

Development of the Nature-Based Therapy Concept for Patients with Stress-Related Illness at the Danish Healing Forest Garden Nacadia

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In 2007 Forest & Landscape Denmark, a center at the University of Copenhagen, initiated a research and development project called the Healing Forest Garden Nacadia (in short: Nacadia). Nacadia will be built during the spring of 2010 and ready to receive patients the following summer. The aim of this paper is to describe the nature-based therapy (NBT) concept and design of Nacadia. The NBT concept describes the theoretical framework around the treatment. It is based on the therapeutic use of sensory experiences, horticultural activities, nature-related stories, and symbols within a mindfulness-based cognitive therapy approach. Based on the experience from the Alnarp Rehabilitation Garden in Sweden, evidence-based guidelines for healing garden design have been further developed and implemented at Nacadia.

In addition to describing the NBT concept and the garden design, a short overview of the NBT program will be given, along with an example from the activity manual used in the program. It is the intention of the authors that this paper be viewed as a contribution toward developing the concept of NBT and healing garden design, bearing in mind that the proposed concept and design must be empirically tested to demonstrate its validity. An important component of the Nacadia project involves conducting comparable effect studies when the garden is up and running. Results from these studies will be presented once they have been completed.

BACKGROUND

According to the World Health Organization (WHO), stress has become a growing global problem and constitutes a risk factor for developing illnesses such as coronary heart disease, type II diabetes, and depression (WHO, 2006, 2008; Aldwin, 2007). Stress is further considered a risk factor for premature death (Nielsen, Kristensen, Schnor & Grønbaek, 2008). During stress, our body organs react in many different ways, and if sustained for an inappropriately long time without the possibility of recovery, these reactions become dysfunctional and harmful, with the risk of causing deleterious changes to, for instance, the cardiovascular system and the neuro-hormonal systems of the body (Tsigos & Chrousos, 2002; Aldwin, 2007). Hence, if people cannot find restoration from stress, their health will be negatively affected in many ways. The WHO has rated stress as one of the major causes of death in the developed world, and consequently has made stress-related diseases a priority health prevention area (WHO, 2006, 2008).

According to a national Danish survey, stress-related illness is also growing in Denmark (Nielsen, Curtis & Nielsen, 2008). Research and new treatment initiatives in this area are therefore encouraged by the Danish health council (Nielsen & Kristensen, 2007). Currently the Danish government is only supporting treatment initiatives run by stress clinics at public hospitals, none of which take place in healing gardens.

In Sweden, the use of nature-based therapy for patients with stress related illness is a well established treatment (Grahm, 2009). The Healing Garden in Alnarp (in short: Alnarp), located at the Swedish University of Agricultural Sciences (SLU), has been identified as an international leader in regard to using nature-based therapy for patients with stress related illness (Cooper Marcus, 2006; Nilsson, 2009). Alnarp has been in operation for the past seven years and the treatment results are impressive; data obtained during that time shows a significant general increase in patients' physiological and physical condition, social functioning, self mastery, and sense of coherence, followed by a significant decrease in experience of skeletal and muscular pain and symptoms of depression and anxiety. After treatment 67% of the patients have been ready to return to employment or studies (Grahm, 2009; Grahm, Tenngart, Stigsdotter & Bengtsson, in publication).

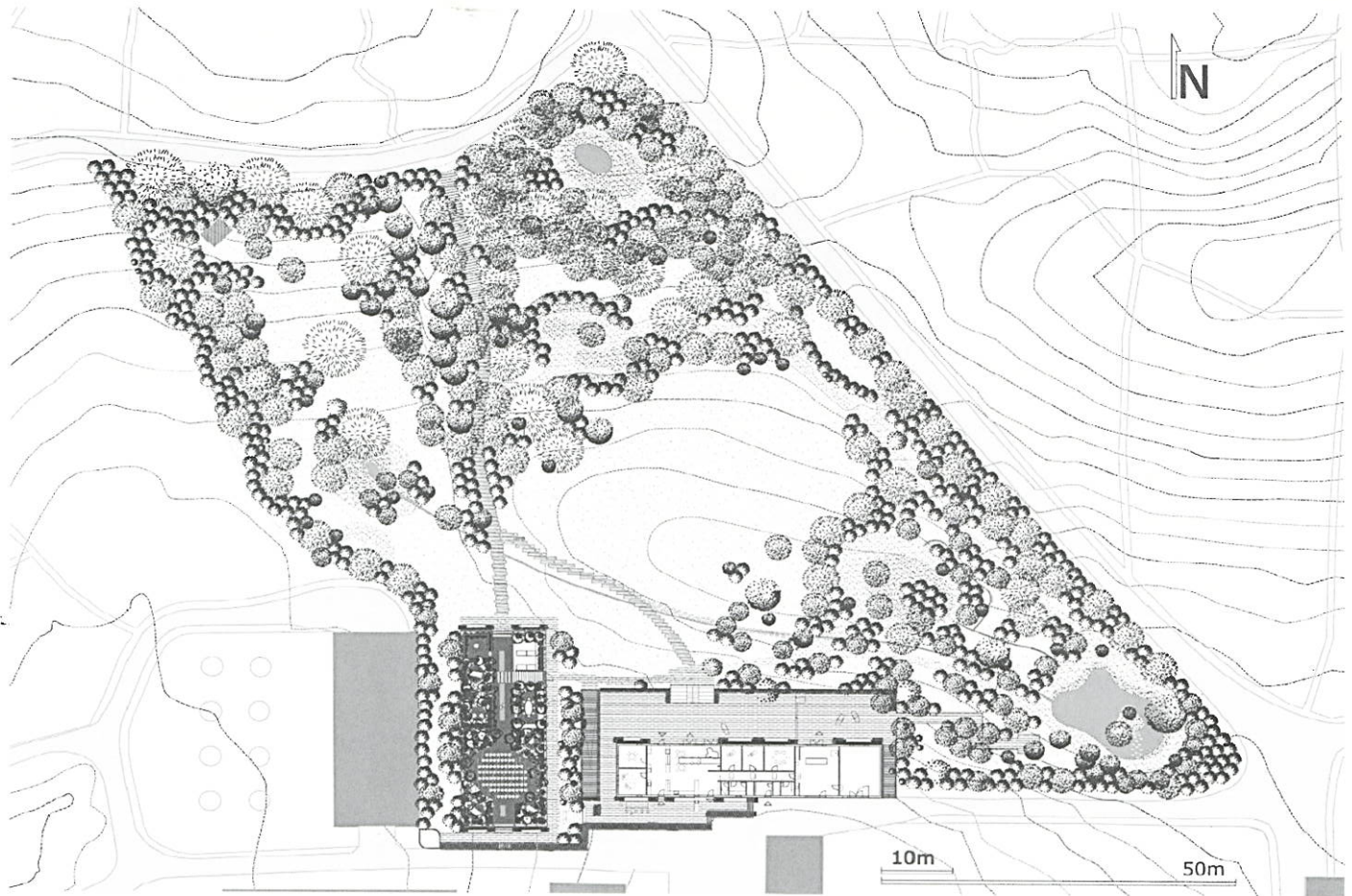


Figure 1: Design of the healing forest garden at Nacadia.

The Nacadia project builds on the experiences, knowledge, and results obtained from Alnarp.

THE HEALING FOREST GARDEN NACADIA

The Nacadia project has four objectives, the two main objectives being to: a) provide treatment for patients with stress-related illness; and b) obtain evidence-based knowledge about the effect of healing garden design and nature-based therapy for this patient group. The two other objectives are to: c) develop and offer education within the field of healing garden design and NBT in general; and d) serve as a knowledge and demonstration center for the public.

The design of Nacadia and the NBT concept was developed from 2007-2009 by an interdisciplinary group at the University of Copenhagen, lead by landscape architect Ulrika Stigsdotter. The group

includes landscape architects, medical doctors, psychologists, and therapists with expertise in the field of nature-based therapy and stress treatment.

The therapy to be conducted in Nacadia is called nature-based therapy. This term is chosen as an umbrella term for therapy based on experiences and activities in a nature setting, which is specifically designed to support the treatment process (see next section: Design). Nacadia will be constructed during the spring of 2010, and the first patients are expected during the following summer. Both public communal and private insurance agencies have committed to financially support Nacadia by prescribing the treatment to their patients and covering the costs.

Nacadia will be constructed on a one hectare (2.5 acres) parcel in the Hørsholm Arboretum, which is located 30 km (18.6 miles) north of Copenhagen. The Hørsholm Arboretum covers almost 40 hectares (99 acres) and

contains the largest collection of plants and shrubs in Scandinavia, with over 2,000 different species (Jensen, 1994). Nacadia will be located in the North American and North European parts of the arboretum, which have the characteristics of a well-established forest including mature, tall trees and lush vegetation. There is also a spacious greenhouse and a gardener's building on the grounds. The greenhouse will be an important setting for therapy programming, especially during the winter, and the gardener's building will serve as office space for therapists and researchers. Most of the treatment will take place outdoors in the garden. A small shelter will be built for individual sessions between patient and therapist and as a room where the patient can seek private refuge.

The Design

Nacadia will be characterized as a behavioral setting - a place where the physical environment and human behavior are indissolubly connected (Bell, Greene, Fisher & Baum, 2001). In terms of the design of Nacadia, evidence-based guidelines for healing garden design have been implemented based on seven years of documented experience from the Alnarp Rehabilitation Garden in Sweden (Stigsdotter & Grahn, 2003; Stigsdotter, 2005; Grahn, et al., in publication) and other European healing garden projects (Grahn, Tenngart & Stigsdotter, 2007, Nilsson, 2009) and further developed with regard to testing new hypotheses concerning its restorative and health-supporting benefits.

Figure 1 shows the design of Nacadia. It is characterized as a healing forest garden, which could be described as a garden with a natural forest appearance, based on the presence of trees, shrubs, and perennial plants. A forest garden is often described as being three dimensional, as vegetation grows in several layers (Hart, 2001). These layers and their three dimensional appearance are intended to create the feeling of a room with floor, walls, and ceiling made up by living nature materials that is thought to enhance the feeling of being totally submerged in nature, thereby supporting the healing process. The layers also provide diverse harvest opportunities, which will change during the season. Once the forest garden is established as a functional ecosystem, it requires very little maintenance. The entrance to Nacadia is located at the north edge, from which there is a path running south toward the greenhouse located in the south-west

corner. The path also leads to the gardener's building, which is located next to the greenhouse, on the east side.

New research shows that people suffering from stress prefer nature environments that provide the experience of wild, free growing, and untouched nature that expresses serenity and refuge by offering the feeling of retreat, safeness and being one with nature, as well as richness in species in the form of variety of both plant and animal life (Grahn & Stigsdotter, 2009). These findings are in keeping with experiences from Alnarp, which show that patients prefer to spend time alone in the more secluded, wild, and serene areas at the beginning of the therapy, and often seek out these areas during the entire duration of the therapy (Palsdottir, 2009). This evidence influenced the decision to locate Nacadia within the forest-like arboretum and Nacadia's design is planned in accordance, offering possibilities to walk, sit, and be alone while being surrounded by a serene and diverse nature environment.

In the design of Alnarp, researchers Stigsdotter and Grahn (2002, 2003) describe how different stages of mental strength are thought to be related to the need for different environmental experiences and the ability to socially interact. The term mental strength refers to the interconnected emotional and cognitive resources available to a person at a given moment. When a person experiences loss of emotional and cognitive resources, due to mental fatigue and stress, for example, it affects his or her overall ability to think, learn, and socially interact and it makes the person very vulnerable to negative mood change and anxiety (LeDoux, 1998; Aldwin, 2007). Stigsdotter and Grahn (2002) set forth that when a person is experiencing low mental strength it is accompanied by a greater need for being alone and surrounded by serene and wild nature environments. It is further thought that when the level of mental strength rises the ability to interact socially and be in more demanding environments rises as well, and the need for serene and quiet nature environments declines (Figure 2). This interconnection between mental strength, nature environments, and social interaction is illustrated in Figure 2.

This model was integrated into the design of Alnarp (Stigsdotter & Grahn, 2003). Experiences at Alnarp support the hypothesis that different stages of mental

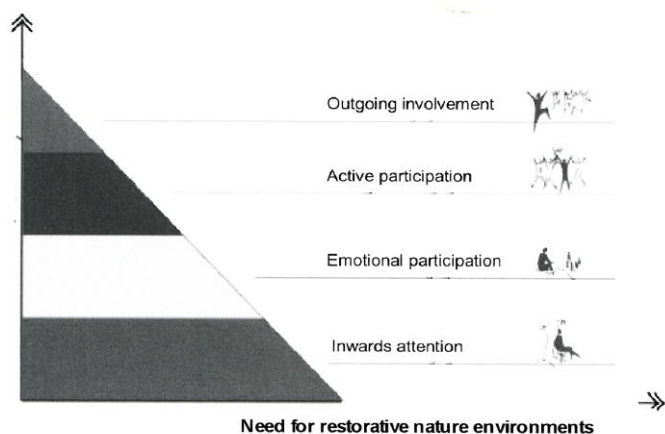


Figure 2: Interconnection between mental strength, nature environments, and social interaction. Modification of Stigsdotter and Grahn's (2002, p.64) model.

strength are related to the need for different nature experiences, but they also reveal that the more mentally demanding areas in the form of an open courtyard, with large risk of social encounters, and a highly cultivated garden area were located too close to the entrance and the main building; patients found the spaces disturbing and difficult to handle emotionally. The knowledge gained from those spatial relationships has been integrated into the design of Nacadia, to better fit patients' needs by incorporating a large serene nature environment with small paths that encircles most of the garden and provides the feeling of refuge (Area 1 in Figure 3). The shape of this low demand area makes it possible for the patient to move from the entrance to the greenhouse and around in the garden without needing to cross open areas or areas with high levels of social interaction and activity. Figure 3 shows the levels of mental strength and social interaction that the different garden areas are designed to support.

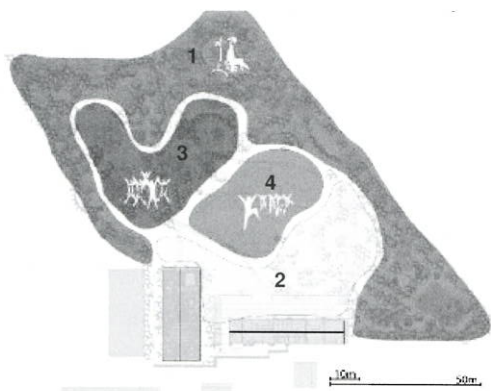


Figure 3: The relationship between mental strength and garden rooms in Nacadia.

Area 1

Area 1 encircles most of the garden and is primarily characterized by being serene, rich in species, and imbued with the feeling of refuge. It is seen as the least demanding area for the patient. The therapeutic activities that will take place in this area are mainly related to private sensory experiences had while walking, sitting, and picking berries as well as other less demanding activities. It is designed to include small paths and places to sit alone and experience nature.

Area 2

In front of the greenhouse and gardeners' building is Area 2 and includes the forest garden, which is seen as more demanding since it is a place for horticultural activities with a higher level of therapeutic guidance and more social interaction than Area 1. Activities here include planting seeds, re-potting plants, preparing the grounds, general care and maintenance of the vegetation, cutting flowers, and harvesting fruits and vegetables.

Area 3

Area 3 is seen as even more demanding than Area 2 in regard to mental strength, as it is more open and designed for larger projects than in the forest garden. Here the patients carry out free projects toward the end of the therapy. Depending on their mental and physical strength the project could consist of making a small pond or decoration, or even a tree house.

Area 4

The last area, Area 4, contains the meadow, which is a flat open space. Since there is no refuge here and one is easily seen and encountered this is considered the most demanding area for a patient with low emotional and cognitive capacity.

The design of the greenhouse, located in the southwest corner, includes small versions of the different garden areas/outdoor rooms, offering both places to sit and relax alone as well as places for various horticultural activities and social gatherings.

It is expected that the patients will be very low in mental strength when they arrive at Nacadia. Therefore it is thought that at the outset they will prefer the areas which provide safety, serene nature, and less chance of social interaction. During the rehabilitation process,

it is expected that their preferences will change and also differ from patient to patient. The patients' use of and preference for different garden areas during rehabilitation will be the subject of research conducted through observations and interviews with the patients.

THE NATURE-BASED THERAPY CONCEPT

The nature-based therapy (NBT) concept is defined as the theoretical delimitation of the therapy in relation to the outlook for the patient, the treatment theory of the program, the overall goals for the patient, and the overall means, which are based on activities and experience in Nacadia's nature environment. The NBT concept has been operationalized into the NBT program, which involves the planning of the therapy relating to the structure of the ten-week treatment, operational goals, and operational means for achieving the goals. The program is the basis for the activity manual. The activity manual includes a description of the daily nature-based activity, its specified goals and means, methods, supplies, procedures, and evaluation tools (see Haller & Kramer, 2006). The nature-based activities described in the activity manual will be intended to apply to the whole patient group, but will be adapted to individual patient needs.

The circle around the NBT concept indicates that this is the main focus of this paper.

The arrows symbolize the interrelationship between the different elements. The arrows pointing left indicate that the program and activity manual has been developed based on the NBT concept. Once the program is operating the patients' actual experiences will be evaluated and used to refine the NBT concept and program, creating an influence in the reverse direction, indicated in the figure by the arrows pointing to the right.

The NBT concept at Nacadia has a salutogenic treatment perspective, which means the focus is on developing and strengthening patient capacities as a means to overcome the illness and enhance their overall life quality (Antonovsky, 1987, 1996). One prerequisite for choosing the appropriate treatment theory and setting treatment goals is to obtain knowledge about the specific patient group, their problems, and needs.

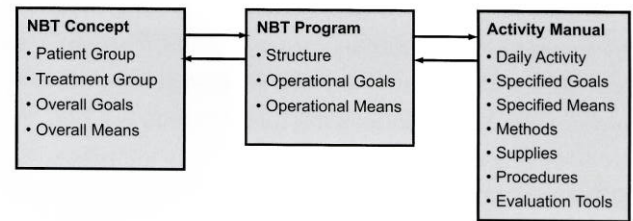


Figure 4: The content of and relationship between the NBT concept, NBT program, activity manual, and therapy.

The Patient Group

Nacadia is designed for the treatment of people on sick leave due to stress-related illnesses, including burnout and fatigue caused by stress (Millet, 2009). The stress diagnosis is based on multidimensional symptoms (Jones & Bright, 2001; Aldwin, 2007). Usually the patient's first interaction with the healthcare system is at a consultation with the family doctor, who provides a diagnosis. This diagnosis is later evaluated by medical doctors connected to the health insurance organization. Nacadia is linked to a private clinic specializing in stress-related illness that has medical responsibility for the patients who will be treated in Nacadia. The medical doctors at the clinic also examine the patient before starting the treatment in Nacadia to ensure that the illness is mainly stress related.

The patients on sick leave due to stress-related illness have usually been exposed to stress over long periods without opportunities for mental restoration, which may have led to impairments in the patient's cognitive, emotional, and physiological state (Lovallo & Thomas, 2000). Prolonged stress may lead to impaired resources for concentration, learning, and knowledge recall (LeDoux, 1998), as well as impaired body awareness and sensory experiences (Gade, 1997). Emotionally, stress is often accompanied by feelings of anxiety, lack of energy, bad mood, and even depression (Brinch, Bøgeskov & Elleman, 2002). On the physiological level, the constant release of stress hormones may lead to cardiovascular imbalances and sleeping trouble, and it weakens the body's physical condition and immune system, making one vulnerable to other diseases (Brownley, Hurwitz & Schneiderman, 2000; Cacioppo & Bentson, 2007). This loss of multidimensional resources affects the patient's overall ability to function in everyday life (Lovallo & Thomas, 2000; Cacioppo & Bentson, 2007).

The Overall Goals of the Treatment

The overall success criterion for NBT is measured by the patient's experience of improved life quality and ability to return to work or studies at the end of the treatment. Underlying this criterion are two treatment goals: 1) to help patients recover their impaired cognitive and emotional capacity and their physiological and physical condition (Jones & Bright, 2001; Millet, 2009); and 2) to enhance their capacity to deal with future strain (Iversen, 2007; Millet, 2009).

The Treatment Theory

The treatment theory draws a psychological framework around the treatment. In several countries cognitive therapy is recommended for treating people with stress-related illness (The Netherlands: Van der Klink & van Dijk, 2003; United Kingdom: National Institute for Clinical Excellence, 2005; Sweden: Socialstyrelsen, 2009), including Denmark (Nielsen & Kristensen, 2007). Based on these recommendations, a cognitive approach has been chosen as the treatment theory of Nacadia.

In cognitive theory, the self is seen as contextual, meaning that the human being is constantly appraising situations and adapting to the environment. The individual's appraisal is based on his or her personal values, goals, and prior experiences – all of which have created patterns of thoughts and reactions that are activated by the situation (Lazarus & Folkman, 1984; Lazarus, 1999). Traditional cognitive therapy is based on gaining control over thoughts as a prerequisite for modifying or changing 'maladaptive' thoughts (Bond & Bounce, 2000; Iversen, 2007). Brain research has shown that the disadvantage of this classic cognitive approach is that it is very difficult to change mental thought patterns by gaining analytical insight into them (Gade, 1997; LeDoux, 1998). Therefore, the Nacadia project team decided to base the treatment on new cognitive rehabilitation initiatives that take current knowledge of brain functioning into account.

This so-called third generation of cognitive approaches to treating patients with stress-related illness draws on mindfulness theory (Iversen, 2007; Crane, 2009; Roemer & Orsillo, 2009), which is a sensory integrating theory of attention (Baer, 2003). Mindfulness is defined as monitoring awareness of experiences as they unfold, and accepting them as part of the present

moment (Brown & Ryan, 2004). The theory is derived from Buddhist meditation, but has been developed into a non-spiritual treatment approach (Kabat-Zinn, 2001) with great evidence-based potential for treating stress by introducing positive emotions and facilitating cognitive and physiological restoration (Chang, Palesh & Caldwell, 2004; Grossman, Niemann, Smidt & Walach, 2004; Baer, 2003). The main goal of mindfulness activities is to achieve acceptance of the present moment by paying non-judgemental attention to events (Kabat-Zinn, 2001). This accepting stance prevents the individual from being carried away by a particular event and the accompanying automatic thoughts and emotions, which might lead to stress.

Acceptance and Commitment Theory (ACT) and Mindfulness-Based Cognitive Therapy (MBCT) are two of the most well-established evidence-based theories among these new mindfulness-based cognitive approaches, which work with acceptance and psychological flexibility, and they are very alike in their approach (Iversen, 2007; Roemer & Orsillo, 2009). In ACT, the therapy consists of six clearly described elements (Hayes, Strosahl & Wilson, 1999; Hayes, Strosahl, Bunting, Twohig & Wilson, 2004), which have been chosen as the foundation for the treatment in Nacadia. The six elements are:

- **Present moment:** Experience of the moment here and now without resentment or judgement, actively embracing the experience as it is happening.
- **Acceptance:** Accept the present moment fully, moving toward the emotions and sensations instead of away from them.
- **Diffusion:** Be an observer of one's own emotions and thoughts as a tool to turning potentially stressful events into something more manageable and less frightening. In ACT, it is believed that it is not the thoughts themselves that are causing stress, but the fact that we identify with them, thereby creating avoidances, repulsions, and frightening future scenarios.
- **Self as context:** Access the position of a transcendent self in the situation, moving two steps away from the action to create space to spot dissonance between experiences,

values, and current actions.

- **Values:** Consider what one finds important in life as the basis for setting up goals that serve as a compass in actions.
- **Committed action:** Decide on and pursue actions that lead toward one's goals and thereby hopefully enhance the feeling of meaning and coherence in one's actions. A part of committed action is accepting that challenges are part of life and will emerge on the path toward one's goals.

These six elements are interconnected and will be brought into play by the nature-based therapeutic means that are part of Nacadia's behavioral setting, which will be described in the following section.

The Overall Nature-Based Means

Three nature-based means will be employed in the therapy: sensory experiences, horticultural activities, and nature-related stories and symbols. The content of these means and their integration with the described mindfulness-based cognitive theory are as follows:

Sensory experiences. Nature environments include diverse sensory stimulations, making them ideal places for working with body awareness and mindful presence as a means to restore emotional and physiological capacity (Østergaard, 2007). Research has shown that experiences of sensations from non-threatening nature environments can promote automatic relaxation of the nervous system and restoration of cognitive resources (e.g., Ulrich, 1993, 1999; Tennessen & Cimprich, 1995; Parson & Hartig, 2000; Berman, Jonides & Kaplan, 2008). According to the Kaplans' attention restoration theory, cognitive resources are restored by the automatic use of soft fascination in nature environments (Kaplan & Kaplan, 1989; Kaplan, 1995), where soft fascination is a mental state very similar to that promoted in mindfulness exercises (Kaplan, 2001). The use of mindfulness exercises in a healing garden environment with diverse sensory stimulations is expected to enhance the relaxation potential of the environment and the patient's experience of presence in the moment. These relaxing and sensory-based experiences will be used as a foundation for working with acceptance of the present moment, which is assumed to be easier in

pleasant, relaxing surroundings. The guided therapeutic work with sensory experiences will take place mostly in Areas 1 and 2 (Figure 3). An example of the therapeutic use of sensory experiences is provided in Appendix A.

Horticultural activities. Using horticultural activities in the rehabilitation process as a therapeutic means has potential for facilitating positive change in that such activities may be experienced as meaningful and intrinsically rewarding (Simson & Strauss, 1998; Relf, 2005; Haller & Kramer, 2006). Furthermore, active work with plant material may enhance the sensory experiences. The theory behind the therapeutic use of horticultural activities derives from occupational theory (Stigsdotter & Grahn, 2002). In the therapy, horticultural activities will be used as a means for incorporating mindful presence by emphasizing some specific sensory experiences while performing the horticultural activities. Midway into the therapy, the work with diffusion and self as context will be incorporated into the activities by using the horticultural activities as stepping stones for guided therapeutic talks between the therapist and the patients while performing the activity. The talks take place between the individual patient and the therapist as well as the whole group and the therapist depending on the activity and the situation. The therapist bases the therapeutic talk on the patients' sharing of feelings and thoughts that arise during the activities initiated by the therapist. The diversity of horticultural activities can further be shaped to suit different performance capacities and interests, thereby matching the patient's capacities, needs, and interests. An example of the therapeutic use of horticultural activities is provided in Appendix A.

Nature-based stories and symbols. As previously mentioned, Nacadia is located in a forest-like area and thereby provides a diverse nature environment that can be explored for its meaning in relation to important topics such as life, care, nurturing, development, and change by the use of metaphors, symbols, poems, and stories (Berger & MCleod, 2006; Ottosson, 2007; Grahn, et al., 2010). A central aspect of the nature-based therapy at Nacadia is to create a bridge of parallels between the processes in nature and the patient's own life situation, thereby evoking acceptance, understanding, and positive change. Enhancing the relation to nature through stories, metaphors, poems, and symbolism is thought to provide an opportunity

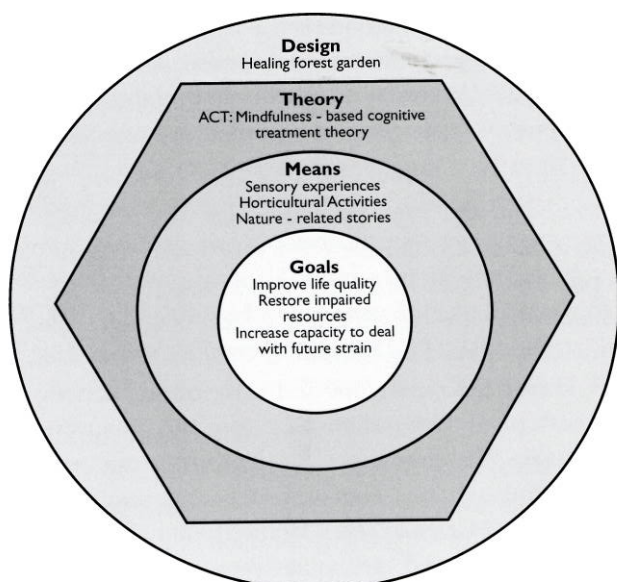


Figure 5: Nacadia's NBT concept.

for personal insight on both the cognitive and intuitive level (Grahn, et al., 2010). In ACT (Acceptance and Commitment Theory), the use of stories, metaphors, and symbols is also regarded as an important therapeutic means of creating change (Hayes et al., 2004).

Inspiration for working with nature-related stories and symbols can be found in the literature (e.g. Kornfield & Feldman, 1997; Kabat-Zinn, 2004, Anh-Huong & Hanh, 2006; Coleman, 2006) or in communications with gardeners, as they are often a good source of stories about nature events that can be used therapeutically. One example comes from the Buddhist monk Thich Nhat Hanh, who draws on the metaphorical meaning of planting a seed (see the therapeutic use of this text in Appendix A):

Your mind is like a piece of land planted with many different kinds of seeds: seeds of joy, peace, mindfulness, understanding, and love; seeds of craving, anger, fear, hate and forgetfulness. These wholesome and unwholesome seeds are always there, sleeping in the soil of your mind. The quality of your life depends on which seeds you water. If you plant tomato seeds in your garden, tomatoes will grow. Just so, if you water a seed of peace in your mind, peace will

grow. When the seeds of happiness in you are watered, you will become happy. When the seed of anger in you is watered, you will become angry. The seeds that are watered frequently are those that will grow strong. (Hanh in Anh-Huong & Hanh, 2006, p.22)

The Nacadia NBT Concept

The above description of the patient group, treatment theory, goals, and means together constitute the Nacadia NBT concept. In nature-based therapy, the environment is never just a background; it is the catalyst for the therapeutic process, and therefore is represented as the outer ring in the diagram in Figure 5. The hexagon represents the mindfulness-based cognitive treatment theory, the six sides symbolizing the six steps in ACT. The nature-based therapeutic means (sensory experiences, horticultural activities, and nature-related stories) are contained in the third ring. The center ring includes the treatment goals of improving life quality, restoring impaired resources, and gaining tools to deal with future strain, which constitute the aim of the treatment.

THE NATURE-BASED THERAPY PROGRAM

Based on the NBT concept, the NBT program has been developed that includes the structure of the ten-week therapeutic treatment along with the operational goals and operational means (see Table 1).

Structure

The therapy program will last ten weeks, with three hours of therapy in the morning or afternoon on the days the patients are in the healing garden. There will be a maximum of eight patients in each session, who start the program at the same time, with a ratio of one therapist to four patients. During the first week, the patients will attend therapy two days. This timeframe was chosen because patients' energy levels are typically very low in the beginning, and starting therapy with other patients while commuting back and forth can be exhausting (Stigsdotter & Grahn, 2002). In the second week patients will attend therapy three days and during the following six weeks the patients will be in Nacadia four days a week, based on the assumption that they will now be feeling safe, more restored, and have more energy to commute from their home to Nacadia.

In the final two weeks, the patients will gradually withdraw from the therapy, attending three days in the ninth week and two days in the tenth and final week. The timeframe for the last two weeks was chosen based on the assumption that the patients should be ready to start activities outside therapy, such as returning to work or studies while still having the support of being in therapy. In the last two weeks of treatment, the therapists will establish contact with local coaches in the areas where patients live. These coaches work at public employment agencies specializing in work and education issues and they will support the patients' transition back to work or other activities.

After the treatment, there will be follow-up sessions with the patients at intervals of one month, three months, and six months, at which time the patients return to Nacadia for one day. In these follow-up sessions the patients participate in a three hour therapy session together with their old group. The therapy session will be similar to the sessions they attended during the therapy.

Themes

The treatment is divided into three themes. Each theme involves two of the elements from mindfulness-based cognitive theory, ACT. These outlined themes, their timeline, and their content are dependent on the needs of the individual patient and should be seen as guidelines for the therapeutic process.

The first theme, "Relaxation & New Beginnings," involves work with presence and acceptance, which will be introduced through pleasant experiences, as they are more easily embraced and accepted. It is assumed that patients will be very weak on all levels when they begin therapy, and therefore in great need of simply feeling the healing effect of being in the garden environment. For this reason, relaxation will be the main focus for the first three weeks, and then more guided work with acceptance will be gradually introduced. The theme of relaxation runs through all of the therapy as it is a vital component of the treatment goals. The means introduced in this theme will therefore be used throughout the whole program.

In the next theme, "Grounding and Strength," the therapeutic work with diffusion and seeing the self as

context as tools to turning potentially stressful events into something manageable and less frightening are vital aspects. It is expected that, at this point, the patients will have regained some of their mental strength and be able to commit to more in-depth therapeutic work. Working with these elements can be very challenging as they reveal how we automatically think and act, but this is important in stepping outside the stress patterns and spirals in one's life (Lazarus, 1999; Bond & Bounce, 2000). This therapeutic work will therefore be carried out in small steps mixed with nature-based relaxation activities and with considerable support from the therapists. There will also be opportunities for individual sessions with a psychologist at Nacadia. The safe nature environment and the possibility to shape the nature-based activities according to the patient's capacity makes it an ideal setting for initiating therapeutic work with these challenging issues. Further, the use of nature-based stories can be used as a catalyst for the patient's reflection on his or her own life situation.

The last theme, "Growth and New Paths," involves committed action and value clarification. Committed action refers to the ability of sustaining the chosen value-based action even in the face of challenges (Hayes, et al., 2004). The assumption is that if one's actions are clearly based on personal values and goals, they may gain greater purpose, meaning, and coherence for one's self, thereby leading to less stress. Value clarification and goal setting can be a hard process for patients, as they are based on choices, judgements, and evaluations. If the goals are to be achieved, they must be realistic and suited to the individual's current resources (Hayes, et al., 2004). This theme requires a great deal of therapeutic guidance from therapists and there will be opportunities to talk individually with a psychologist. It is anticipated that during the ten weeks of treatment a dynamic of support within the group will be built up that can serve as an additional support in the process of value clarification and starting committed action. This in-group support may be helpful when returning to work, finding a new job, starting studies, or other actions.

Daily Schedule

Each day will begin and end with a group session. It will be a social gathering but the social interaction during the gathering will be kept to a minimum in the beginning

Week	Theme	Operational Goals	Operational Means
1-10	Relaxation & New Beginnings	<ul style="list-style-type: none"> a) Promote relaxation in the autonomous nervous system. b) Promote body awareness. c) Promote relaxation and learn relaxation techniques. Train social interaction. d) Enhance muscular toning. e) Enhance ability to concentrate and use mindful attention to a task. f) Initiate reflection and acceptance of life situation. g) Initiate personal development process on the way to gaining greater life quality 	<ul style="list-style-type: none"> a) Patients have time on their own to get to know the grounds, spend time in the garden, and discover favorite places of refuge. b) Slow walking and meditation in the garden. c) Body and breath relaxation sitting or lying around the fire in the forest, laying on hay in the greenhouse or in the grass outside if it is warm weather. d) Easy body awareness and stretching exercises with parallels to nature processes, e.g. stretching like a flower growing from the ground up to meet the sun. e) Easy horticultural activities, e.g. planting fast growing seeds and harvesting fruits and vegetables. f) Therapist reads nature-related stories that are used for personal reflection and integrated into the horticultural activities. g) Individual photo documentation of nature elements the patients can relate to and feel are inspiring. The photos are used to begin their own personal journal.

Week	Theme	Operational Goals	Operational Means
4-8	Grounding & Finding Strength	<ul style="list-style-type: none"> a) Examination and understanding of the way automatic thoughts and emotions can lead to stress through guidance from the therapists. Train ability to step away from the situation for a moment to evaluate one's thoughts and actions. b) Enhance muscle tone and body awareness. c) Train the feeling of self-efficacy and safety. d) Personal development process on the way to gaining greater life quality. e) Guidance in the patient's individual therapeutic process with focus on the work in goal A above. 	<ul style="list-style-type: none"> a) Horticultural activities with different levels of complexity and social interaction such as transplanting young seedlings, where one has to be very careful about not destroying the root network and caring for planted areas in regard to fertilizing, pruning, etc. b) Physically demanding horticultural activities designed to suit the patient's capacity; e.g. chopping wood, clearing areas to be replanted, etc. c) Longer individual meditative walks extended to the whole arboretum and not just inside the enclosed area of Nacardia, thereby introducing possible encounters with other people. d) Collecting objects for journal and/or using the journal for writing. e) Possibility for individual sessions with psychologist in the small shelter or another place in the garden that the patient chooses.

Week	Theme	Operational Goals	Operational Means
7-10	Growth and Values	<ul style="list-style-type: none"> a) Value clarification b) Train psychological flexibility through the use of all the previous elements in ACT. Enhance feeling of self-efficacy. c) Begin integration back into an active life in society with work, studies, or other activities based on the client's individual values and goals. 	<ul style="list-style-type: none"> a) Use of short nature-based stories, diverse horticultural activities, photo taking, and journals as a basis for therapeutic group and individual talks about values and goals. b) Larger and more free horticultural activities and garden projects alone or in cooperation with other patients. c) Support patients in taking up activities outside the therapy setting through individual therapeutic talks with psychologist and therapists. If relevant, involve job agencies and support job assessment and planning in cooperation with present workplace or new workplace, or establish contact with educational institution.

Table 1: Therapy Program: Structure, operational goals, and operational means.

of the therapy since the patients will be weak in mental strength. This will be achieved by creating a social room around an object like the fire, which the patients can share by sitting together and watching without the pressure of engaging in conversation. The mornings in Denmark are usually quite cold except in July and August, therefore the fireplace can be used most of the year. In the opening session, the patients have time to tune into the day after the commute. Usually the therapist will read or tell a small story related to nature, which might function as a pleasant introduction to the therapeutic work during the day. This gathering will be followed by a communal relaxation, sensory, and/or a body awareness exercise. Then horticultural activities or other garden experiences will follow. The day will end with a gathering at which patients and therapists can share the experiences of the day, followed by a short relaxation exercise. This is a proposed structure that will be adjusted according to patients' needs. See Appendix A for a one-day session example from the activity manual.

Evaluation

All activities are optional for the patients; they should be seen as invitations they are encouraged to accept. If the patients do not wish to join activities or if the goals fail to be achieved even though the patients participate, this could indicate that the activities either are not appropriate for or interesting to the patients or that they are not well suited to the desired goals. This patient-activity-goal fit will be the subject of the action research carried out by the therapists. Action research is here defined as the therapists' observation of patients.

The effect of the single activities on the patients will not be formally evaluated or tested; it would be too demanding both for patients and staff if each change were to be measured. After the end of each therapy session, the therapists will evaluate the success of the goals for each patient based on their impressions during the day and conversations with the patients. Their evaluation is written down in each patient's file. These evaluations will be discussed with the patients in interviews during the therapy to ensure there is accordance between the therapists' observations and the patient's own assessment of the effect. A few times during the therapy there will be effect studies of a single activity, to evaluate the fit between observed effect and measured effect in relation

to the goal. These methods are also employed to attain further knowledge about what constitutes the effect of nature-based therapy and how it can be improved.

RESEARCH PERSPECTIVES

There is a need for more comprehensive quantitative research into the effect of nature-based therapy (Nilsson, Baines & Konijnendijk, 2007) since most research to date has been qualitative and does not often provide comparable results of the treatment effect (Grahm, et al., 2007). Therefore one of the objectives of the Nacadia project is conducting quantitative effect studies comparing nature-based treatment with treatment as usual in a conventional clinical setting. There are difficulties in conducting comparable research between two treatments with so many unlike variables to account for, so an important goal in planning this research has been that the cost benefit variable will be comparable. This has been achieved by choosing to compare the nature-based treatment in Nacadia with a conventional treatment at a public stress clinic that has the same patient cost. The effect study will be designed as a randomized longitudinal clinical trial consisting of measurements of the same items over a longer period of time where the researchers will measure the change in cognitive, emotional, physiological, and physical condition using clinical tests and validated questionnaires. The appropriate interval at which to apply these measurements during therapy has not yet been determined. Researchers employed at the University of Copenhagen and the medical doctors at the Kalmia stress clinic will be conducting the effect studies. The data collection will run over several years with follow-up studies of the patients 12 weeks after the end of the treatment and then at a one year interval, which will provide insight into long-term effect of the two treatments. The results from the Nacadia effect study will be compared to the results from Alnarp. It is hoped that more comprehensive and comparable research can pave the way to wider acceptance and financial support in the area of nature-based therapy and healing gardens in the future.

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Appendix A:**One-day session example from the second week of therapy.**

The theme is "Restoration and New Beginnings" (see NBT program).

Time Guide	Activity / Specific Means	Specific Goal	Method	Procedures
09:00 - 09:15	Arriving and gathering	Gathering the patients.	Individual transport and arrival to Nacadia.	The patients arrive to Nacadia. They change into the provided outdoor clothing and walk to the gathering area that is at the outside fire area near the greenhouse. There is hot tea and juice that they can bring with them to the fire.
09:15 - 09:40	Relaxation and body awareness activity using sensory stimulation from nature and inwards attention.	Relax the nervous system: Shift activity to the parasympathetic nervous system for 20 minutes. Train ability to hold mindful attention for short periods of 4-5 minutes.	Therapist-guided relaxation activity.	The patients are invited to take a comfortable seat or lie on thermo mats around the fire. The therapist asks the patients to pay attention to the meeting points between the body and the ground, then to focus their attention on the different sounds and tactile stimulations from the environment, like the feeling of the air touching the skin. The therapist continues by turning the patients' attention to their breath, then naming the different body parts and asking the patients to use their attention to mentally follow the naming, moving around in their own body.
09:40 - 10:00	Reading aloud from a text based on nature-related symbols.	Individual reflection on what good quality of life means.	Therapist reads aloud followed by individual reflection and writing.	The therapist reads aloud a text written by the monk Thich Nhat Hanh about planting seeds (see quote under the Nature-Based Stories and Symbols section). Patients are given time to reflect on the meaning of the text. They are invited to write or silently name the seeds they feel are unhealthy for them that they will not mentally water and they can give them to the fire symbolically in the form of paper to burn. The patients are then invited to reflect on which seeds they would like to plant in themselves for future care and watering.
10:00 - 11:00	Preparing soil and planting seeds.	Train attention span. Focused attention on activity for 10 minutes at a time. Reflection on good quality of life. Enhance body awareness in the hands.	Horticultural activity of preparing soil and planting seeds.	The patients are invited to join a seed planting activity. They are instructed on how to prepare the seeds and the ground. Therapist and patients join together in the activity. The therapist links the horticultural activity to the previous text reading by encouraging the patients to care for the seeds as if they were the mental seeds they have just decided to plant in themselves. The therapist initiates a discussion about why some seeds start growing and some do not, what they need in terms of care, and how the circumstances affect the success of the seeds we plant (sometimes the time isn't right for the seeds due to weather or other uncontrollable conditions that inhibit seed growth). It is important that the therapist guide the discussion in a positive direction and emphasize that we can plant new seeds – there is always a second chance. The seeds are planted in a joint plant bed so the patients don't get anxious about whether their own seeds will grow. They are planted outside in the forest garden or inside in the greenhouse depending on the weather.

Appendix A (con't.):**One-day session example from the second week of therapy.**

The theme is "Restoration and New Beginnings" (see NBT program).

Time Guide	Activity / Specific Means	Specific Goal	Method	Procedures
11:00 - 11:30	Individual time in the garden walking, sitting, or writing in diary.	Relax the nervous system: Shift activity to the parasympathetic nervous system for 30 minutes. Relax the cognitive functions: Shift to soft fascination.	Individual methods.	Individual walking, sitting, experiencing the different sensations in the garden, and/or writing in journal. It is possible to continue the seed planting activity if anyone wishes to do so.
11:30 - 11:50	Gathering, sharing experiences and thoughts.	Joint learning by sharing experiences and thoughts in a safe and well-defined social environment with minimum social interaction.	Each patient has the possibility to share a short experience or thought from the day.	A bell will ring to indicate the start of the gathering. This is the only time the bell is used during the day; otherwise there are no time indications. The patients go to the meeting area at the fire area to end the day together. The therapist initiates the joint sharing by taking a small round stone in his or her hands and sharing a thought, then passing the stone to the patient on the right. The patient shares a thought or experience and then passes the stone on to the next patient. If a patient doesn't feel like talking they just pass the stone on. It is possible to share in other ways than talking; for example, an object can be brought from the garden to share without speech. The patients' words and sharing are not commented on by the other patients. Only the one holding the stone may speak.
11:50 - 12:00	Relaxation activity.	Relax the nervous system: Shift activity to the parasympathetic nervous system for 5 minutes. Enhance body awareness of the hands. Extend the therapeutic activities outside Nacadia by bringing home seeds.	The therapist guides a short relaxation activity that includes seeds.	The therapist passes a basket with leftover seeds from the horticultural activity around and invites the patients to pick some to hold in their hands during the relaxation activity and to take home with them to plant. The patients are invited to take a comfortable seat. The therapist uses the same technique as in the morning to relax and focus the patients' attention, but this time the exercise is shorter and with emphasis on the sensation of the seeds in the patients' hands.

Specific Goals in the One-Day Session Example

The reoccurring goal this day is to enhance relaxation of the nervous system. This goal is present in almost all the activities, but especially in the guided relaxation activities at the gatherings and during the private time in the garden. The other primary goal is to initiate the therapeutic process of positive change by reflection on what is involved in seeking a better quality of life; here, the use of a nature-related text and the subsequent horticultural activity play important roles as therapeutic means. All activities are optional for the patients and should be seen as invitations they are encouraged to accept.