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Stress, Nature & Therapy

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Sus Sola Corazon

KØBENHAVNS UNIVERSITET

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ABSTRACT

The dissertation is founded upon research on restorative natural environments and the western health situation whereby work-related stress is increasing and is related to a number of serious illnesses. The dissertation takes a treatment and research perspective on stress which comprises two independent studies:

- A. an interdisciplinary study to develop nature-based therapy (NBT) for people with stress-related illnesses at the healing forest garden Nacadia
- B. a national representative public health study on self-reported activities to alleviate stress

The objective in study A is to develop a theoretical framework and treatment programme for the nature-based therapy in Nacadia. The study takes an overarching psychological treatment perspective on 'stress, nature and therapy', but is based on a 'white' and 'green' interdisciplinary field and adopts a multi-methodological research approach. The results indicate that the field of nature-based therapy for the patient group is highly heterogeneous in regard to treatment theory, which is an under-examined aspect in NBT. The developed Nacadia therapy has a white framework, which is based on mindfulness, and a green framework, which is based on permaculture, both of which are intertwined and guide the therapeutic process. The dissertation aims to contribute to transparency in and the development of the field of NBT.

The objective of study B is to increase knowledge about the broad spectrum of activities in which people reportedly engage to alleviate stress on their own with a special focus on physical activity. The data is derived from a national representative public health study. The methods for analysing the data entail both qualitative coding and qualitative correspondence analyses. The reported activities can be divided into two almost equally large segments, one refers to sedentary activity while the other to physical activity. The results from the quantitative analyses show an association between being physically active when relaxing from stress and engaging in a physically active leisure time. The related respondent characteristics further indicate that physical activity is connected to good health, and socioeconomic factors such as high education, employment, and good housing conditions.

Keywords: Stress treatment, nature based therapy, eco-therapy, leisure time activities, relaxation.

DANSK RESUMÉ

Ph.d.-projektet har udgangspunkt i forskning i restorative naturmiljøer samt den vestlige sundhedssituation, hvor arbejdsrelateret stress er et voksende problem og relateret til alvorlige sygdomme og samfundsomkostninger. Projektet har både et behandlings- og forskningsperspektiv på stress i to uafhængige studier:

- A. et interdisciplinært studie til udvikling af naturbaseret terapi for mennesker med stressrelaterede lidelser
- B. et national repræsentativt folkesundhedsstudie omhandlende selvrapporterede aktiviteter til at slappe af, når man er stresset.

Formålet med studie A er at udvikle den teoretiske ramme og behandlingsprogram til terapihaven Nacadia. Studiet har et overordnet psykologisk behandlingsperspektiv, men bevæger sig inden for et interdisciplinært 'grønt' og 'hvidt' felt. Studiemetoderne er multi-metodologiske og inkluderer tværgående casestudier af naturbaseret terapi for stressramte. Resultaterne fra forskningen viser, at naturbaseret terapi er et heterogent felt i relation til behandlingsteori, hvilket er et overset aspekt i feltet. Den udviklede Nacadia-terapi har en 'hvid' mindfulness-baseret behandlingstilgang og en 'grøn' permakultur-inspireret tilgang til havebrug, der er integrerede og guider den terapeutiske proces. Formålet med studiet er at bidrage til transparens og udviklingen inden for feltet naturbaseret terapi.

Formålet med studie B er at bidrage med viden om, hvilke aktiviteter danskere rapporterer at bruge til afslapning fra stress, med fokus på fysisk aktivitet. Data er hentet fra en national og repræsentativ folkesundhedsundersøgelse. Som metoder er der brugt både kvalitativ kodning og statistisk korrespondance-analyse. Resultaterne viser, at de rapporterede aktiviteter fordeler sig i to omtrent lige store segmenter, hvor den ene refererer til fysisk aktivitet og den anden til stillesiddende aktivitet. Resultaterne fra korrespondance-analysen viser endvidere, at der er sammenhæng mellem at være fysisk aktiv for at slappe af fra stress og have en fysisk aktiv fritid og vice versa. De relaterede respondent-karakteristika indikerer endvidere, at fysisk aktivitet er relateret til godt helbred og socioøkonomiske faktorer såsom høj uddannelse, arbejde og gode boligforhold, hvilket understøtter tidligere forskning på området.

Nøgleord: stressbehandling, naturbaseret terapi, eco-terapi, fritidsaktiviteter, afslapning.

PREFACE

In 2007, Forest & Landscape, Denmark, University of Copenhagen initiated a research and development project called, "The Healing Forest Garden Nacadia". The initiator was Associate Professor Ulrika K. Stigsdotter in collaboration with Professor Thomas Randrup. The main aims of the project were to design and establish a healing forest garden utilising nature-based therapy for people with stress-related illnesses, and to conduct quantitative and qualitative research into the effect of the therapy, hereunder the use and influence of the natural environment. The project received funding from Realdania to design the healing garden, and to develop and publish a "Conceptual Model" for the therapy garden (Stigsdotter & Randrup, 2008).

It was assumed that the funding to construct Nacadia would be in place soon after the conceptual model was developed, and that the facility would be ready to receive patients in 2009. In 2008, I received a scholarship for a PhD from the Faculty of Life Sciences, University of Copenhagen to study the effect of the nature-based therapy in Nacadia, with a special focus on change in mental self-regulation. In the end, it took two more years before the entire funding for laying out the healing garden was in place. Clearly, there was no way of knowing that this time delay would occur when I began my PhD.

Based on my interest in stress and the therapeutic potential of natural environments, I instead was given the opportunity to develop the nature-based therapy for the healing forest garden Nacadia (in short Nacadia) and to study stress in a public health perspective. These two studies form this PhD.

Status of the healing forest garden Nacadia

Nacadia (the garden) officially opened in November 2011. It has multiple functions as a treatment facility for people with stress-related illnesses, a research, education and demonstration centre for evidence-based health design, nature-based therapy, landscape architecture and environmental psychology. The garden is located approximately 30 kilometres north of Copenhagen on 1.5 hectares of land in the North American/North European section of an arboretum, which comprises the largest collection of trees and shrubs in Denmark.

Sus Sola Corazon
Copenhagen, January 2012

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***Picture 1**: Bench at the small pond in the healing forest garden Nacadia*

1. INTRODUCTION

In today's modern society, the majority of people live in cities, and so it is very seldom that we come face-to-face with a tiger or any other dangerous predator, where we need to fight or flee. However, we face new challenges related to work and life demands both from the external and internal environment (Aldwin, 2007; Jones & Bright, 2001). These demands still trigger our genetically evolved physiological response and mobilise energy in the body (LeDoux, 1998). The response entails the activation of the sympatic nervous system and interrelated emotional and cognitive processes, which is today known as 'stress' (Lovallo & Thomas, 2000). Stress is not an illness in itself, but it becomes a health issue if prolonged without the possibility for restoration (Hartig et al., 2011). When it comes to obtaining mental restoration, research supports that a visit to, or a view of, natural and aesthetically pleasing environments has the potential to reduce stress and provide restoration (ibid).

The dissertation is founded upon research on restorative natural environments and the western health situation whereby work-related stress is increasing and is related to a number of serious illnesses (Ekholm et al., 2006; Nielsen & Kristensen, 2007, Nielsen, Curtis & Nielsen, 2008). The Danish National Board of Health has, therefore, encouraged new research, prevention and treatment initiatives within this field (Nielsen & Kristensen, 2007). The dissertation has a treatment and a research perspective on stress comprising two independent studies:

- A - an interdisciplinary study to develop nature-based therapy for people with stress-related illnesses at the healing forest garden Nacadia.
- B - a national representative public health study on self-reported activities to alleviate stress.

The two studies are both focused on stress, but from different subject areas and perspectives and are, therefore, described separately in the introduction. Only study A concerns all three subject areas; *stress, nature & therapy*, with three theoretical papers (papers I, II, III) and a practical treatment programme for Nacadia. Study B comprises paper IV.

STUDY A: DEVELOPING THE NACADIA THERAPY

State of the art

Research has found evidence that contact with natural environments can have a stress-reducing and health-promoting effect (Hartig, 2011, Louv, 2011; Ulrich, 1999). This evidence then forms the rationale for performing therapy in nature. However, NBT is a heterogeneous field with many intertwined branches (Stigsdotter et al., 2011) and not much consistency between treatments or environments (Tenngart, 2011). The field also lacks clear descriptions of interventions (Annerstedt & Währborg, 2011), apart from the well-documented 'Alnarp model' at the Swedish Rehabilitation Garden (Grahn & Ottosson, 2010, Grahn et al, 2010). A large amount of qualitative reports exists, although few longitudinal quantitative studies have been conducted (Annerstedt & Währborg, 2011; Stigsdotter et al., 2011). However, the field and related research is under development and in recent years, new studies have been being published, especially in the Nordic countries (e.g. Söderback, söderström & Schälander, 2004, Gonzalez et al., 2010). Efforts have been made to define and categorize and review the field (Annerstedt & Wahrborg, 2011), clarify and describe the different health benefits of a contact with nature (Hartig et al., 2011) and a new bi-lingual journal on ecopsychology has appeared on the market (*European Journal of Ecopsychology*).

Nevertheless, the diversity and lack of transparency in the field makes it very difficult to understand the therapeutic mechanisms involved in the different treatments and to perform comparable research, since any therapeutic model or theory can be integrated into NBT.

The Study

When the Nacadia project started in 2007, the NBT had only been vaguely described (see: Stigsdotter & Randrup, 2008). The main objective of the PhD project is to develop a transparent theoretical framework for the Nacadia therapy to integrate best available practice and research within the field of NBT and stress treatment. The study comprises papers I, II, III and the treatment programme.

Hypothesis, aim and research questions

My main hypothesis in this study is that natural environments have therapeutic potential in the form of experiences, activities and relation to nature that

can support and add new dimensions to the therapeutic process compared to conducting therapy indoors.

Aim

To develop a theoretical framework to structure and guide the therapeutic process and the practical treatment programme for the day-to-day treatment in Nacadia, where the patient group is composed of people with stress-related illnesses.

Research questions

- Question 1: What is the current state of practices, theory and reserach within the field of NBT especially in regard to treating people with stress-related illnesses in a healing garden setting?
- Question 2: How can practice and knowledge within 'conventional' stress treatment be integrated into NBT to support and enhance the therapeutic process?
- Question 3: How can the embodied dimension of taking therapy into a natural environment support the intended therapeutic process?
- Question 4: How can horticulture be planned and conducted in a healing garden to support the intended therapeutic process?
- Question 5: How can the results from the above questions be merged into a theoretical framework and treatment programme for NBT in Nacadia?

Definitions

Some central concepts are used in the different parts of the PhD thesis, which are clarified below.

Nature based therapy

Through my research, I have defined 'Nature-based therapy' (NBT) as a generic term for a heterogeneous field of therapeutic practices, which take place in natural environments and which use activities and experiences from the environment as therapeutic means (Corazon, 2011). The therapeutic practices range from psychotherapy to occupational therapy and the field is highly interdisciplinary. In the literature, the term "nature assisted therapy" is also used, which covers a broader range of therapeutic practices (Annerstedt & Wählborg, 2011). I have chosen the word *based* to emphasise the fact that the therapy takes place within a natural environment; since nature assisted therapy can also be conducted indoors with potted plants. One could argue that the most comprehensive term under which the Nacadia therapy

belongs would be "Nature-based & assi sted therapy", which will therefore be the term I will use in future work.

Healing forest garden
The Nacadia therapy takes place in a healing forest garden and the term 'garden therapy' can be c onsidered a subgro up of NBT, since it refers to a specific natural environment. Nacadia is designed according to guidelines from evidence-based health design (for more information see Stigsdotter & Randrup, 2008) and is called a healing garden in relation to its design and expected impact (Corzaon et al. 2010; S tigsdotter & Grahn, 2002). It should be mentioned that none of these definitions include any information regarding which therapeutic practice is being employed.

Natural environment
The terms natural environ ment and nature are used interchangeably in this thesis, in acc ordance with Kaplan & Kaplan definition of 'Nature' (19 89). The terms cover a wide range of outdoor spaces from gardens to large serene wilderness areas, which mainly consist of living plant material and other 'natural' objects such as stones and water, but can also include built elements and can appear designed or 'wild'.

Restoration and therapeutic potential
The term restoration refers to the rec overy of both mental and physiological resources which have been dim inished through dealing with the different challenges presented in ev eryday life (Hartig, 2011) . The ter m therapeutic potential is used to cover a broader ran ge of possible benefits of interaction with nature from mere relaxation to restoration and personal development.

***Picture 2**: The fireplace in the healing forest garden Nacadia*

Theory and research

The study takes an overarching psychological treatment perspective on 'stress, nature and therapy', but is nested in a 'white' and 'green' field since it takes psychotherapy into nature. The study is therefore interdisciplinary and is based on theory and research from the fields of environmental psychology, clinical psychology and sub-theories within NBT as well as gardening. Theory and research within embodied cognition and neuroscience is also employed to shed light on specific aspects of the therapeutic potential of bodily involvement. Since a large part of the study concerns the development and integration of theory, this section only presents a brief general overview of the interdisciplinary foundation for the study; the specific theoretical framework for the Nacadia therapy is presented in papers I and II.

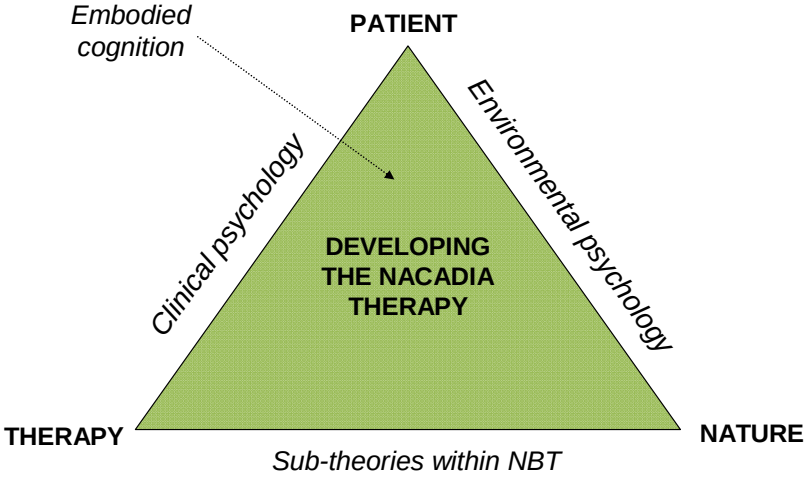

***Figure 1**: Overview of the interdisciplinary field of the study*
Theory and research from environmental psychology is used to understand the therapeutic potential of being in a natural environment, while clinical psychology is employed to gain knowledge of psycho and allied therapy for the specific patient group, and specific sub-theories and practices within NBT are integrated in order to understand specific aspects of and approaches to conducting therapy in nature.

It should be mentioned that the figure is a description of the multidisciplinary field regarding the relation between the three subjects "therapy, nature and patients". During the therapy itself, the patient is placed in the centre based on a salutogenetic (health creating) approach, which focuses on supporting individual resources for health and well-being (Antonovsky, 1996) in an interplay with the natural environment.

Environmental psychology

The very foundation for taking therapy into nature rests, as previously mentioned, on a growing body of research which documents the different stress reducing and other health-related effects of contact with natural environments, which in a therapy context can be regarded as 'therapeutic potential' that can be formed and integrated into a therapeutic frame. Two of the most prominent and longstanding theories on psychological restoration in nature are Rachel and Steven Kaplan's Attention Restoration Theory (Kaplan & Kaplan, 1989) and Roger Ulrich's psycho-evolutionary theory (Ulrich, 1999), upon which this dissertation is also based. Kaplan's theory focuses on cognitive functioning and information processing, which research claims are affected by natural environments which have certain characteristics (e.g. Berman, Jonides & Kaplan, 2008): According to the theory, the mind enters a state of 'soft fascination' which helps the individual to recover from fatigue in the directed attention system. This state of mind is analogous to a relaxed present centeredness, where thoughts just come and go. Prolonged exposure to the environment is presumed to lead to a 'cognitive quiet' with no thoughts at all, thus resembling a meditative state of mind (Kaplan & Kaplan, 1989; Kaplan, 2011). Roger Ulrich's theory emphasises our innate emotional and physiological response to natural environments that provide a safe habitat (Ulrich, 1993; 1999). Research also supports this theory in regard to stress recovery in certain natural environments (e.g. Parson et al., 1998). Also, one should not diminish the personal, cultural and social aspects which interact with the effects of natural environments (Hartig et al., 2011), since we all have individual scope of meaning and preferences. Therefore, the above theories should be seen as generalisations that will differ at the level of the individual. In the research on Nacadia, the patients' use of the garden and their preferences e.g. in relation to favourite places will therefore also be a research topic.

Clinical psychology

Theory and research within clinical psychology and related fields are integrated in the study in order to obtain an understanding of treatment for patients with stress-related illnesses, and the potential of integrating aspects of conventional stress treatment into NBT to support and enhance the therapeutic process. Since NBT is defined as taking place in nature and based on activities and experiences in the environment, it is generally speaking much more body-oriented than conventional psychotherapy.

The study's understanding of stress and its treatment is based on a mainly cognitive – behavioural foundation. The effect of cognitive-behavioural therapy is supported by research (Klink et al., 2011; Richardson & Rothstein, 2008).The understanding of the mechanisms in stress has its offspring in Richard Lazarus's cognitive emotional theory of meaning, which asserts

that it is not only the content of the situation that causes stress, but also our appraisal of it (Lazarus, 1999), which depends on the individual, socio-cultural and biological factors (ibid). The understanding of the physiological mechanisms of appraisal is expanded by the neuro-scientific theory of Joseph LeDoux (1998), which emphasises the fact that we learn how to appraise situations through our experiences and that our reactions become wired into our brains (LeDoux, 1998; 2003). Many new theories and practices have emerged from the cognitive-behavioural field and they have a stronger focus on creating psychological flexibility by changing our *relation* to our thought content rather than the content itself (Roemer & Orsillo, 2009). Part of this study examines this in relation to the development of the Nacadia therapy (See papers I and III).

Embodied cognition

Another interesting therapeutic potential, which is included in this dissertation, has its origin in the theory of embodied cognition (Anderson, 2003), and concerns our ability to move from embodied concrete experiences to abstractions, through the use of symbols and metaphors, which allow us to transfer information and meaning from one domain to another (Gallese & Lakoff, 2005), e.g. from nature to personal life. The theory and research within embodied cognition is described in paper II in order to theoretically expand the understanding of the therapeutic potential of bodied involvement and the use of metaphors in NBT.

Sub-theories and practices within NBT

The two main branches which deal with how to conduct NBT are eco-therapy and horticultural therapy. This study mainly draws inspiration from horticultural therapy, but also finds value in eco-therapy's emphasis on relating the external environment to internal experiences (Jordan, 2009). The different practices within eco-therapy are largely based on psychodynamic (e.g. Burns, 1998; Jordan, 2009b), Jungian and also shamanistic theories (e.g. Berger & MCleod, 2006). The focus for eco-therapy is, to a large extent, on the symbolic relation to the natural environment, but it also entails a theory of environmental sustainability (Roszak, 2009). Little research has been conducted in eco-therapy besides qualitative reports from therapists (for reports see: Buzzell & Chalquist, 2009). Horticultural therapy refers to the use of cultivation activities as therapy and it therefore often takes place in a garden or indoors (e.g. Simsom & Strauss, 1998). It entails almost no psychotherapy. Horticultural therapy has its roots in occupational therapy which emphasises engagement in meaningful activities based on assessment of the client's volition (values and interests), habituation (roles and habits) and performance capacity (Kielhofner, 2008). There is some research concerning

the positive effects of horticultural therapy for different client groups (Söderback, Söderström & Schälander, 2004).

Picture 3: *Vocational horticulture at the New York Botanical garden*

Methods

In study A, I had no prior theory or research design for developing the Nacadia therapy. The research questions and methods developed during the research, initiated by the following simple question:

What is nature based therapy?

A multi-methodological approach was employed, which mainly entailed qualitative methods. As a method for developing the treatment programme, I used introspective research with myself as the subject, as well as supervision and workshops. Furthermore, I accumulated knowledge on gardening in order to be able to integrate 'green' (activities and experiences in nature) and 'white' (psychotherapy) so that they mutually support and enhance the therapeutic process. I took courses in horticultural therapy (*New York Botanical garden, USA)* and permaculture (*The permaculture research Institute, Australia*). For an overview of the methods and subjects involved see figure 2. Below is a description of the main methods applied in the study.

Cross case study

A cross case study was employed to gain knowledge of different theoretical and practical approaches to NBT in healing gardens for the patient group

(question 1). The different cases were studied in order to understand the 'whole', the cases provided altogether, with less detail and intensively regarding the single case (Flyvbjerg, 2011, Stake, 2005). Through reference to American, European, Swedish and Danish resources on NBT in healing/therapeutic gardens for the patient group, it was determined that cases only existed in Denmark and Sweden. Field trips where conducted to the two leading "healing gardens" in Sweden: The Alnarp Rehabilitation Garden at the University of Agricultural Sciences and the Haga Hälsoträdgård near Stockholm (closed in 2009). Qualitative interviews were held with a therapist at both gardens along with guided tours of the gardens. The interviews were based on research question one, which was operationalized into subquestions (Kvale, 2008). Four conferences and seminars with presentations of the treatments were attended as information sources and the existing literature on the treatments was studied. In order to obtain the patients' perspective, a researcher, who was conducting qualitative interviews with patients at Alnarp, was interviewed.

Through requests to two Danish national networks on "Nature & Therapy", three NBT treatments for the patient group were identified in Denmark. Field trips were conducted with guided tours of the gardens, informal talks and interviews with the therapists (not all the therapists wished to participate in the interviews). There was only sparse literature available regarding the Danish treatments, while there were no studies which analysed the effects of any of the treatments.

The aim of studying several cases within the same subject was to obtain the best possible picture of current NBT treatments for the patient group.

Literature study

A broad literature study was conducted in environmental and clinical psychology and the field of NBT. Due to my previous employment at Danish Clearing House for Educational Research, where I had conducted research reviews, I felt well-grounded regarding the methods for reviewing. The literature on NBT was too sparse for the specific patient group in order to conduct a review to identify guidelines for "best practice." Therefore, I changed the purpose of the literature study so that it became a broad investigation for the development of the Nacadia therapy. The literature study on clinical psychology focused on theory, practice and research within stress treatment from a mainly cognitive-behavioural perspective, although this changed during the process to a mindfulness-based perspective. The literature searches on NBT led me to eco-therapy, horticultural therapy, as well as wilderness therapy, and I separated the literature studies according to these subjects in order to understand the different therapeutic practices conducted in natural environments.

Introspection and workshops

Introspection is observation of our own mind; the conscious inner thoughts, emotions and sensations (Wilson, 2003). I used this as method to develop and test aspects of the treatment programme on myself while also receiving supervision on the programme. I gave myself a metaphor and an activity to work with for two hours in relation to the themes in the programme, during and afterwards I observed my mental processes. The observations were structured in three components: A. Experience: emotional and mental processes during the therapeutic work, B. Effect: the effect on my emotions, thinking and physiology, and C. Evaluation: what worked and what did not work as intended. In this way, I went through the main aspects of the programme twice within a two month period. It should be mentioned that introspection has been widely criticised and questioned in psychological research mainly due to problems with objectivity (Wilson & Dunn, 2004). However, it is the only method which allows direct observation of the content of personal mental processes as they occur, and it is widely applied in qualitative research (Wilson, 2003). I therefore chose it as method so that I could use myself as a test person during the initial development of the program, and not to objectively validate the program. In order to receive feedback on the program and to test the core aspects, I also held two workshops, one with experts from related fields and one with volunteers, where we discussed the exercises according to the three components I also used myself (experience, effect, evaluation). It is important to emphasize that the programme is a theoretical construct which needs further development and validation through practical application and the effect studies.

***Picture 4**: NBT Workshop with experts*

Research overview

The following figure provides an overview of the methods and subjects in relation to the research questions. The research questions and related methods developed gradually during the research, starting with question 1 and so forth. The results from research regarding questions 1 - 4 form the background information to answer question 5. The initial results of this work are presented in paper I and the final results in paper III and the treatment programme. The theoretical examination of question 3 is further addressed in paper II.

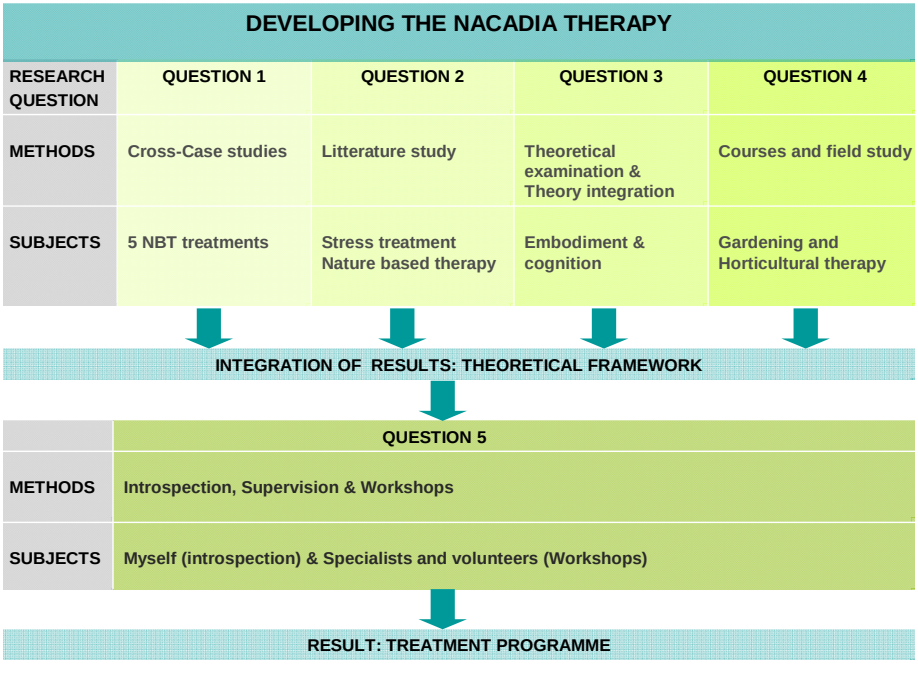

Figure 3: *Overview of methods and subjects in relation to research questions in Study A*

Results and discussion

Below is a description of the different results and their integration into the development of the Nacadia therapy. The end of the section provides an overview of the results. Research related to questions 1,2 and 4 are integrated into papers I and III as background for the development of the theoretical frame, whereby paper III entails a more detailed integration of the

green and white aspects. The treatment programme is considered to be a main result in itself, and it is presented in the appendix in its full length and is, therefore, not dealt with further in the results section.

The field of NBT

Through my cross-case studies related to the first question, I quickly discovered that there is not only *one* way of conducting NBT, but rather each treatment has a unique approach. This finding is also supported by Carina Tenngart's dissertation on the Alnarp Rehabilitation Garden in which she describes the garden design and therapy as being *unique* and difficult to compare with other treatments (2011). The treatments in the case studies seemed to rely on the same green theories regarding the effect of natural environments and garden activities, but the white theories, differed substantially ranging from psychodynamic, cognitive and elective theory. This diversity in the white aspects of the treatments is quite important and is an under-examined subject in NBT, which makes it difficult to compare treatments. One can not speak of NBT as a homogeneous field, but in the literature on the subject, until recently, the problems relating to this issue have been left out, maybe because it is a field which is still struggling for acceptance and a footing. The literature study painted an even broader picture than the case studies of the different white treatment theories employed in NBT. Furthermore, the lack of research and transparency makes it very difficult to identify best practices in the field.

Horticultural therapy is the most well-established branch of NBT, and through my studies I found that it is probably the most green of the NBT approaches, since it keeps a narrow focus on gardening activities for rehabilitation, vocation or wellness, with very little psychotherapy. This was confirmed when I took the education in HT at the New York Botanical Garden and visited horticultural therapy programmes in the USA; the gardening is the therapy. In my literature study, I found that eco-therapy is most similar to psychotherapy, but also the most diverse when it comes to white theories since any psychological theory can be integrated into the practices.

These findings regarding the diversity of the field and the scant guidelines regarding best practices, led me to decide not to develop *the* (evidence-based) way of conducting NBT. This was because there is not enough research to support what it actually is. There are probably many answers. Instead, I decided to create transparency around *one* way of conducting NBT, with a focus on the best possible integration of white and green aspects so that they are mutually supportive and enhance the therapeutic process. This work is mainly presented in paper III.

Integration of results and development of the Nacadia therapy
Through researching questions 1-4, I obtained different pieces to the puzzle, which needed to be crystallised and integrated. First of all, I asked myself what similarities the different NBT treatments shared and I identified four aspects they all used in the therapeutic process to varying extents and in different therapeutic frames:

- The mental present centeredness, which nature seems to promote naturally, which is supported by Kaplan and Kaplan's ART theory.
- Pleasant sensory experiences in order to relax the body and enhance well-being.
- Gardening or wilderness activities to provide meaningful and joyful occupation.
- The existential relation between the external environment and the individual through, e.g. the use of metaphors and symbols.

The mental present centeredness, which simply refers to "being in the present moment", can be seen as an overarching term which can be enhanced by experiences and activities in nature.

Present centeredness and stress treatment
According to a stress treatment perspective, it is very interesting that natural environments facilitate a present-centred relaxed state of mind, besides lowering physiological arousal. Therefore, as Kaplan also notes, deliberately integrating meditative practices into natural environments may have potential (Kaplan, 2001). My stance within the cognitive-behavioural field, combined with Kaplan & Kaplan's ART theory and the finding that aspects of training "present centeredness" are generally employed in NBT for the patient group, led me to focus on theory and research within mindfulness-based stress treatment in the investigation of conventional stress treatments (research question 2). This then led me to a new branch of mindfulness- and acceptance based therapies, which became the white framework for the Nacadia therapy. Mindfulness refers to focusing ones attention on the present moment in a non-judgemental and accepting way (Kabat-Zinn, 2001) and therefore entails a more elaborate and intentional mental awareness than mere 'being present centred', which described in paper III in regard to the therapeutic potential of conducting therapy in a natural environment. My research and courses regarding gardening, led to the integration of permaculture (Holmgren, 2002; Morrow, 2009) in the theoretical framework. Permaculture is a design and cultivation approach aimed at creating environmentally sustainable and productive gardens and settlements (ibid). This integration is also presented in paper III.

Embodiment and metaphors

There is little research on the use of metaphors and symbols in NBT and no theory which links it with the embodied dimension in NBT. I therefore tried to contribute to the field with a theoretical examination of the subject, which is presented in paper II. The results from this work led to the proposal that the use of metaphors to conceptualise desired therapeutic understanding, in connection with the performance of activities in NBT, can support change processes by semantically relating cognition and bodily involvement.

Research Questions	Results
1	• The field of NBT is highly heterogeneous in regard to white treatment theory • Horticultural therapy is the most green in the field of NBT • The different treatments within NBT share similarities in relation to therapeutically working with: present centeredness, sensory experiences, gardening and / or wilderness activities and the existential relation to nature.
2	• In conventional stress treatment, theory and research support the effect of training 'accepting present centeredness', known as mindfulness.
3	• Semantically relating cognition and bodily involvement through metaphors can possibly support the therapeutic process in NBT.
4	• The integration of permacultural gardening with psychotherapy is supposed to support the therapeutic process in the Nacadia therapy.
5	• The Nacadia therapy rests on common practices within NBT, theory and research within stress treatment. It has a mindfulness- and acceptance based white framework and a permacultural green framework, which are intertwined and guide the therapeutic process.

Table 1: Overview of results in study A

Concluding remarks and future perspectives

The proposed theoretical framework (paper III) and treatment programme (Appendix) should be seen as work in progress. The theoretical constructs need to be tested and evaluated in a continuous process through the treatment of patients in Nacadia. The field of NBT is currently developing, and the dissertation aims to contribute to greater transparency by presenting one way of conducting NBT, which integrates mindfulness and acceptance-based

therapy with permacultural gardening and nature experiences in a healing forest garden.

The greatest challenge in this work was the integration of the green and white aspects. I found that linking embodied experiences with nature-based metaphors (paper II) and the integration of permaculture (paper III) were steps along the way to combining white and green. The therapeutic use of permacultural principles is only briefly described in paper III, and it is not addressed in the treatment programme, since it came very late to me in the process. However, I consider that the continuance of this fusion has great potential, so that the activities are never isolated or just attached to the psychotherapy, but are truly and equally combined. I believe that permaculture has a lot to offer in this regard.

Future research

The Nacadia project has received funding to conduct longitudinal comparative effect studies which will start in 2012. The research will include different qualitative and quantitative methods. However, it will still be quite difficult to isolate the effects of single elements, such as the gardening or psychotherapeutic approach, since it is part of an interrelated process. In regard to an investigation of the therapeutic mechanisms at play in the treatment, different questionnaires and interviews can be employed. Comparative research within mindfulness and acceptance-based therapy indicates that mental self-regulation related to acceptance and psychological flexibility mediates the effect in this therapy form (Flaxman & Bond, 2010). It could be interesting to investigate whether this is also the case in the Nacadia therapy and whether the nature context and gardening contribute new mediators in self-regulation and recovery. For example, can it be hypothesised that self-compassion is also promoted by relating caring for a garden to one's personal life through metaphors. This possible therapeutic mediator is interesting to investigate in the light of recent research indicating that self-compassion may offer similar mental health benefits as self- esteem (Neff, 2011). To investigate these aspects, the acceptance and action questionnaire (Bond et al., 2011) and self compassion scale (Raes et al., 2011) can be used in combination with interviews conducted at several points during the therapy. Furthermore, comparative research on the treatment at the Alnarp Rehabilitation Garden and the Nacadia garden could open new doors for understanding the similarities, differences and effects of different NBT treatments for specific patient groups.

Picture 5: *View to a lake located beside the therapy garden Nacadia*

I invite you to take a break; maybe go for a nice walk in a natural environment before moving on to study B.

STUDY B: ACTIVITIES TO ALLEVIATE STRESS

State of the art

Research regarding stress has many branches in relation to studying the factors that influence stress such as occupation and individual resources and those factors that can provide recovery from stress, such as activities and environments. When it comes to stress recovery, there is a growing body of research regarding the effect of different leisure time activities, environments and related experiences (Korpela & Kinnunen, 2011). Research further shows that physical activity can provide recovery from stress (Hamer, Stamatakis, & Steptoe, 2009), while it also has general health benefits (World Health Organization, 2006). Building on this knowledge, it was decided to focus on the level of physical activity in the study on self reported activities to alleviate stress, which to the authors' knowledge represents the largest study with this focus.

The study
Through the research collaboration between Forest & Landscape and the National Institute of Public Health, University of Southern Denmark (NIPH) I was given the opportunity to study self-reported activities to alleviate stress by analysing representative data from the national Danish health and morbidity survey from 2005. Here, this study is named *Study B* and is presented in paper IV. The study is only briefly described in the introduction, since it is well-covered in the paper.

It should be mentioned that due to the collaboration between Forest & Landscape and the National Health Institute, the national health and morbidity survey also included 3 questions on green space, where the use of and distance to green space showed correlations with different health factors (Stigsdotter et al., 2010; 2011). In the beginning of this study, my initial aim was to have a special focus on activities which take place in natural environments / green space. However, my preliminary data analysis did not support this inquiry and the nature aspect is therefore not included.

Aim and research questions

Aim
To increase knowledge about the broad spectrum of activities in which people reportedly engage to alleviate stress, the level of physical activity and the respondent characteristics associated with the different activities.

Research questions

- What activities are reported to be used to relax when feeling stressed?
- How does the reported choice of stress-reducing activities correspond to general leisure time activities and respondent characteristics?

Methods

The main data for the study comprises the answers from 7,797 respondents to the following open ended question, "*When you are stressed and need to relax, what do you do*?" This was part of the Danish National Health and Morbidity Survey in 2005, from which the background data for this study is also derived. (I was not involved in formulating the question, but I got access to the data afterwards). My method for analysing the data was based on a systematic qualitative approach whereby I coded the answers in regard to similarities between the reported activities in a spiral-like process (Saldana, 2009). The results from the qualitative analyses are referred to as sub-results in the figure below.

In cooperation with statisticians from the Danish National Institute of Public Health, it was decided to use multiple correspondence analyses to gain knowledge of the respondent characteristics associated with the different activities. This method was chosen due to its descriptive nature and ability to identify complex relations through graphical representations (Hjelbrekke, 1999). The statistical analyses were performed in cooperation with the statisticians at the National Institute of Public Health and my supervisors at the University of Rome, Institute of Cognitive Sciences and Technologies, who I visited to learn more about environmental psychology. I decided to include the respondents' leisure time activities to gain an insight into the association between what people generally engage in, in their free time and the activities employed specifically for relaxation when feeling stressed. The results from the statistical analyses are entitled main results in the figure below.

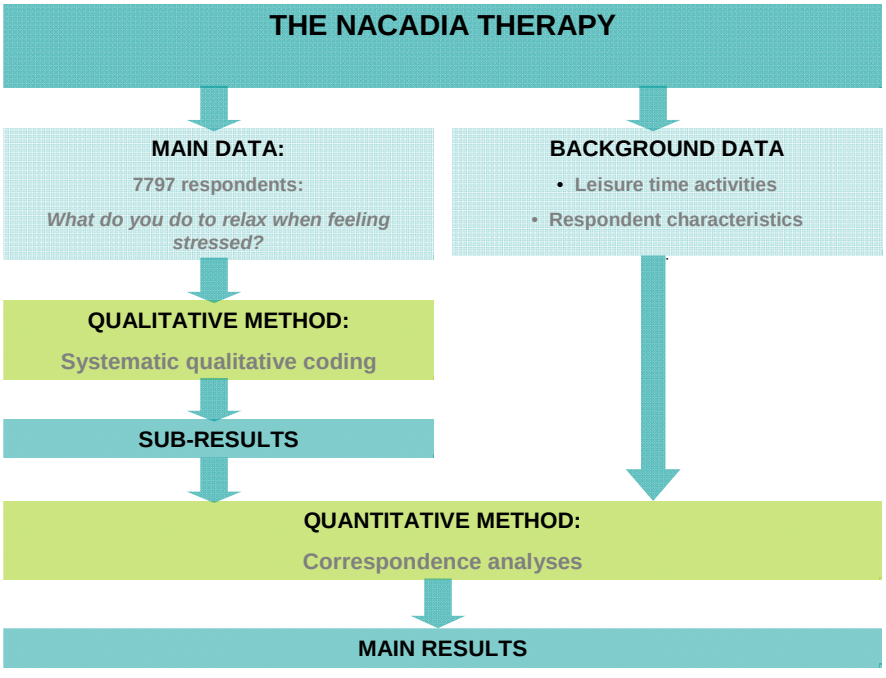

***Figure 4**: Overview of data and methods in Study II*

Results

The qualitative analyses led to the formation of 15 categories of activities. The categories divide into two almost equally sized segments; one refers to sedentary activity and the other to physical activity. The results from the quantitative analyses show an association between being physically active when relaxing from stress and engaging in physical activity during leisure time and vice versa. The related respondent characteristics further indicate that physical activity is related to good health and socio-economic factors such as high education, employment, and good housing conditions.

Concluding remarks and future perspectives

This study paints a representative picture of the diverse field of activities for stress relaxation and related user characteristics in a Danish context. The findings show an association between activities for stress relaxation and leisure time and support earlier research which indicates that social inequality

plays an important role in the choice of activities (WHO, 2006). Clearly, the strength of the study is the large amount of representative data utilised. The weakness lies in the lack of information on preferences and perceived effects of the described stress relaxing activities. For future health surveys, I would recommend a more detailed formulation of this survey question in order to gain knowledge into these aspects. The question could, for example, be followed by a scale, where the respondent rates the effect of the most frequently employed activity. Another interesting avenue for future research would be to include different mediators in the question design, for example building on the study by Korpela & Kinnunen (2011), or include information regarding the environments where the activities take place, in relation to previous research on public health and green space at Forest & Landscape (Stigsdotter, 2010).

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I thank my supervisors
I am grateful to my loved ones
And I bow to Nature the greatest teacher of all

Picture 6*: My supervisor Ulrika Stigsdotter and me at the fireplace*

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Paper I: Corazon, S.S., Stigsdotter, U.K., Nielsen, A.G., & Nilsson, K. (2010). Developing the nature based therapy concept for people with stress related illness at the Danish healing forest garden Nacadia. Journal of Therapeutic Horticulture xx, 35-50.

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