional climate, which tends to facilitate therapeutic processes. The nature environment creates an incentive for the self-recovery process to begin, as it inspires the participant to get closer to his/her feelings. Emotional awareness is mainly described in Papers III and IV.
- Reactions connected to existential awareness are, of course, as the other awarenesses, built upon individually different experiences. The meaningfulness seems to evolve when the existential condition is reflected upon (e.g. the philosophers Kierkegaard, 1843; Sartre, 1943; Heidegger, 1927). Existential concerns include issues of life and death, which make the individual consider what safety means. Knowing that death will inevitably come one day may be the tool for justifying finding one's goals and meaning in life, and the existential awareness within garden therapy often tends to be reached through the plant-human symbolism (Paper IV). Bucci (2003, 2007) has written about how symbolic experiences can be very subtle, nearly unconscious. All people do not read into plant-human symbolism to the same extent - some people don't see the symbolism at all - and presumably many people 'get

it' in connection with or before they end up in a life crisis. Existential awareness is mainly described in Paper III.

When living with an illness a heightened sense of awareness is occurring (Gerlach-Spriggs et al., 1998) as well as an increased sensitivity to insecurity (Ulrich, 1999). After conducting the restoration studies, the conclusion is that 'the garden' in garden therapy is the active ingredient that adds to, promotes and enhances the therapeutic relationship for the participant which enables the awareness-changes. The garden and nature can be seen as a 'tool' that in effect functions as a powerful 'actor', as a 'therapist' itself. It is when the environment is experienced as safe, the stress-recovery response seems to begin. (Note that a negative environment such as thorniness may be seen as safe by some, though this is individual; an idiosyncratic preference). The caregiver in this garden therapy-context of course has to be professional, but is in the real sense a secondary figure. When the participant enters into a completely different state of mind, a secure and coherent environment is needed. The caregivers' role is e.g. to release the participant into the 'great security' in the nature and garden. To have the opportunity to put into words what has transpired, tend beneficial to the well-being, and I consider it is the garden being 'responsible' for stress-recovery after the therapy session has been conducted. When participants 'open up' in the garden they tend to access memories that help them to recover. The garden represents a resource for one's own health, where the participant individually can return time after time to fortify newfound reflections. The garden tends to strengthen impressions from therapy and cement the newfound feeling of security. This seemingly inspires an opening of the senses, strengthens various moods, gives the feeling that there is meaning in life, and 'listens' to the individual, which tends to result in a feeling of calm and of an inner happiness and satisfaction. The importance of the garden for the participants' recovery process was described as of significance both when 'occurring individually' as well as in a group with other actors (Paper IV). The garden, the caregivers, and the group of participants together make up an arena which combines structure with freedom of action, in which the participants get the chance to regulate their needs and desires.

There was constant movement between changed introvert and extrovert behavior among the participants (Paper V) after therapy has been conducted. For instance, with a combination of physiotherapy and time spent in nature in direct connection, the participants were inclined to be friendly, but mentally unreachable; choosing to slowly move along, while looking outward to take in what nature has to offer and to find resonances with their internal processes. During the actual walk after therapy - first contact with

nature, then a therapy session, and afterwards contact with nature again when the body is in movement during the walk from the session – I consider something important concerning the recovery process is occurring. I consider it is in *this* the recovery response is triggered – being able to reach extended awarenesses from therapy or other activities within the garden therapy and using nature as a 'landing strip' for it all. I believe different types of therapy that incorporate nature, could offer the individual the possibility to 'land' and stress-recover afterwards, through the meeting with nature. I consider it is the refuge, or 'landing strip,' which is essential. 'The landing strip in nature' is not usually included in therapy in general – the individual may be affected by the stress of making it on time to the therapy session, finding a parking place, spending an hour with 'the therapist', and afterwards the rushed thanks and goodbye ('Yes, I'll be sure to think about that for next time!'). And then the intrusion of outside reality in the form of listening to messages on the mobile phone and returning calls while driving back to work, the supermarket, daycare or home. Caregivers within traditional care usually have no possibility to offer a 'landing strip' like in Alnarp.

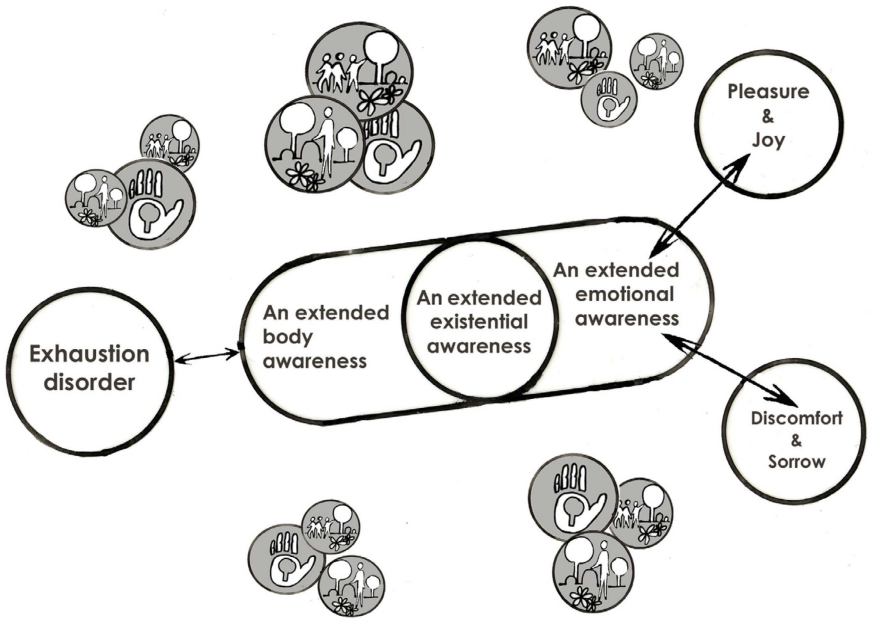

Figure 3. NATHERPIA: The continuum within the recovery process within garden therapy. The three shaded circles of different sizes represent 'togetherness' (three persons and a tree; Paper IV), 'the garden and I' (one person, trees and flowers; Paper IV), and the interaction between activities, therapeutic interventions and nature (the hand with a tree; Papers III & V).

The different behaviors observed directly after psychotherapy (extrovert) and physiotherapy (introvert) may in part be expressions of different psycho-physiological responses induced by the respective treatments (Paper V). It was the observed changed behavior which moved me and made me realize that successful garden therapy involves different kinds of awareness changes and those tend to be an important component in the recipe.

The garden can be seen as something that succeeds in offering tools for working with one's own life problems on many levels simultaneously – the emotional, existential, cognitive, physical and social – as well as the possibility to move back and forth between these levels in a continuum according to one's own needs. In my point of view, this continuum tends to especially develop and affect an individual suffering from severe stress in a unique way. During the rehabilitation process the participant is traveling along the continuum between pleasure and joy and discomfort and sorrow

(Paper V). Of course, there are many other mental states within an individual, but 'pleasure and joy' and 'discomfort and sorrow' are used here to explain that stress-recovery is enhanced through a heightened tolerance for negative emotions and exposure to positive emotions, by the interaction on the three 'awareness-change-levels'. The outcome is extended awareness, when the participant begins to feel different states, e.g. anger, joy, sorrow, frustration, excitement, etc. It should be noted that the participant is commuting between each level, which is obviously not easy to capture in this context with a static figure. The interaction is critical for understanding the figure, as the stress-recovery process moves back and forward along the continuum. Exactly how the process moves, of course depends on the individual. When help has been received from a caregiver, and this includes the restorative 'landing strip' in nature, only the individual him/herself can take control of his/her own life.

Figure 4: An illustration describing all studies conducted within the thesis. (Illustration: Tove Vollbrecht)

Reflections for the future

Hypotheses connected to humans having preferences for, and are best recovered in environments seen as an innate primordial abode as a savannah-like environment (Ulrich, 1999; Orians, 1986), have not gained the impact as thought in the beginning of this thesis' studies. Hypotheses connected to the cultural and personal – not at least attachment-theories- have been more accurate to involve, based on findings presented in this thesis. Feelings of safety and trust for a nature environment/landscape are instead factors being essential. When an individual knows the environment well, he/she experience the environment as stable, which does not abandon him/her – especially when stress-parameters are included.

Both nature attachment and the ecological self seem to develop during childhood, but probably only up to a certain age. Future research is needed to comprehend the underlying factors. To what age is the child 'receptive' to preferences concerning nature characteristics and landscape-environments? Nature attachment probably 'closes down' at a certain age. In comparison, the attachment between mother and child gets established during the infant's first year of life and our personality is said to be

established by six years of age. Are there similarities between those in general and if so, how?
Attachment-behavior and ecological self may all have a significant impact on human mental health. Does the NA-hypothesis have a role regulating different emotional disorders as e.g. neurological diseases?
A table in paper I shows how individuals who have grown up where they did not have many possibilities to visit nature (big city with inner-city characteristics), have a lower 'feeling of home', for the natural landscape they have grown up in. More research is desirable to follow this up, preferably in countries with large population and fairly homogeneous culture, where many people live in both cities and rural areas.
It would be interesting to further determine whether certain sensory impressions 'function' more easily in the attached and well-known childhood-landscape and whether nature attachment could be involved as a deliberate factor in future garden therapeutic activity; e.g. establishments of rehabilitation gardens in coast areas for coast-attached, etc. Future research studies concerning the NA-hypothesis could also examine the effect of personality traits and nature attachment. And what about those who during their childhood, developed insecure or disorganized attachment-patterns to the caregiver, who he or she shared the landscape with? Does it result in 'insecure nature attachment'? What about one kind of nature attachment as a child but another kind as an adult? Research related to 'place attachment processes' is needed.

Further, the 'mental touch in the meeting with nature' becomes a connection and attachment for the individual in a most caring and supportive way. Future research ought to involve studies focused on if and how oxytocin-release is related in this anti stressful, natural 'touch'. Does Ulrich's statement concerning experienced calmness from nature (1999) correlate with oxytocin releases?

After what I have noticed from my communication with both caregivers and participants (and 'others'), I consider that shortcomings in the individual's attachment history may be the reason for severe stress-related illnesses. The shortcomings are not the focus of the thesis, but the outcome is so apparent that some mention is warranted. I consider that previous 'traumatic' experiences in combination with experiences of insecure attachment (from childhood), might be important contributing factors to later vulnerability to stress in later life. The work parallel is a strong contributing factor in the development of exhaustion disorder and is widely recognized as such, but clues concerning which individuals are more

sensitive for getting the disorder may be found in experiences further back in life. Future research is needed concerning those matters.

For an individual going through the rehabilitation process, time ought to abide without obvious connections to the prior working place. This has to be adapted after the participants' individual needs and after what he/she is able of managing. That which helps those affected on their way to recovery is synonymous with what the infant requires in the form of care, love, attention (bonding parameters), which represents feelings of security – and is sometimes best when there is not stiff pressure connected to the prior working place. 'Return to work' has long been synonymous with 'recovery' (in 'Rehabilitation-Sweden). In my opinion, this is a non-human way of looking at people suffering from severe stress disorders in their way back to recovery. Something is needed on a political level, for changing this approach, with a stronger emphasis on a new working place for the participant. Rehabilitation at large needs to be placed on the political agenda and with that the specific potential garden therapy offers to many different groups and needs. Future research ought to include studies concerning an eventual impact from Cognitive Behavioral Therapy (CBT) in connection with garden therapy, if specific individual interests by the participant may be possible to include in the activity of garden therapy; if a whole therapeutic year is to be recommended compared with shorter rehabilitation-periods. It is desirable that quality assurance within garden therapy in Sweden is carefully examined with the help of additional research.

Acer palmatum 'Ornatum' in the park of Alnarp.

REFERENCES

Abramsson, K., & Tenngart, C. (2003). *Gron Rehabilitering. Behov, forutsattningar och mojligheter for en gron rehabiliteringsmodell,[Green rehabilitation: Needs, possibilities and preconditions for a green rehabilitation model].* (In Swedish). Vaxjo: LRF Sydost.

Ainsworth, M.D.S., Blehar, M.C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation.* Hillsdale, NJ.: Lawrence Erlbaum.

Albertsen, K., Rugulies, R., Persson, R., & Garde, A. (2009). *Psychosocial work environment, performance-based self-esteem and stress symptoms among Dansish knowledge workers.* Abstract published in: Conference proceedings of the 14th European Congress of Work and Organizational Psychology.

Aldwin, C. M. (2007). *Stress, coping, and development. An Integrative Perspective.* New York: Guilford Press.

Altman, I., & Low., S.M. (1992). *Place Attachment.* New York: Plenum Press.

Alvesson, M., & Skoldberg, K. (1994). *Tolkning och reflektion.* [*Interpretation and reflection].* (In Swedish). Lund: Studentlitteratur.

Anagnostou-Laoutides, E. (2007). Ancient ritual and the search for Arcadia: From Vergil to Poussin, *Transcultural Studies*, 2-3, 19-53.

Antonovsky, A. (1990). A somewhat personal odyssey in studying the stress process. *Stress Medicine*, 6, 2, 71-80.

Antonovsky, A. (1991). *Halsans mysterium, [The mystery of health].* (In Swedish). Stockholm: Natur & Kultur.

Antonovsky, A. (1996). The Salutogenic Model as a theory to guide health promotion. *Health Promotion International*, 11 (1), 11-18.

Appleton, J. (1996). *The experience of landscape.* London: John Wiley and Sons (Original 1975)

Arbetslivsinstitutet http://www.arbetslivsinstitutet.se. [Accessed: 12 May 2007].

Asberg, M., Grape, T., Krakau, I., Nygren, A., Rohde, M., Wahlberg, A. & Wahrborg, P. (2010). Stress som orsak till psykisk ohalsa, [Stress as a reason for psychical ill health]. (In Swedish). *Lakartidningen*, 19, 1307-1310.
Ayres, J. (1983). *Sinnenas samspel hos barn, [The interactions of the senses in children].* (In Swedish). Stockholm: Psykologiforlaget.
Balling, J.D. & Falk, J.H. (1982). Development of visual preference for natural environments. *Environment and Behavior*, 14 (1), 5-28.
Barker, R.G. (1968). *Ecological Psychology: Concepts and methods for studying the environment of human behavior.* Palo Alto, CA.: Stanford University Press.
Baron-Cohen, S., & Swettenham, J. (1996). The relationship between SAM and Tomm: two hypotheses. In: P. Carruthers & P.K. Smith (eds.), *Theories of theories of mind,* pp. 158-168. Cambridge: Cambridge University Press.
Bell, S. (1999). *Landscape: Pattern, Perception and Process.* New York: E & FN Spon.
Bell, P.A, Greene, T.C., Fisher, J.D. & Baum, A. (2001). *Environmental psychology.* 5 ed. Fort Worth, Tex.: Harcourt College.
Berk, L. E. (1994). *Child Development.* 3. ed. London: Allyn & Bacon.
Benedetti, F., Colombo, C., Barbini, B., Campori, E., Smeraldi, E. (2001). Morning sunlight reduces length of hospitalisations in bipolar depression. *Journal of Affective Disorders,* 62, 221-223.
Berggren-Barring, A.M. & Grahn, P. (1995). *Gronstrukturens betydelse for anvandningen: en jamforande studie av hur manniskor i barnstugor, skolor, foreningar, vardinstitutioner m fl organisationer utnyttjar tre staders parkutbud, [The impact of the green structure on usage. A comparative study of how people in day care, schools, clubs, institutions and other organizations use what is offered in three citities].* (In Swedish). Landskapsplanering Rapport 95:3, Alnarp: Sveriges Lantbruksuniversitet.
Bieling, P.J., Israeli, A.L., & Antony, M.M. (2004). Is perfectionism good, bad, or both? Examining models of the perfectionism construct. *Personality and Individual Differences*, 36 (6), 1373-1385.
Blumer, H. (1969). *Symbolic Interactionism, Perspective and Method.* Englewood Cliffs, NJ.: Prentice Hall.
Bollas, C. (1987). *The Shadow of the object.* London: Free Associations.
Bollas, C. (1992). *Being a Character: Psychoanalysis and Self Experience.* London: Routledge.
Bowlby, J. (1969). *Attachment and Loss, Vol. 1: Attachment.* London: Hogarth Press and the Institute of Psycho-Analysis.

Bowlby, J. (1973). *Attachment and Loss. Vol. 2: Separation: Anxiety and Anger.* London: The Hogarth Press and the Institute of Psycho-Analysis.
Bowlby, J. (1980). *Attachment and Loss. Vol. 3: Loss: Sadness and Depression.* London: The Hogath Press and the Institute of Psycho-Analysis.
Bryman, A. (2008). *Social Research Methods.* 3. ed. Oxford: Oxford University Press.
Bucci, W. (2003). Varities of dissociative experiences. *Psychoanalytic Psychology*, 20, 542-557.
Bucci, W. (2007). Dissociation from the perspective of multiple code theory. *Contemporary Psychoanalysis*, 43, 165-184, 305-326.
Bucht, E. (1998), Den forsta, andra och tredje naturen - forestallningar om naturens roll i staden och på landsbygden, (The first, the second and the third nature – ideas about the role of nature in the city and countryside). (In Swedish). In: R. Petterson & S. Sorlin (eds.), *Miljon och det forflutna, landskap, minnen, varden*, [*The environment and the past, landscape, memories, values],* pp. 20–39. Institutionen for idéhistoria, Umea universitet.
Burr, V. (1995). *An introduction to social constructionism.* London: Routledge.
Carson, R. (1998). *The sense of wonder.* New York: Harper Collins.
Chawla, L. (1992). Childhood place attachments. In: I. Altman & S.M. Low (eds.), *Place Attachment*, pp. 63-86. New York: Plenum Press.
Clayton, S. (2007). Domesticated nature: motivations for gardening and perceptions of environmental impact. *Journal of Environmental Psychology,* 27, 215-224.
Coffey, L.C., Skipper, J.K., & Jung, F.D. (1988). Nurses and shift work: effects on job performance and job-related stress. *Journal of Advanced Nursing,* 13, 245-254.
Conzen, M. P. (1990). Town-plan analysis in an American setting: cadastral processes in Boston and Omaha, 1630-1930. In: T.T. Slater (ed.), *The built from of Western cities*, pp. 142-170. Leicester: Leicester University Press.
Copyriot:http://copyriot.se [Accessed 23 Aug 2008].
Cornwall, A., & Jewkes, R. (1995). What is participatory research? *Social Science & Medicine*, 41 (12), 1667-1676.
Corrigan, J. (2008). *The Oxford handbook of religion and emotion.* Oxford: University Press.
Coss, R.G., & Moore, M. (2002). Precocious Knowledge of Trees as Antipredator Refuge in Preeschool Children: An Examination of Aesthetics, Attributive Judgements, and Relic Sexual Dinichism, *Ecological Psychology*, 14 (4), 181-222.

Coss, R.G., Ruff, S., & Simms, T. (2003). All that Glistens: II. The effects of reflective surface finishes on the mouthing activity of infants and toddlers. *Ecological Psychology,* 15, 197-213.
Csikszentmihalyi, M. (1975). Play and instrinsic rewards. *Journal of Humansistic Psychology*, 15 (3), 41-63.
Cullberg Weston, M. (2007). *Sjalvkansla pa djupet – en terapi for att reparera negative sjalvbilder. [Self-esteem in depth – a therapy repairing negative self images.]* (In Swedish). Stockholm: Natur & Kultur.
Dahlgren, A. (2006). *Work stress and overtime work –effects on cortisol, sleep, sleepiness and health.* Diss. Stockholm: Stockholm University.
Damasio, A. (2003). *Pa spaning efter Spinoza – gladje, sorg och den kannande hjarnan.* [*Looking for Spinoza – joy, sorrow and the feeling brain].* (In Swedish). Stockholm: Natur & Kultur.
Davis, S. (1998). Development of the profession of horticultural therapy: principles and practice. In: S.P. Simson & M.C. Straus (eds.), *Horticulture as Therapy*, pp. 3-18. New York: Food products Press.
Denzin, N.K., & Lincoln, Y. (2005). *The Sage Handbook of Qualitative research.* 3. ed. Thousand Oaks: Sage Publications.
De Grazia, S. (1962). *Of time, work, and leisure.* New York: Twentieth Century Fund.
Diener, E., Suh, E., Lucas, R. & Smith, H. (1999). Subjective Wellbeing: Three decades of progress, *Psychological Bulletin*, 125 (2), 276-302.
Dovey, K. (1985). The concept of home. In: I. Altman & C. Werner (eds.), *Home Environments. Human behavior and environment: Advances in theory and research*, 8, pp. 115-137. New York: Plenum Press.
Egidius, H. (2002). *Termlexikon i psykologi, pedagogik och psykoterapi, [Term dictionary in psychology, pedagogic and psychotherapy].* (In Swedish). Lund: Studentlitteratur.
Ehn, B., & Lofgren, O. (1982). *Kulturanalys, [Culture analysis].* (In Swedish). Klippan: Gleerups Utbildning AB.
Eisenberg, N., & Fabes, R.A. (1998). Prosocial behavior and development. In: B. Damon (ed.), *Handbook of child psychology,* pp. 701-778. New York: Academic Press.
Ekerwald, H., & Johansson, S. (1989). Vetenskap som byrakrati eller som konst? [Science as bureaucracy or as art?]. (In Swedish). *Sociologisk Forskning,* 2, 15-33.
Epistles; www.epistle.com [Accessed 12 May 2007].
Epstein, S. (1991). Cognitive-experiential self-theory: An integrative theory of personality. In: R. Curtis (ed.), *The self with others: Convergences in psychoanalytic, social, and personality psychology*, pp. 111-137. New York: Guilford Press.

European Agency for Safety and Health at Work. (2011) http://osha.europa.eu/sv/topics/stress/index_html. [Accessed 13 June 2011].
European Landscape Convention (2000). Strasbourg: CouncilofEurope. http://conventions.coe.int/Treaty/en/Treaties/Html/176
[Accessed 13 June 2011].
Ewles, L., & Simnett, I. (2003). *Promoting Health- A practical guide*. London: Bailliere Tindall.
Faber Taylor, A., Kuo, F.E., & Sullivan, W.C. (2002). Views of Nature and Self-Discipline: Evidence from Inner city children. *Journal of Environmental psychology*, 22, 49-63.
Fezler, W. (1987). *The Good Girl Syndrome: how women are programmed*. New York: Berkley Pub Group.
Flett, G.L., & Hewitt, P.L. (2006). Positive versus negative perfectionism in psychopathology: A comment on Slade and Owens's dual process model. *Behavior Modification,* 30, 472-495.
Flyvbjerg, B. (1991). *Rationalitet og magt. Det konkretes videnskab, [Rationality and power].* (In Danish). Copenhagen: Academisk Forlag.
Flyvbjerg. B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, 12 (2), 219-245.
Fogany, P., Gergely, G., Hurist, E.L., & Target, M. (2002). *Affect regulation, mentalization and the development of the self*. New York: Other press.
Folkhalsorapporten (2005). http://www.socialstyrelsen.se/publikationer2005/2005-111-2
[Accessed 31 Jan 2010].
Folkman, S., & Lazarus, RS. (1980). An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behavior*, 21, 219-239.
Fornara, F. (2011). Are 'attractive' built places as restorative and emotionally positive as natural places in the urban environment? In: M. Bonaiuto, M. Bonnes, A.M. Nenci, G. Carrus (eds.), *Urban diversities – environmental and social issues*. Advances in people-environment studies. 2, pp 159-170. Gottingen: Hogrefe & Huber.
Forsakringskassans officiella statistik. SCB. [Accessed 15 Sept. 2011].
Foxall, M. J., Zimmerman, L., Standley, R., & Captain, B.B. (1990). A comparison of frequency and sources of nursing jobstress perceived by intensive care, hospice, and medical surgical nurses. *Journal of Advanced Nursing*, 15, 577-584.
Franken, R.E. (2002). *Human Motivation*. 5. ed. Belmont, CA: Wadsworth.

Freitas, S.R. (2003). Landscape: Where geography and ecology converge. *Holos Environment,* 3 (2), 150-155.
Geertz, C. (1973). *The interpretation of cultures: selected essays*. New York: Basic Books.
Geertz, C. (2000). *Available Light: Antropological Reflections on Philosophical Topics*. Princeton: Princeton University Press.
Gerlach-Spriggs, N., Kaufman, R.E., & Warner, S.B. (1998). *Restorative gardens: The healing landscape*. New Haven, CT.: Yale University Press.
Giacaman, R., Khatib, R., Shabaneh, L., Ramlawi, A., Sabri, B., Sabatinelli, G., Khawaja, M., Laurance, T., & Books, Z. (2009). What is health? The ability to adapt. The Lancet 373 (9666), 781.
Gibson, J.J. (1977). The Theory of Affordances. In: R.E Shaw & J. Bransford (eds.), *Perceiving, Acting, and Knowing*. Hillsdale, NJ.: Lawrence Erlbaum Associations.
Gibson, J.J. (1979). *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin.
Gilje, N., & Grimen, H. (2004). *Samhallsvetenskapernas forutsattningar, [The prerequisites of the society].* (In Swedish). Goteborg: Daidalos.
Gillham, B. (2000). *Case study research methods*. London: Continuum.
Glaser, B.G., & Strauss, A.L. (1967). *The discovery of grounded theory: strategies for qualititative research*. New York: Aldine.
Golden, R.N., Gaynes, B.N., Ekstrom, R.D., Hamer, R.M., Jacobsen, F.M., Suppes, T., Wisner, K.L., & Nemeroff, C.B. (2005). The efficacy of light therapy in the treatment of mood disorders: A review and meta-analysis of the evidence. *American Journal of Psychiatry,* 162, 656-662.
Goranzon, B., Florin, M., & Sallstrom, P. (1988). The concept of dialogue. *AI & Society*. 2 (4), 279-286.
Grahn, P. (1991). *Om parkers betydelse, [On the meaning of parks].* (In Swedish). Diss. Alnarp: Swedish University of Agricultural Sciences.
Grahn, P. (1992). Manniskans behov av parker, amerikans forskning idag, [Humans need of parks- American research of today]. (In Swedish). *Stad & Land* nr 107, Byggforskningsradet och Movium/SLU, Alnarp.
Grahn, P. (2005). Om tradgardsterapi och terapeutiska tradgardar, [About garden therapy and therapeutic gardens]. (In Swedish). In: M. Johansson & M. Kuller (eds.), *Svensk Miljopsykologi,* pp. 245-262. Lund: Studentlitteratur.
Grahn, P., & Ottosson, A. (2010). *Tradgardsterapi [Garden therapy].* (In Swedish). Stockholm: Bonnier Existens.

Grahn, P., & Stigsdotter, U.K. (2010). The relation between perceived sensory dimensions of urban green space and stress restoration. *Landscape and Urban Planning,* 94, 264-275.
Grahn, P., Tenngart Ivarsson, C., Stigsdotter U.K., & Bengtsson, I.L. (2010). Using affordances as a health-promoting tool in a therapeutic garden. In: C. Ward Thompson, S. Bell & P. Aspinall (eds.), *Innovative approaches to researching landscape and health,* pp. 116-154. London: Taylor & Francis.
Gross, M.J., & Brown, G. (2008). An empirical structural model of tourists and places: progressing involvement in place attachment into tourism. *Tourism Management*, 29 (6), 1141-1151.
Hagerhall, C., Purcell, T., & Taylor, R. (2004). Fractal dimension of landscape silhouette outlines as a predictor of landscape preference. *Journal of Environmental Psychology,* 24 (2), 247-255.
Halliday, M.A.K. (1978). *Language as social semiotic: The social interpretation of language and meaning.* Maryland: University Park Press.
Hallsten, L. (1993). Burning out: A framework. In: W. Schufeli, C. Maslach & T. Marek (eds.), *Professional burnout: Recent developments in theory and research,* pp. 95-113. Washington: Taylor & Francis.
Hallsten, L., Bellaagh, K., & Gustavsson, K. (2002). Utbranning i Sverige- en populationsstudie. [Burnout in Sweden - a population study]. (In Swedish). *Arbete och Halsa*, 6. Stockholm: Arbetslivsinstitutet.
Hallsten, L., Josephson, M., & Torgén, M. (2005). *Performance-based self-esteem: A driving force in burn-out processes and its assessment.* Scientific Report. Stockholm: National Institute for Working Life.
Harlow, H.F., & Harlow, M.K. (1965). The affectional system. In: A. Schrier, H.F. Harlow & F. Stollnitz (eds.), *Behavior of nonhuman primates,* 2. New York: Academic Press.
Harris, P.B., Brown, B.B., & Werner, C.M. (1996). Privacy regulation and place attachment: predicting attachments to a student family housing facility. *Journal of Environmental Psychology*, 16, 287-301.
Hartig, T., Mang, M., & Evans, G. (1991). Restorative effects of nuatral environment experiences. *Environment and Behavior*, 23 (1), 3.
Hartig, T., Evans, G.W., Jamner, L.D., Davis, D.S., & Garling, T. (2003). Tracking restoration in natural and urban field settings. *Journal of Environmental Psychology,* 23 (2), 109-123.
Hartig, T., van den Berg, A. E., Hagerhall, C.M., Tomalak, M., Bauer, N., Hansmann, R., Ojala, A., Syngollitou, E., Carrus, G., van Herzele, A., Bell, S., Podesta, M.T.C. & Waaseth, G. (2011). Health benefits of nature experience: psychological, social and

cultural processes. In: K. Nilsson, M. Sangster, C. Gallis, T. Hartig, S. de Vries, K. Seeland & J. Schipperijn (eds.), *Forests, trees and human health*, pp. 127-168. New York: Springer Verlag.
Hay, R. (1998). Sense of place in developmental context. *Journal of Environmental Psychology*, 18 (1), 5-29.
Heft, H. (1988). Affordances of children's environments. *Childrens Environments Quarterly,* 5, 29-37.
Heft, H. (1997). The Relevance of Gibson's Ecological Approach to Perception for Environment Behavior Studies. In: G.T Moore & R.W Roberts (eds.). 1. ed. *Advances in Environmental Behavior and Design. Toward the Integration of Theory, Methods, Research and Utilization*, pp. 71-108. New York: Springer.
Heft, H. (2010). Affordances and the perception of landscape: an inquiry into environmental perception and aesthetics. In: C. Ward Thompson, P. Aspinall & S. Bell (eds.), *Innovative approaches to researching landscape and helath: open space: people space* 2, pp. 9-32. New York: Routledge.
Heidegger, M. (1927). *Sein und Zeit. [Being and Time].* Halle: Niemeyer.
Henderson, N.R. (2009). Managing Moderator Stress: Take a Deep Breath. You can Do This! *Marketing Research,* 21 (1), 28-29.
Herzog, T.R. (1985). A cognitive analysis of preference for waterscapes. *Journal of Environmental Psychology*, 5 (3), 225-241.
Herzog, T.R., Kaplan, S., & Kaplan, R. (1982). The predicition of preference for unfamiliar urban places. *Population & Environment*, 5 (1), 43-59.
Herzog, T.R., Maguire, C., & Nebel, M. (2003). Assessing the restorative components of environments. *Journal of Environmental Psychology*, 23, 159-170.
Hjort, B. (1983). *Var hor manniskan hemma? [Where does the human belong?].* (In Swedish). Diss. Stockholm: Kungliga Tekniska Hogskolan.
Hofer, M. (2003). The emerging neurobiology of attachment and separation; How parents shape their infant's brain and behavour. In: S.W. Coates, J.L. Rosenthal & D.S. Schechter (eds.), *September 11: Trauma and human bonds*, pp 191-210. Hillsdale; NJ.: Analytic Press.
Holme, I.M., & Solvang, K.B. (1997). *Forskningsmetodik: Om Kvalitativa och Kvantitativa Metoder, [Research methodology: About Qualitative and Quantiative Methods].* (In Swedish). Lund: Studentlitteratur.
Humphrey, N.K. (1980). Natural Aesthetics. In: B. Mikellides (ed.), *Architecture for People,* pp 59-73. London: Studio-Vista.

Hunt, J.D. (2000). *Greater Perfections: The Practice of Garden Theory*. Philadelphia: University of Pennsylvania Press.
Iso-Ahola, S. (1980). *Social psychological perspectives on leisure and recreation*. Illinois: C.C. Thomas Publisher.
Jackson, J.B. (1984). *Discovering the Vernacular Landscape*. New Haven, CT.: Yale University Press.
Jakobsson, A. (2009). *Experiencing landscape while walking: on the interplay between garden design, sensory experience and medical spa philosophy at Ronneby Spa*. Diss. Alnarp: Swedish University of Agricultural Sciences.
James, W. (1962). *Psychology: The Briefer course*. New York: Collier Books.
Jenner, H., & Svensson, I. (2003). *Perspektiv pa utbrandhet – om orsaker och motkrafter, [Perspective on burnout – the causes and counterforces]*. (In Swedish). Stockholm: Forlagshuset Gothia AB.
Johansson, U. (1998). *Om ansvar. Ansvarsforestallningar och deras betydelse för den organisatoriska verkligheten, [About responisibility. Conceptions of responsibility and their importance for the organisatory reality]*. (In Swedish). Lund studies in economics and management, 43. Lund: Lund University Press.
Johnson, M., & Blom, V. (2007). Development and validation of two measures of contingent self-esteem. *Individual Difference Research*, 5, 300-328.
Joye, Y., & De Block, A. (2011). 'Nature and I are two': a critical examination of the biophilia hypothesis. *Environmental Values,* 20, 189-215.
Kabat-Zinn, J. (1990). *Full catastrophy living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York: Dell.
Kaplan, S. (1995). The restorative benefits of nature: toward an integrated framework. *Journal of Environmental Psychology,* 15, 169-182.
Kaplan, S. (2001). Meditation, restoration, and the management of mental fatigue. *Environment and Behavior*, 33 (4), 480-506.
Kaplan, S., & Kaplan, R. (1982). *Cognition and environment: functioning in an uncertain world*. New York: Praeger.
Kaplan, S., & Kaplan, R, (1989). *The Experience of Nature: A Psychological Perspective*. New York: Cambridge University Press.
Karasek, R., & Theorell T. (1990). *Healthy work: Stress, productivity and the reconstruction of the working life*. New York: Basic Books.
Karppa, P. www.ab05.se
Kellert, S., & Derr, V. (1998). *A national study of outdoor wilderness experience*. New Haven: School of Forestry and Environmental Studies, Yale University.

Kellert, S.R., & Wilson, E.O. (1993). *The Biophilia Hypothesis*. Washington DC.: Island Press.
Kelly, J. (1982). Leisure subculture. In: J. Kelly (ed.), *Leisure,* pp. 240-255. Englewood Cliffs, NJ: Prentice –Hall.
Kendrick, K.M. (2000). Oxytocin, motherhood and bonding. *Experimental Psychology*, 85, 111-124.
Kierkegaard, S. A. (Eremita, V) (1843). *Enten – eller, et Livs-Fragment. [Either- or, a Fragment of Life].* (In Danish). Kobenhavn: Reitzel.
Kisilevsky, B.S., Hains, S.MJ., Kang Lee; Xing Xie; Hefeng Huang; Hai Hui Ye; Ke Zhang, & Zengping Wang. (2003). Effects of experience on fetal voice recognition. *Psychological Science*, 14 (3), 220-224.
Klingberg-Larsson, S. (2000). *Stressutlosta utmattningsreaktioner och utbrandhet, [Stress-induced exhaustion reactions and burnout].* (In Swedish). Stockholm: Liber AB.
Knopp, T. (1972). Environmental Determinants of Recreation Behavior. *Journal of Leisure Research,* 4 (2), 129-138.
Koivula, N., Hassmén, P., & Fallby, J. (2002). Self-esteem and perfectionism in elite athletes: effects on competitive anxiety and self-confidence. *Personality and Individual Differences*, 22, 865-875.
Konijnendijk, C.C. (2008). *The Forest and the City – The cultural landscape of urban woodland.* Berlin: Springer.
Korolija, N. (1998). *Episodes in talk: Constructing coherence in multiparty conversation.* Linkoping University: Department of Communication Studies.
Korolija, N., & Linell, P. (1996). Episodes: Coding and analyzing coherence in multiparty conversation. *Lingusitics,* 34, 799-831.
Korpela, K.M. (1989). Place-identity as a product of environmental self-regulation. *Journal of Environmental Psychology,* 9, 241-256.
Korpela, K.M., & Hartig, T. (1996). Restorative qualitites of favorite places. *Journal of Environmental Psychology,* 16, 221-233.
Korpela, K.M., Hartig T., Kaiser, F.G., & Fuhrer, U. (2001). Restorative Experience and Self-Regulation in Favorite Places. *Environment and Behavior,* 33 (4), 572-589.
Korpela, K.M., Kytta, M., & Hartig, T. (2002). Restorative experience, self-regulation, and children's place preferences. *Journal of Environmental Psychology*, 22 (4), 387-398.
Korpela K.M., & Ylen, M. (2007). Perceived health is associated with visiting natural favorite places in the vicinity. *Health and Place*, 13 (1), 138-151.
Kramer, S.N. (1958). *Sa levde sumererna, [From the tablets of Sumer].* (In Swedish). Stockholm: Forum.

Krauklis, M., & Schenstrom, O. (2003). *Utbrandhet – den nya folksjukdomen, [Burnout – the new population-illness].* (In Swedish). Sodertalje: Robert Larsson AB.
Kullberg, B. (1996). *Etnografi i klassrummet, [Ethnography in the class room].* (In Swedish). Lund: Studentlitteratur.
Kuller, R. (1991). Environmental assessment from a neuropsychological perspective. In: T. Garling & G. W. Evans (eds.), *Environment, Cognition, and Action*, pp. 78–95. New York: Oxford University Press.
Kvale, S. (1997). *Den kvalitativa forskningsintervjun, [The qualitative research interview].* (In Swedish). Lund: Studentlitteratur.
Kvale, S. (1999). Intervjun som kunskapskonstruktion, (The interview as a construct of knowledge). In: C.A. Safstrom & L. Ostman (eds.), *Textanalys, [Textanalysis].* (In Swedish). pp. 57-75. Lund: Studentlitteratur.
Kyle, G.T., Graefe, A.R., & Manning, R.E. (2005). Testing the dimensionality of place attachment in recreation settings. *Environment and Behavior*, 37, 153-177.
Lantz, A. (1993). *Intervjumetodik. Den professionellt genomförda intervjun, (Interview methodology. The professionally conducted interview). (In Swedish).* Lund: Studentlitteratur.
Larsson, S. (1986). *Kvalitativ analys- exemplet fenomenografi, [Qualitative analysis – the example of phenomenology].* (In Swedish). Lund: Studentlitteratur.
Larsson, S. (1993). Om kvalitetskriterier i kvalitativa studier, [About criterions of quality in qualitative studies]. (In Swedish). *Nordisk Pedagogik*, 13 (4), 194-211.
Lazarus, R.S. (1966). *Psychological Stress and the Coping Process*. New York: Mc Graw-Hill.
Lazarus, R.S., & Folkman, S. (1984). *Stress, Appraisal and Coping*. New York: Springer.
Lawton, M. P. (1985). The Elderly in Context: Perspectives from Environmental Psychology and Gerontology. *Environment and Behavior*, 17, 501-519.
Lieberg, M. (2004). Participant Research as a Tool in the Communication between Research and Practise. In: N.A. Lobanov, E. Lobanov, A. Maryshev, V. Skvortsova, L. Trachenko (eds.), *Education Across the Life: Development of Sustainable Education in Common Educational Space of Euroasian Economic Commonwealth,* pp. 162-166. S:t Petersburg State University, Ministry of Education of the Russian Federation, UNESCO, 2.
Liebowitz, M. (1983). *The chemistry of love.* New York: Berkeley Books.

Lorenz, K.Z. (1965). *Evolution and Modification of Behavior.* Chicago: University of Chicago Press.
Lowrie, W. (1968). Kierkegaards attack upon 'Christendom'. Princeton.
Lundvik Gyllensten, A., Skar, L., Miller, M., Gard, G. (2010). Embodied identity – A deeper understanding of body awareness. *Physiotherapy Theory and Practice,* 26, 7, 439-446.
Main, M. (2000). The organized categories of infant, child, and adult attachment: Flexible vs. inflexible attention under attachment-related stress. *Journal of the American Psychoanalytic Association,* 48, 1055-1095.
Maller, C., Townsend, M., Pryor, A., Brown, P., & St Leger, L. (2006). Healthy nature, healthy people. 'Contact with nature' as an upstream health promotion intervention for populations. *Health Promotion International*, 21 (1)*,* 45-54.
Mandelbrot, B.B. (1977). *The fractal geometry of nature.* New York: H. Freemanand Company.
Mandelbrot, B.B., & Blumen, A. (1989). Fractal Geometry: What is it, and What does it do? *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences,* 423, 3-16.
Manly, B.F.J. (1994). *Multivariate Statistical Methods.* 2. ed. London: Chapman & Hall.
Manning, R. (1999). *Studies in Outdoor Recreation.* Corvallis, OR.: Oregon State University Press.
Marshall, C., & Rossman, G.B. (1999). *Designing Qualitative Research.* 3. ed. London: Sage Publications.
Martensson, F. (2004). *Landskapet i leken. En studie av utomhuslek på forskolegarden, [The landscape of play. A study in outdoor play in the preschool yard].* (In Swedish). Diss. Alnarp: Swedish University of Agricultural Sciences.
Maslach, C., Schaufeli, W.B., & Leiter, M.P. (2001). Job burnout. In: S.T. Fiske, D.L. Schacter & C. Zahn-Waxler (eds.), *Annual Review of Psychology*, 52, 397-422.
Mazzola, J.J., Schonfeld, I.S., & Spector, P.E. (2011). What qualitative research has tought us about occupational stress. *Stress and Health,* 27 (2), 93-110.
Mehling, W.E., Wrubel, J., Daubenmier, J.J., Price, C.J., Kerr, C.E., Silow, T., Gopisetty, V., & Stewart, A.L. (2011). Body awareness: a phenomenological inquiry into the common ground of mind-body therapies. *Philosophy, Ethics, and Humanitites in Medicine*, 6, 6.
Merriam, S.B. (1994). *Fallstudien som forskningsmetod, [The case study as a research method].* (In Swedish). Lund: Studentlitteratur.
Merriam, S.B. (1998). *Qualitative research and case study applications in education.* San Fransisco: Jossey-Bass Publishers.

Metcalfe, J., & Mischel, W. (1999). A hot/cool system analysis of delay of gratification: Dynamics of willpower. *Psychological Review*, 106, 3-19.
Myers, M. (1998). Empowerment and community building through a gardening project. *Psychiatric Rehabilitation Journal*, 22 (2), 181-183.
Naess, A. (1989). *Ecology, community and lifestyle.* Cambridge: Cambridge University Press.
Naidoo, J., & Wills, J. (2007). *Folkhalsa och halsoframjande insatser, [Population health and salutogenic efforts].* (In Swedish). Lund: Studentlitteratur.
Nationalencyklopedin (2011) http://www.ne.se [Accessed 30 August 2008].
Neisser, U. (1991). Two perceptually given aspects of the self and their development. *Developmental Review*, 11 (3), 197-209.
Norberg-Schulz, C. (1980). *Genius loci: towards a phenomenology of architecture.* New York: Rizzoli.
Nordh, H., Hartig, T., Hagerhall, C., & Fry, G. (2009). Components of small urban parks that predict the possibility for restoration. *Urban Forestry and Urban Greening*, 8, 225-235.
Norman, D.A. (1988). *The psychology of everyday things.* New York: Basic Books.
Norman, J., Ellingson, L., Boman, M., & Mattsson, L. (2010). The value of forests for outdoor recreation in southern Sweden: Are broadleaved trees important? *Ecological Bulletins*, 53, 21-31.
Odman, P.J. (2001). *Tolkning, forstaelse, vetande. Hermeneutik i teori och praktik, [Interpretation, understanding, knowing. Hermaneutics in theory and practice].* (In Swedish). Stockholm: Norstedts Forlag.
O'Donnell, K., Brydon, L., Wright, C.E., & Steptoe, A. (2008). Self-esteem levels and cardiovascular and inflammatory responses to acute stress. *Brain, Behavior, and Immunity,* 22 (8), 1241-1247.
Orians, G.H. (1980). Habitat selection: General theory and applications to human behavior. In: J.S. Lockard (ed.), *The Evolution of Human Social Behavior.* New York: Elsevier.
Orians, G.H. (1986). An ecological and evolutionary approach to landscape aesthetics. In: E.C. Penning-Rowsell & D. Lowenthal (eds.), *Landscape meanings and values*, pp. 3-25. London: Allen & Unwin.
Orth, U., Robins, R.W., & Roberts, B.W. (2008). Low self-esteem prospectively predicts depression in adolescence and young adulthood. *Journal of Personality and Social Psychology*, 95 (3), 695-708.
Otto, R. (1924). *Det heliga, [The holy].* (In Swedish). 12. ed. Svenska Kyrkans Diakonistyrelses Bokforlag.

Ottosson, J. (2007). *The importance of nature in coping: creating increased understanding of the importance of pure experiences of nature to human health.* Diss. Alnarp: Swedish University of Agricultural Sciences.
Palaeolexicon: http://www.palaeolexicon.com/default.aspx?static=12&wid=346416) Word study tool of ancient languages [Accessed 2 May 2011]
Paasi, A. (1999). The changing pedagogics of space: the representation of the other in Finnish school geography textbooks. In: A. Buttimer & S. Brunn (eds.), *Text and Image.* Social Construction of Regional Knowledges, pp. 226-236. Institut fur Landerkunde, Leipzig 49.
Parr, H. (2007). Mental health, nature work, and social inclusion. *Environment and Planning. Society and Space,* 25 (3), 537-561.
Parsons, R., Daniel, T.C., & Tassinary, L.G. (1994). Landscape aesthetic, ecology, and human health. In: W. Covington & DeBanco (eds.), *Sustainable ecological systems,* pp. 226-280. Fort Collins, CO: USDA Forest Service General Technical Report RM-247.
Perski, A. (2006). *Ur balans: om stress, utbrandhet och vagar tillbaka till ett balanserat liv, [Out of balance: about stress, exhaustion disorder and ways back to a balanced life].* (In Swedish). Stockholm: Bonnier Fakta.
Peterson, U., Demerouti, E., Bergstrom, G., Samuelsson, M., Asberg, M., & Nygren, A. (2008). Burnout and physical and mental health among Swedish healthcare workers. *Journal of Advanced Nursing*, 62 (1), 84-95.
Pieper, J. (1963). *Leisure: The basis of culture.* New York: New American Library.
Polanyi, M. (1966). *The Tacit Dimension.* London: Routledge. (University of Chicago Press, 2009, reprint)
Politiken. 2007.10.20 data.arbejdsmiljoforskning. dk/upload/presentations/kal_130509.pdf. [Accessed 30 Sept. 2011].
Prohansky, H. M., Fabian, A.K., & Kaminoff, R. (1983). Place-identity: Physical worlds' socialization of the self. *Journal of Environmental Psychology*, 3, 57-83.
Purcell, T., Peron, E., & Berto, R. (2001). Why do preferences differ between scene types? *Environment & Behavior*, 33 (1), 93-106.
Purcell, A. T., & Lamb, R.J. (1984). Landscape perception: An examination and empirical investigation of two central issues in the area. *Journal of Environmental Management*, 19, 31-63.
Rabinowitz, C.B., & Couglin, RE. (1970). *Analysis of landscape characteristics relevant to preference.* Regional Science Research Institute Discussion Paper No. 38, Philadelphia.

Renstig, M., & Sandmark, H. (2005). *Duktighets syndromet – darfor gar allt fler kvinnor in i vaggen, ['The good girl syndrome'- the reasons why more women hit the wall].* (In Swedish). Stockholm: Wombri forlag.
Risjord, M.W., Dunbar, S.B., & Moloney, M.F. (2002). A new foundation for methodological triangulation. *Journal of Nursing Scholarship,* 34 (3), 269-275.
Rosenbaum, M.S., Sweeny, J.C., & Windhorst, C. (2009). The restorative qualitites of an activity-based, third place café for seniors: restoration, social support, and place attachment at Mather's – more than a café. *Seniors Housing & Care Journal*, 17 (1), 39-54.
Roxendal, G. (1985). *Body awareness therapy and the body awareness scale, treatment and evalutation in psychiatric physiotherapy*. Kallered: Kompendietryckeriet.
Roxendal, G., & Winberg, A. (2002). *Levande manniska – Basal kroppskannedom for rorelse och vila. [The living man – Basic body awareness therapy in movements and stillness].* Stockholm: Natur & Kultur.
Rush, B. (1812). *Medical Inquiries and Observations upon the Diseases of the Mind.* Philadelphia: Kimber & Richardson.
Sacks, O. (2009). Foreword in L. Campbell & A. Wiesen (eds.), *Restorative Commons: Creating Health and We—being through Urban Landscapes*, USDA Forest Service, PA, pp. 1-3.
Sandberg, A. (2002). *Vuxnas lekvarld. En studie om vuxnas erfarenheter av lek, [Adults world of play. A study about adults' experiences from play].* (In Swedish). Diss. Gothenbourg: University of Gothenbourg.
Sarap, T. (1991). *'Parken ar en hon', ['The park is a she'].* (In Swedish). Text from a lecture in Stadshallen, Lund, Kulturnatten, 21 Sept. 1991.
Sartre, J.P. (1943). *Letre et le neant. [Being and Nothingless].* (In French). Paris: Librairie Gallimard.
SAS Statistics. (2009). SAS 9.2 Documentation. SAS Institute, Inc. Release 9.2. (Cary, NC: SAS). Available at http: //support. Sas.com/documentation/cdl_main/ [Accessed 14 December 2009].
Scannell, L., & Gifford, R. (2010). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology,* 30, 1-10.
Scherer, K.R. (2005). What are emotions? And how can they be measured? *Social Science Information,* 44, 695-729.
Schneiter-Ulmann, R. (2010). *Lehrbuch Gartentherapie, [Textbook Garden therapy].* (In German). Bern: Huber.

Scopelliti, M., & Giuliani, M.V. (2004). Choosing restorative environments across the lifespan: A matter of experience. *Journal of Environmental Psychology*, 24, 423-437.
Scopelliti, M., & Tiberio, L. (2010). Homesickness in university students: The role of multiple place attachment. *Environment and Behavior*, 42, 335-350.
Searles, H.F. (1960). *The Nonhuman Environment in Normal Development and in Schizophrenia*. New York: International Universities Press.
Sebba, R. (1991). The landscapes of childhood: The reflections of childhoods's environment in adult memories and in children's attitudes. *Environment and Behavior*, 23, 395-422.
Sempik, J., Aldridge, J., & Becker, S. (2003). *Social and therapeutic horticulture: Evidence and messages from research*. Thrive with the Centre for Child and Family Research. Loughborough: Loughborough University.
Sempik, J., Hine, R., & Wilcox, D. (2010). *Green care: a conceptual framework. A report of the working group on the health benefits of green care*. COST866, Green Care in Agriculture. Loughborough: Loughborough University.
Shaffer, D.R., Wood, E., & Willoughby, T. (2002). *Developmental Psychology: Childhood and Adolescence*. Scarborouh, ON.,: Nelson Thomson Learning.
Shoemaker, C.A. (2002). The profession of horticultural therapy compared with other allied therapies. *Journal of Therapeutic Horticulture*. 13, 74-80.
Sinnett, L. 2011-11-10 A citation from a student during a lecture; Environmental Psychology in Landscape Architecture – Health Promoting Everyday Environments (LP0515).
Sjoberg, K. (2004). The Wall Street Culture, Market actors and popular media discourses. *European Journal of Cultural Studies*, 7 (4), 481-499.
Sluckin, W. (1972). *Imprinting and Early Learning*. London: Methuen.
Smaldone, D. (2007). *The role of time in place attachment*. Proceedings of the 2006 Northeastern Recreation Research Symposium, P-14. Newtown Square, PA: Department of Agriculture, Forest Service, Northern Research Station.
Socialstyrelsen (2003). *Utmattningssyndrom- Stressrelaterad psykisk ohalsa, [Exhaustion disorder – stress related psychic illness]*. (In Swedish). Stockholm: Socialstyrelsen.
Socialstyrelsen (2005). *Klassifikation av sjukdomar och halsoproblem, [The classification of illnesses and health-problems]*. KSH97. http://www.socialstyrelsen.se/klassificeringochkoder/diagnoskoder/Documents/Alfa2005feb.pdf- (In Swedish).

Spitzform, M. (2001). The Ecological Self: Metaphor and Developmental Experience? *Journal of Applied Psychoanalytic Studies*, 2 (3), 265-275.
Stake, R. (1995). *The art of case study research*. Thousand Oaks, CA.: Sage Publications.
Stamps, A.E. (1999). Physical Determinants of Preferences for Residental Facades. *Environment and Behavior*, 31 (6), 723-751.
Stamps, A.E. (2004). Mystery, complexity, legibility and coherence: A meta-analysis. *Journal of Environmental Psychology*, 24 (1), 1-16.
Stankey, G., & Manning, R. (1986). Carrying capacity of recreation settings. A Literature Review. The Presidents' Commission on Americans Outdoors. Washington, DC.: U.S. Government Printing office, M-47-M-57.
Starrin, B., Larsson, G., Dahlgren, L., & Styrborn, S. (1991). *Fran upptackt till presentation. Om kvalitativ metod och teorigenerering på empirisk grund, [From discovery to presentation. About qualitative method and generation of theory on an empirical base].* (In Swedish). Lund: Studentlitteratur.
Stedman, R.C. (2003). Sense of place and forest science: Toward a program of quantitative research. *Forest Science*, 49, 822-829.
Sterling, P., & Eyer, J. (1988). Allostatis: A new paradigm to explain arousal pathology. In: S. Fisher and J. Reason (eds.), *Handbook of Life Stress, Cognition and Health*. New York: John Wiley & Sons.
Stewart, W.P., Liebert, D., & Larkin, K.W. (2004). Community identities as visions for landscape change. *Landscape and Urban Planning*, 69, 315-334.
Stigsdotter, U., & Grahn, P. (2003). Experiencing a Garden: a Healing Garden for People suffering from Burnout Diseases. *Journal of Therapeutic Horticulture*, 14, 38-48.
Strauss, A., & Corbin, J. (1990). *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. London: Sage.
Sunde-Persson, K. www.sundedesign.se
Svenska Akademiens ordlista (2010)
http://www.svenskaakademien.se/web/ordlista.aspx [Accessed 20 July 2011].
Svensson, L., Brulin, G., Ellstrom, P-E., & Widegren, O. (2002). *Interaktiv forskning – for utveckling av teori och praktik, [Interactive research – for development of theory and practice].* (In Swedish). Stockholm: Arbetslivsinstitutet.
Swan, J., & Swan, R. (1996). *Dialogues with the Living Earth*. Wheaton, IL.: Quest Books.
Tennessen, C., & Cimprich, B. (1995). Views to Nature: Effects on attention. Journal of *Environmental Psychology*, 15 (1), 77-85.

Tenngart Ivarsson, C. (2011). *On the Use and Experience of a Health Garden*. Diss. Alnarp: Swedish University of Agricultural Sciences.
Tenngart Ivarsson, C., & Grahn, P. (2010). Patients' experiences and use of a therapeutic garden: from a designer's perspective. *Schweizerische Zeitschrift fur Forstwesen*, 161 (3), 104-113.
Tenngart Ivarsson, C. T., & Hagerhall, C.M. (2008). The perceived restorativeness of gardens: Assessing the restorativeness of a mixed built and natural scene type. *Urban Forestry & Urban Greening*, 7 (2), 107-118.
Theorell, T. (2003). *Ar okat inflytande på arbetsplatsen bra för folkhalsan? [Is increased influence in the work place good for public health?].* (In Swedish). Stockholm: Folkhalsoinstitutet.
Thompson Coon, J., Boddy, K., Stein, K., Whear, R., Barton, J., & Depledge, M.H. (2011). Does Participating in Physical Activity in Outdoor Natural Environmetns Have a Greater Effect on Physical and Mental Wellbeing than Physical Activity Indoors? A Systematic Review. *Environmental Science & technology* 45 (5), 1761-1772.
Tuan, Y. F. (1974). *Topophilia: a study of environmental perception, attitudes, and values*. Englewood Cliffs, N.J.: Prentice-Hall.
Twigger-Ross, C., Bonaiuto, M., & Breakwell, G. (2003). Identity Theories and environmental Psychology. In: M. Bonnes, Lee T. & M. Bonaiuto (eds.), *Psychological theories for environmental issues*. Burlington: Ethnoscapes. Ashgate Publishing Company.
Uddenberg, N. (1995). *Det stora sammanhanget. Moderna svenskars syn på manniskans plats i naturen, [The big picture. Modern Swedes' views on the humans place in nature].* (In Swedish). Nora: Nya Doxa.
Uddenberg, N. (2003). *Ideer om livet, [Ideas about life].* (In Swedish). Stockholm: Natur & Kultur.
Ulrich, R.S. (1973). *Scenery and the Shopping Trip: The Roadside Environment as a Factor in Route Choice.* Michigan Geographical Publication No. 12, Department of Geography, University of Michigan.
Ulrich, R.S. (1979). Visual landscapes and psychological wellbeing. *Landscape Research*, 4, 17-23.
Ulrich, R.S. (1981). Natural versus urban scenes. *Environment and Behavior*, 13 (5), 523.
Ulrich, R.S., (1983). Aesthetic and Affective Response to Natural Environment. *Human Behavior and Environment,* 6**,** 85-125.
Ulrich, R.S. (1984). View from a window may influence recovery from surgery. *Science*, 224, 420-421.
Ulrich, R.S. (1993). The Biophilia Hypothesis. In: S. R. Kellert & E. O Wilson (eds.), *Biophilia, Biophobia and Natural Landscapes*, p. 73. Washington: Island Press.

Ulrich, R.S. (1999). Effects of gardens on health outcomes: theory and research. In: C. Cooper-Marcus & M. Barnes (eds.), *Healing Gardens: Therapeutic Benefits and Design Recommendations,* pp. 27-86. New York: John Wiley.
Ulrich, R.S., Lundén, O., & Eltinge, J. (1993), 'Effects of exposure to nature and abstract pictures on patients recovering from open heart surgery'. *Journal of Social and Psychophysiological Research*, 30, 20-221.
Ulrich, R.S., & Parsons, R. (1992). 'Influences of passive experiences with plants on individual wellbeing and health'. In: D. Relf (ed.), *The role of horticulture in human wellbeing and social development,* pp. 93-105. Portland, OR.: Timber Press.
Ulrich, R.S., Simons, R.F., Losito, BD., Fiorito, E., Miles, MA., & Zelson, M. (1991). Stress-recovery during exposure to natural and urban environments. *Journal of environmental psychology,* 11, 201-230.
Uvnas-Moberg, K. (2000). *Lugn och beroring. Oxytocinets lakande verkan i kroppen, [Calm and touch- Oxytocins' healing effect in the body].* (In Swedish). Stockholm: Natur & Kultur.
Uvnas-Moberg, K. (2009). *Narhetens hormon –oxytocinets roll i relationer. [The hormone of proximity].* Stockholm: Natur & Kultur.
Uvnas-Moberg, K., & Peterson, M. (2006). Antistress, wellbeing, empathy and social support. In: B.B. Arnetz & R. Ekman (eds.). *Stress in health and disease*, pp. 226-242. Weinheim: Wiley-VCH.
Uvnas-Moberg, K., & Petersson, M. (2011). Role of oxytocin and oxytocin related effects in manual therapies. In: H.H. King, V. Janig & M.M. Patterson (eds.). *The Science and Clinical Application of Manual Therapy*. Edinburgh, London, New York & Philadelphia: Churhill, Livingstone. Elsevier Group.
Van Cleef, E. (1918). The Finn in America. *Geographical Review*, 6, 185-214.
Van den Berg, A., Hartig, T., & Staats, H. (2007). Preference for nature in urbanised societies: Stress, restoration, and the pursuit of sustainability. *Journal of Social Issues*, 63 (1), 79-96.
Van den Berg, A.E., Koole, S.L., & Van der Wulp, N.Y. (2003). Environmental preference and restoration: (How) are they related? *Journal of Environmental Psychology,* 23 (2), 135-146.
Van Lier, L. (2004). *The ecology and semiotics of language learning: A sociocultural perspective*. Boston: Kluwer Academic Publishers.
Velarde, MD, Fry, G., & Tveit, M. (2007). Health effects of viewing landscapes- landscape types in environmental psychology. *Urban Forestry & Urban Greening*, 6 (4), 199-212.
Vetenskapsradet (1990). Forskningsetiskaprinciper, [Ethical principles in science]. (In Swedish). http://www.codex.vr.se/texts/HSFR.pdf [Accessed 2 Feb 2010].

Vollbrecht, T. flaskstarr@hotmail.com
Wahrborg, P. (2009). *Stress och den nya ohalsan* [Stress and the new disease scenario]. (In Swedish). 2. ed. Stockholm: Natur & Kultur.
Wahrborg, P., Petersson, I., & Grahn, P. (in manuscript)
Wallén, G. (1996). *Vetenskapsteori och forskningsmetodik*, *[Theory of science and methodology of science].* 2. ed. (In Swedish). Lund: Studentlitteratur.
Ward, C., & Styles, I. (2007). Evidence for the ecological self: English-speaking migrants' residual links to their homeland. *International Journal of Applied Psychoanalytic Studies*, 4, 319-332.
Watts, M. (2003). *Kierkegaard*. Oxford: Oneworld.
Wells, N.M. (2000). At home with nature. *Environment and Behavior,* 32 (6), 775.
Werne, F. (1987). *Den osynliga arkitekturen, [The invisible architecture].* (In Swedish). Goteborg: Vinga Press.
WHO (1946). *Preamble to the Constitution of the World Health Organization,* as adopted by the international health conference, New York. Entered into force on 7 April 1948, pp. 19-22.
WHO (2005). *Participants at the 6th Global Conference on Health Promotion. The Bangkok Charter for health promotion in a globalized world.* (Accessed 4 Februay 2009).
WHO (2008). *Programmes and Projects: Mental Health – Depression,* (online).*A*vailablefrom: http://www.who.int/mental_health/management/depresson/definition/en/ [Accessed 30 September 2009].
WHO (2011).
http://www.who.int/mental_health/.../mental _health [Accessed 28 December 2011].
Wilkingson, S. (1998). Focus group methodology: A review. *International Journal of Social Research. Methodology,* 1, 181-203.
Williamson, G.R. (2005). Illustrating triangulation in mixed-methods nursing research. *Nurse Researcher*, 12, 7-18.
Wilson, E.O., (1984). *Biophilia: The Human Bond with Other Species*. Cambridge: Harvard University Press.
Winnicott, D.W. (1960). The Theory of the Parent-Infant Relationship. *International Journal of Psychoanalysis*, 41, 585-595.
Yin, R.K. (2003). *Case study research. Design and methods*. 3. ed. Thousand Oaks, CA.: Sage Publications.

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Skanor, February 2012.

Appendices

Appendice 1

The interview guide being used within the individual in-depth interviews with the caregivers in ARG (Paper III), was comprehensive. Here the main headlines are presented. The question concerning 'participants care' was followed up.

Definition of activity type/model
Target group
Rules/laws/attitudes
Definition of therapy/rehabilitation
Support staff
Participants care
What is it that makes the participants undergo stress-recovery here?
What factors do you consider the most essential in the recovery process?
In your opinion, how do participants receive this?
Do the participants receive 'enough' help?
Budget
Staff-role-description
Schedule
Contact with the outside world
Documentation
The research-link
Environmental description

Appendice 2

The interview guide being used in the focus group interview with the caregivers (Paper III)

How would you describe yourself?
What do you stand for in your rehabilitation?
Green Rehab? Garden therapy? How do you define yourself and the rehabilitation you provide?
Are there written procedures?
What do you think your strength is in general?
What is it that is 'healing'/essential in the recovery process?
What could you be better at?
What visions do you have for the future?
What is 'high quality' in the treatment?
What are your primary and most powerful tools for ensuring high quality?
What is 'successful' stress-rehabilitation?
What are you doing to realize that?
How do you measure that?
How do you know you have succeeded?
The significance of various occupations and its composition.
What is quality in the garden room?
What are the effects?
Certification process: what should it contain/be based on?

Appendice 3

Informed consensus. Papers III & V.

June, 2009
Alnarp

To participants in the Alnarp Rehabilitation Garden

There is on-going research and evaluations being carried out on the activities at the Alnarp Rehabilitation Garden. One of the research tasks is to find out how participants perceive rehabilitation and the multifaceted process that many go through. To determine this, the interviews have been conducted with former students. As a Ph.D. Student in the field of environmental psychology, I participate in the analysis of this material and

I need to gain insight into how the business works in practice during a rehabilitation period.

In order to create a picture of the Alnarp rehabilitation garden for myself I need to be with you during regular activities. The idea is that I mostly work with the gardener and sometimes exist in the background during your activities. I do not collect any personal or individual information. It is about understanding how the business as a whole is structured and functions and how it feels to be a participate in it.

According to the Helsinki protocol for ethical approval of medical treatment you have the right to, at any time, discontinue participation without disclosing any reason. If you have any questions, you are welcome call me or have me call you. My direct number is 040-415415 and e-mail address is anna.a.adevi@slu.se.

Sincerely,

Anna A Adevi

PhD Student in environmental psychology
Department of Work Science, Business Economics & Environmental Psychology

I have been informed about the research and its importance and give my consent to participate in the study.

_ _ _ _

I have been informed about the research and its importance but do not give my consent to participate in the study.

_ _ _ _

Name

_ _

Informed consensus. Papers III & V.

July, 2010
Alnarp

To participants in the Alnarp Rehabilitation Garden

There is on-going research and evaluations being carried out on the activities at the Alnarp Rehabilitation Garden. One of the research tasks is to find out how participants perceive rehabilitation and the multifaceted process that many go through. To determine this, the interviews have been conducted with former students. As a Ph.D. Candidate in the field of environmental psychology, I participate in the analysis of this material and I need to gain insight into how the business works in practice during a rehabilitation period.

In order to create a picture of the Alnarp rehabilitation garden for myself I need to be with you during regular activities. The idea is that I mostly work with the gardener and sometimes exist in the background during your activities. I do not collect any personal or individual information. It is about understanding how the business as a whole is structured and functions and how it feels to be a participate in it.

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Sincerely,

Anna A Adevi

PhD Student in environmental psychology
Department of Work Science, Business Economics & Environmental Psychology
Alnarp, SLU
I have been informed about the research and its importance and give my consent to participate in the study.

Name: Date:

I have been informed about the research and its importance but do not give my consent to participate in the study.

Name: Date:

Appendice 4

Dates for the 14 observations in ART during the summer of 2009:

June 2
June 10
June 17
June 23
June 24
June 30
July 2
July 7
July 8
July 14
July 15
Semester break
August 25
September 1
September 7

Dates of the 11 observations in ART during the summer of 2010:

June 22
The observer at a conference for one week
July 7
July 14
Semester break
August 10
August 11
August 17

August 18
August 24
August 31
September 6
September 7

Appendice 5

The interview guide and inform consensus related to interviews of past participants were unavailable. Paper IV.

Appendice 6

The Board's definition of exhaustion disorder

(Socialstyrelsen, 2003)

Diagnostic criteria for exhaustion disorder
All the criteria designated by a capital letter must be met before a diagnosis can be made.
A. Physical and psychological symptoms of fatigue for at least two weeks. Symptoms have evolved as a result of one or more identifiable stressors which have persisted for at least six months.
B. Clear lack of mental energy dominates the picture, as manifested by reduced initiative/entrepreneurship, reduced endurance or prolonged recovery time related to mental stress.
C. At least four of the following symptoms have persisted for almost every day during the same two-week period:
1) Difficulty concentrating or memory impairment
2) Significantly reduced ability to cope with demands or doing things under time pressure
3) Emotional liability or irritability
4) Sleep disturbance
5) Clear bodily weakness or fatigue
6) Physical symptoms such as pain, chest pain, palpitations, gastrointestinal symptoms, dizziness, or sound sensitivity.
D. The symptoms cause clinically significant distress or impairment in social, occupational or other important areas.

E. Is not the direct physiological effects of a substance (e.g. drug abuse, medication) or a general medical condition / injury (e.g. hypothyroidism, diabetes, infectious disease).
F. If the criteria for major depression, dysthymia or generalized anxiety disorder and simultaneous fulfilment of specified chronic fatigue syndrome has only additional specification for the current diagnosis.