



The Therapy Garden Nacadia®

The interplay between evidence-based health design in landscape architecture, nature-based therapy and the individual

Sidenius, Ulrik

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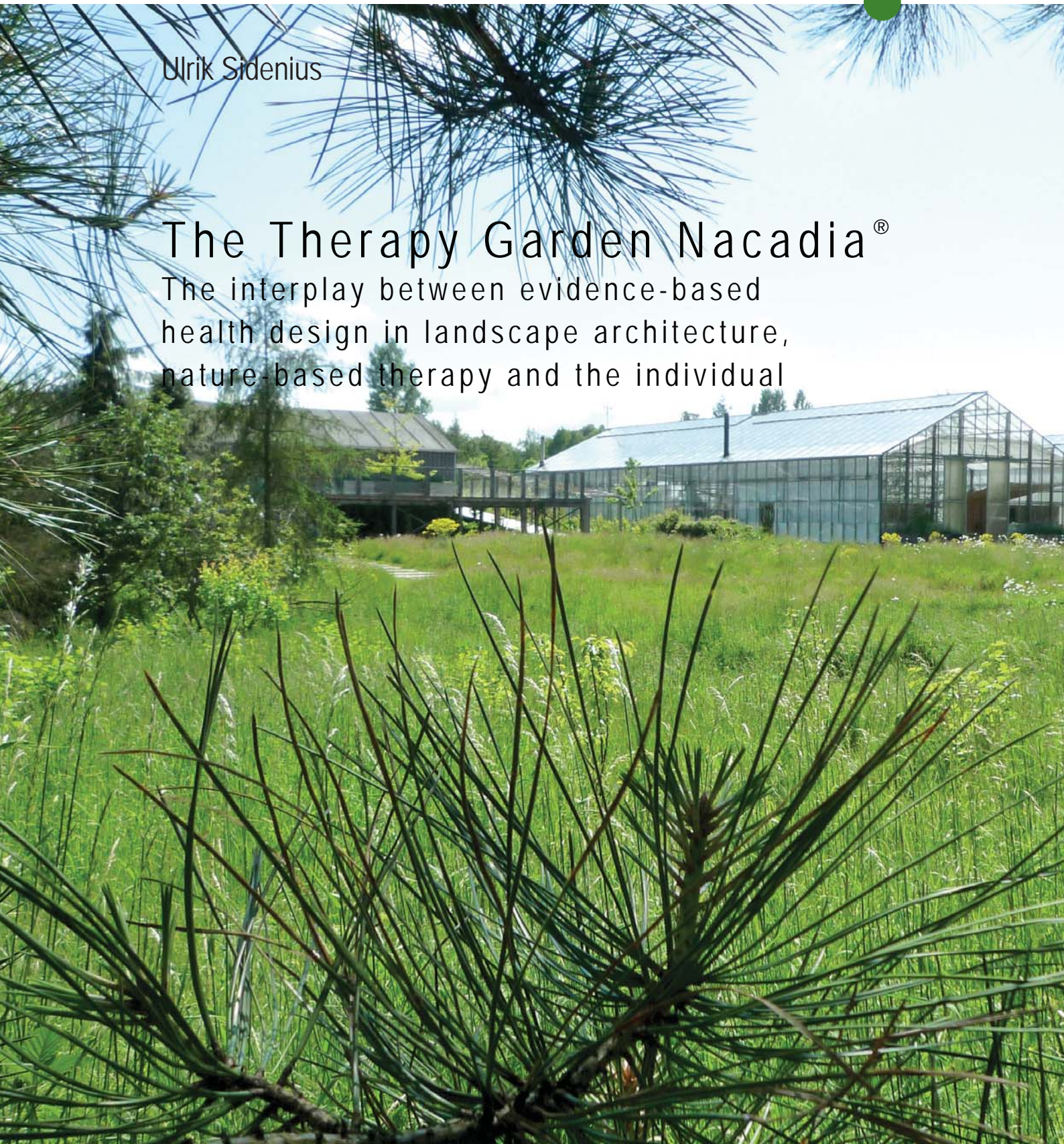
UNIVERSITY OF COPENHAGEN



Ulrik Sidenius

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Summary

This PhD project examines the relationship between the design of a therapy garden, a nature-based therapy programme and the users – citizens with stress-related illnesses. The thesis is based on research conducted at the Section of Landscape Architecture and Planning, Department of Geosciences and Natural Resource Management at the Faculty of Science, University of Copenhagen. The study was conducted due to increasing international and national demands for innovative interventions to treat stress-related illnesses. The demands have arisen as a result of the growing challenge that stress-related illnesses represent for public health and the health care sector globally, in the EU and in Denmark. The treatment of illnesses must be evidence-based and validated to ensure high quality and positive health outcomes. In the research group, Nature, Health & Design, research is conducted on the relationship between nature, human health and design based on an 'evidence-based, health design in landscape architecture' approach with the aim of working in accordance with the most recent and current evidence. A diagnostic post occupancy evaluation is an important part of a good 'evidence-based health design in landscape architecture' process, and is used as an effective tool for ensuring health-promoting outcomes in accordance with the aims and objectives of the design in question.

From 2008 to 2010, the Nacadia[®] therapy garden was established through a process of evidence-based health design in landscape architecture. It was an interdisciplinary collaborative process that used state-of-the-art evidence and expert knowledge on therapy gardens and nature-based therapy. The garden is designed to provide a setting and framework for a nature-based therapy programme for people suffering from stress-related illnesses. The therapy programme was developed as an integrated part of the design process of Nacadia. The overall aim of this thesis is to gain a deeper understanding of and develop more knowledge about landscape architecture in a therapeutic intervention under Danish conditions for people suffering from stress-related illnesses. It is an exploratory case study that examines Nacadia's nature-based therapy for 42 citizens who suffer from severe stress-related symptoms. In order to study the case in as much depth as possible, several data collection and data processing methods were used. Data was collected through: Landscape analyses, observations, participants' logbooks, interviews and questionnaires. Through the landscape analyses, the overall physical proportions of the garden were determined, and from the observations and participants' logbooks, the overall patterns of use were found. Through methods of thematic analysis based on the phenomenological approach 'reflective lifeworld research' the participants' experiences of nature-based therapy in Nacadia were illuminated. Finally, paired sample t-tests were conducted

to see the development in participants' general well-being from the beginning to the end of the treatment period.

Data is used in three articles, which each have a different focus. Article I focuses on 4 groups of a total of 27 participants in nature-based therapy during spring, summer, autumn and winter. Based on observations and interviews, participants' use and preferences in Nacadia were studied to gain knowledge and an overall understanding. Article II examines participants' experiences of nature-based therapy from a lifeworld perspective. The article is based on interviews with 14 participants and is supported by data from observations and logbooks. Article III uses a diagnostic post occupancy evaluation to assess the quality and efficacy of Nacadia's landscape design in relation to its original aim and objectives. Article I determined how the different types of activity were distributed around the garden and that the most preferred rooms were described as: “*Enclosed*”, or “*slightly closed*” but with a “*view out*”, to “*see far*”, and “*see the sky*” to get a “*sense of expanse*”. It gave the participants the feeling that their “*backs were covered*” and that they were “*protected from behind*”. Such places were preferred for emptying the mind, reflecting in peace or getting small experiences. Article I also found that there was no significant negative influence on use and preferences due to changing seasons. Article II shows that the participants in nature-based therapy experience it as a dynamically evolving process in which they explore and develop to understand themselves and life from new perspectives, and to live life from new approaches that can be implemented in their own lives after the nature-based therapy. The participants' mental and physical ability fluctuates throughout the course of the treatment, but the level of their executive functions increases linearly, so that they can act beneficially in accordance with their current capabilities. Article III evaluates the garden design in relation to its original aim and objectives. A number of successes and minor failures in Nacadia were identified. Overall, the design of the garden meets the original objectives satisfactorily. The issue of exposure was the biggest problem in the design. In addition, Article III developed and used a generic model for diagnostic post occupancy evaluations of therapy gardens.

This PhD project contributes with knowledge to the understanding of nature-based therapy and evidence-based health design in landscape architecture. Currently, experiences and knowledge gained from the project are being transformed into practice through municipal cooperation, which will hopefully lead to more research as there is a need for longitudinal studies of participants' overall nature consumption after nature-based therapy. Further, there is a need for more research that focuses on the development of nature-based therapy programmes and the design of therapy gardens suitable for different patient groups.

Resumé

Dette ph.d. projekt undersøger forholdet mellem designet af en terapihave, et natur-baseret terapiprogram og brugerne – borgere med stressrelaterede lidelser. Studiet er lavet hos sektion for Landskabsarkitektur og Planlægning, Institut for Geovidenskab og Naturforvaltning ved det Natur og Biovidenskabelige Fakultet, Københavns Universitet. Studiet er lavet på basis af en øget international og national efterspørgsel på innovative stressbehandlingsformer.

Efterspørgslen er opstået som et resultat af den tiltagende udfordring, som stress er blevet for folkesundheden og sundhedssektoren globalt, i EU og i Danmark. Sygdomsbehandling skal være evidens-baserede og valideret for at sikre kvalitet og positiv effekt. I forskergruppen, Natur, Sundhed & Design, forskes i forhold mellem natur, menneskers sundhed og design fra en tilgang i 'evidens-baseret sundheds design i landskabsarkitektur', for at arbejde i overensstemmelse med den mest nylige og aktuelle evidens. En 'diagnostic post occupancy evaluation' er en vigtig del af en god 'evidens-baseret sundheds design i landskabsarkitektur'-proces, og benyttes som et effektivt værktøj for at sikre sundhedsfremmende effekter i hht. intentionerne med det pågældende design.

Fra 2008 til 2010 blev terapihaven Nacadia[®] designet gennem en proces af 'evidens-baseret sundheds design i landskabsarkitektur'. Det var en tværfaglig samarbejdsproces, som benyttede state-of-the-art evidens og ekspertviden om terapihaver og naturbaseret terapi. Haven er designet for at danne ramme om et natur-baseret terapiprogram for mennesker, der lider af stressrelaterede symptomer. Terapiprogrammet blev udviklet som led i designprocessen af Nacadia. Det overordnede mål med denne afhandling er at opnå en dybere forståelse af, og udvikle mere viden om landskabsarkitektur i en terapeutisk intervention under danske forhold, for mennesker, som lider af stressrelaterede lidelser. Det er et eksplorativt casestudie, som undersøger naturbaseret terapi i Nacadia for 42 borgere, der gennem visitation er vurderet at lide af alvorlige stressrelaterede symptomer. For at studere og belyse sagen i så vid udstrækning som muligt, blev flere dataindsamlings- og databehandlingsmetoder benyttet. Data blev indsamlet gennem: Landskabsanalyser, observationer, deltagerne logbøger, interviews og spørgeskemaer. Gennem landskabsanalyserne fandtes de overordnede fysiske proportioner af haven. Fra observationer og deltagerne logbøger, fandtes de overordnede brugsmønstre. Gennem tematiske analysemetoder, baseret på den fænomenologiske tilgang 'reflective lifeworld research' blev deltagerne oplevelser af naturbaseret terapi Nacadia belyst. Slutteligt lavedes en 'paired sample t-test' for at se udviklingen i deltagerne generelle velvære fra begyndelsen til enden af behandlingsperioden.

Data er benyttet i tre artikler med forskellige fokus. Artikel I fokuserer på 4 grupper af i alt 27 deltager i naturbaseret terapi i løbet af forår, sommer, efterår og vintersæson. Baseret på observationer og interviews, blev deltagernes brug og præferencer i Nacadia studeret for at opnå en overordnet forståelse og viden. Artikel II undersøger deltagernes oplevelser af naturbaseret terapi ud fra et 'lifeworld' perspektiv. Artiklen er baseret på interviews med 14 deltagere, understøttet med data fra observationer og logbøger. Artikel III benytter en 'diagnostic post occupancy evaluation' for at vurdere kvaliteten og effektiviteten af Nacadia's landskabsdesign i forhold til de oprindelige intentioner og mål med designet. Artikel I fandt hvordan de forskellige aktivitetstyper var fordelt i haven og fandt ud af, at de mest foretrukne rum blev beskrevet som: "Tillukket" eller "let lukket" men med "udsyn" så man kan "se langt" og "se himlen" og "fornemme vidderne". Det motiverede en følelse af at være dækket og beskyttet bagfra. Sådanne steder blev foretrukket med det formål at: Tømme sindet, reflektere i fred eller få små oplevelser. Artikel I fandt endvidere, at der ikke var nogen mærkbar negativ indflydelse på brug og præferencer på grund af skiftende årstider. Artikel II viser at deltagerne i naturbaseret terapi i Nacadia oplever det som en dynamisk udviklende proces hvor de udforsker og udvikler sig for at forstå sig selv og livet fra nye perspektiver og leve livet med nye tilgange, som kan implementeres i deres eget liv efter at have deltaget i naturbaseret terapi. Deltagernes mentale og fysiske formåen svinger igennem behandlingsforløbet, men niveauet af eksekutive funktioner stiger lineært, så de kan agere mere hensigtsmæssigt i forhold til deres formåen. Artikel III evaluerer havens design i henhold til den oprindelige målsætning, hvilket resulterede i fund af en række succeser og mindre fejl i Nacadia. Overordnet set imødekommer havens design de oprindelige mål tilfredsstillende. Risikoen for eksponering udgjorde det største problem i designet. Desuden videreudvikledes og anvendtes der i artikel III en generisk model for 'diagnostic post occupancy evaluation' af terapihaver.

Dette ph.d.-projekt bidrager med viden til forståelsen af naturbaseret terapi og evidensbaseret sundhedsdesign i landskabsarkitektur. Aktuelt bliver erfaring og viden fra projektet omsat til praksis gennem kommunale samarbejder. Det vil forhåbentlig føre til mere forskning, da der i forlængelse af dette ph.d. projekt bl.a. er behov for langtidsstudier af deltagernes generelle brug af natur efter naturbaseret terapi. Derudover er der behov for mere forskning, som fokuserer på udvikling af naturbaseret terapi-programmer og design af terapihaver specifikt egnede til forskellige patientgrupper.

Abstract

Mental illness is one of the main challenges to public health in the EU and Denmark. For this reason, there is an increasing demand for innovative interventions and practices to treat mental illness. Treatments should be evidence-based and validated to ensure high quality and positive effects. The research group, Nature, Health & Design, conducts research on the relationship between nature, human health and design from an evidence-based health design in landscape architecture (EBHDL) approach using the most up to date evidence. From 2008 to 2010, the therapy garden, Nacadia[®], was designed through an EBHDL process, which was a multidisciplinary collaborative process using state-of-the-art evidence and experts in therapy gardens and nature-based therapy (NBT) for people suffering from stress-related illnesses. Alongside the design of the garden, a NBT programme was developed. A diagnostic post occupancy evaluation (DPOE) is part of the EBHDL process and an efficient tool for examining the possible impact of the design. The overall objective of this PhD project is to gain a deeper understanding of landscape architecture in therapeutic interventions for people suffering from severe stress in a Danish context. It is an exploratory case study to examine NBT in Nacadia (NBTN) for people (N=42) suffering from severe stress. In order to explore the case thoroughly, the following mixed methods were selected based on the objectives of the study: Landscape analyses, behaviour mapping (BM), participant logbooks (LB), semi-structured interviews (SSI), and EQ-VAS rating scale. Article I focuses on 4 groups of participants (n=27) in NBTN during spring, summer, autumn and winter to gain an overall understanding of usage and preferences regarding Nacadia, based on illustrative clustering of BM data and thematic analysis of SSI. Article II studies the participants' experiences with the case using 'reflective lifeworld research', based on SSIs with 14 participants, which are corroborated by BM and LB data. Article III examines the case using a DPOE approach based on findings from LA, BM, SSI, LB and EQ-VAS to assess the quality and effectiveness of the landscape design of Nacadia in relation to its original aim and objectives. Article I determines how different categories of activities were distributed in the garden, and found that the most preferred spaces were described as: "Enclosed", or "slightly closed" but with a "view out", to "see far", and "see the sky" to get a "sense of expanse". It gave the participants the feeling that their "backs were covered" and that they were "protected from behind". Such places were preferred for emptying the mind, reflecting in peace or getting small experiences. Study I further found that the changing seasons had no noticeable negative influence on use or preferences. Study II found that NBTN is experienced as a dynamic evolving process of exploring and developing to see and live life from new

perspectives and approaches for moving on after NBTN. While there was a fluctuation in mental and physical capabilities during the course of the project, there was a linear increase in executive functions (EF). Article III found a number of successes and failures of Nacadia. The garden design meets the original aims and objectives sufficiently. The issue of exposure was the most significant failure in the design. Article III further developed and applied a generic model of DPOEs for therapy gardens.

Keywords: Evidence-based design, health care setting, health design, landscape architecture, natural environments, nature-based therapy, phenomenology, qualitative case study, reflective lifeworld research, restorative experiences, supportive environments.

Author's address: Ulrik Sidenius, Department of Geosciences and Natural Resource Management, UCPH, Rolighedsvej 23, 1958 Frederiksberg C, Denmark

E-mail: us@ign.ku.dk



Photo 1. The mowed circle in the meadow (f on fig. 9)

Contents

SUMMARY	3
RESUMÉ	5
ABSTRACT	7
CONTENTS	9
LIST OF PUBLICATIONS	12
BACKGROUND	14
Stress.....	14
Nature, health & design	15
Evidence-based health design in Landscape architecture (EBHDL)	16
Diagnostic Post Occupancy Evaluation (DPOE)	18
Research status in relation to therapy gardens	19
Theories on the relationship between human health and natural environments	20
Aesthetic-Affective theory (AAT)	20
Attention Restoration Theory (ART)	20
Supportive Environment Theory (SET)	21
Therapy gardens.....	22
Nature-based therapy (NBT).....	23
Aim and main research questions	24
Aim of the thesis	24
The aims are:.....	24
The objectives are:	25
METHODS	26
Study design	26
The setting	28
The Therapy Garden Nacadia	28
The Nature-Based Therapy in Nacadia (NBTN).....	31
Subjects	33
Sampling	33

Ethical considerations	34
Data collection instruments, methods and protocols	34
Instruments.....	34
Landscape analyses	35
Observations	36
Interviews.....	36
Semi-structured interviews (SSI) with participants.....	36
Interview with therapists.....	37
Logbooks	37
Questionnaires	37
Data analyses.....	39
Analysis of observations	39
Analyses of SSI.....	39
Analysis of logbook data	39
Analysis of data from questionnaires	40
RESULTS	41
Summary of findings from article I.....	41
Summary of findings from article II	44
Summary of findings from article III.....	45
DISCUSSION	48
Participants' use and preferences in Nacadia	48
Preferred natural environments for restoration	48
A therapy garden is more than safety and pleasing environments	48
Accessibility of natural environments.....	49
Participants' experiences of nature-based therapy in Nacadia	50
Capabilities and awareness	50
Nacadia in relation to its original aims and objectives	53
The interplay between EBHDL, NBT, and the individuals	53
Strengths and weaknesses	55
Implications for practice and future research.....	56
CONCLUSION.....	58

ACKNOWLEDGEMENTS59

REFERENCES60

ARTICLE I67

ARTICLE II79

ARTICLE III95



Photo 2. The meadow in Nacadia

List of publications

The thesis is based on articles I-III:

Article I:

Sidenius, U., Stigsdotter, U.K., Refshauge, A.D., 2015. A year in the therapy forest garden Nacadia[®] - participants' use and preferences in the garden during a nature-based treatment program. *ALAM CIPTA, International Journal of Sustainable Tropical Design Research and Practice*, pp. 44-53.

Article II:

Sidenius, U., Stigsdotter, U.K., Poulsen, D.V., Bondas, T., 2017. "I look at my own forest and fields in a different way" - The lived experience of nature-based therapy in a therapy garden when suffering from stress-related illness. *International Journal of Qualitative Studies of Health and Well-being*, 12(1).

Article III:

Sidenius, U., Nyed, P.K., Lygum, V.L., Stigsdotter, U.K., 2017. A diagnostic Post Occupancy Evaluation of the therapy garden Nacadia[®]. *International Journal of Environmental Research and Public Health*, 14(8).

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Photo 3. Nacadia in winter

Abbreviations

AAT – Aesthetic-Affective Theory

AE – Awareness Exercises

ART – Attention Restoration Theory

BED – Binge Eating Disorder

BM – Behaviour Mapping

CBT – Cognitive Behaviour Therapy

DPOE – Diagnostic Post Occupancy Evaluation

EBCP – Evidence-Based Clinical Practice

EBHDL – Evidence-Based Health Design in Landscape Architecture

EBM – Evidence-Based Medicine

EF – Executive Functions

EQ-VAS – Euro Quality of Life Visual Analogue Scale

GA – Garden Activities

GIS – Geographical Information System

ICD-10 – International Classification of Diseases

ICT – Individual Conversation Therapy

IPA – Interpretive Phenomenological Analysis

LB – Logbook

NBT – Nature-Based Therapy

NBTN – Nature Based Therapy in Nacardia

NH&D – Nature, Health & Design

OT – Own Time

MPC – Mental and Physical Capabilities

RCT – Randomized Clinical Trial

SET – Supportive Environment Theory

SoA – Scope of Action

SoM – Scope of Meaning

SSI – Semi-Structured Interviews

WHO – World Health Organization



Photo 4. Pergola from the entrance to Nacardia

Background

Stress

Mental illness is a common challenge for the public health sector in Europe, and it is estimated that around 25% of the inhabitants are affected each year (WHO, 2013). Stress and stress-related illnesses are predicted to become one of the greatest threats to public health in the western world by 2020 (WHO, 2005). Stress and stress-related illnesses are an increasing cause of incapacity to work and sick leave in Denmark (Netterstrøm, 2014). Stress can be defined as, “[...] a state in the organism characterized by physiological responses with activation of the sympathetic nervous system, immune system and energy mobilization and mental activation due to strain of a psychological, physical, chemical or biological kind [...]” (*ibid.* p. 14) from a medical perspective (*ibid.*). From a holistic perspective, people who suffer from stress-related illnesses can be seen as having their relationship to the world disturbed; individuals who are unwell lose their undisturbed freedom, which involves exclusion from ‘life’ (Gadamer, 1996). In Dahlberg et al. (2008), illness (such as stress-related illnesses) is described thus: “*When we are in pain and weak, our bodies become obstacles that keep us from immediate engagement with the world. Illness alters one’s attachment to the world*” (p. 44). Stress is not diagnosed as an illness in itself. The ‘stress diagnosis’ is based on multidimensional stress-related symptoms (Aldwin, 2009), identified by the International Classification of Diseases, ICD-10 (WHO, 1992).

Stress represents a major burden on the Danish public welfare economy, as well as being a threat to the quality of life of the stressed individual and their relatives (Netterstrøm, 2014; WHO, 2013). The World Health Organization (WHO) reports that if the community could cope with the stress-burden, quality of life and productivity would be improved and suicides could be prevented (WHO, 2013). These challenges have led to global, national, regional and local demands for innovative interventions to prevent and treat stress (Eplöv & Lauridsen, 2008;

European Communities, 2005; National Board of Health, 2014; WHO, 2005; 2013). The demand is directed towards evidence-based and effective treatments (WHO, 2013), and the need is for safe, evidence-based interventions with a multidisciplinary approach (*ibid.*).

In recent decades, there has been a growing awareness, interest, and acknowledgement of a biopsychosocial and multispectral approach to human health and the treatment of diseases among the population, and in contemporary health science and clinical practice (Nolen-Hoeksema et al., 2014; Pearson et al., 2009; Taylor & Francis, 2013). Such view is based on the WHO's broad definition of health from 1948: "*Health is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity*" (WHO, 1948). As a result, today, human health is often considered from a biopsychosocial perspective to include an individual's entire life situation, e.g. the biological, cultural, social and environmental aspects.

Nature, health & design

There is a long history of using gardens in health care (Gerlach-Spriggs et al. 1998; Marcus & Barnes, 1999). Today there is an increasing use of natural environments and therapy gardens as health care facilities (Marcus & Sachs, 2014), and evidence of positive health outcomes as a result of participating in nature-based therapy (NBT) interventions, e.g. therapy gardens, is increasing and across research disciplines (Hartig et al., 2014; Marcus & Sachs, 2014; Nilsson et al., 2011; Sahlin et al., 2015; Währborg et al., 2014). This has resulted in a political awareness in the Scandinavian countries of using nature in care and treatment settings. In Denmark, there is a demand from the municipal health authorities for efficient and evidence-based treatment in general (COWI A/S, Bolt & Iversen, 2009), and currently, several Danish municipalities are conducting or planning therapy gardens and NBT.

An evidence-based approach can yield suitable measures for improving the health outcomes of different patient groups and for identifying the effect of the nature-based care or treatment setting. Evidence gives weight for argumentations, e.g. for new approaches or initiatives in the health care sector. For these reasons, several municipalities have sought support in the evidence-based design approach, which has developed as a branch in both architecture and landscape architecture – Health Design (HD). In landscape architecture, HD is defined as: The conscious design of green spaces and gardens so that they, in a certain way, support health processes and result in improved health outcomes (Stigsdotter, 2015). The design of the therapy gardens matters, and examples of therapy gardens which have a negative effect on patients do exist (Marcus & Barnes, 1999). Therefore, health design within landscape architecture must have an evidence-based design approach.

In the field of HD, the landscape architects primarily work with planning, design and management in relation to health from two perspectives and two types of environments:

1. Natural environments and urban green areas – the emphasis is to maintain, nurse and improve physical and psychological health (health promotion).
2. Therapy Gardens - treatment of mental and physical illnesses (treatment)

This thesis explores therapy gardens, and considers the landscape and natural environments as settings for health care practice.

Evidence-based health design in Landscape architecture (EBHDL)

EBHDL evolved from other disciplines that have used evidence-based models to guide decisions and practices in their respective fields (Stichler & Hamilton, 2008), e.g. *evidence-based medicine* (EBM) and *evidence-based clinical practice* (EBCP) in which the clinical practitioners make decisions about the treatment, care and practice of individual patients based on current best evidence from research (EBM) and practice (EBCP) (Gray, 1997; Pearson et al., 2009; Sackett et al., 1996). The Center for Health Design (2017) defines evidence-based design (EBD) as: “*The process of basing decisions about the built environment on credible research to achieve the best possible outcomes*” (The Center of Health Design, 2017). EBHDL has a concrete focus on the design of landscape, gardens or natural environments to maximize the health and wellbeing of clients. The EBHDL process does not end when the design has been realised as it calls for systematic and thorough evaluations to ensure, maintain, and enhance the positive health outcomes. A crucial constituent is a post occupancy evaluation (POE) of the EBHDL settings. A POE is an evaluation and validation of the design as well as the treatment programme (Corazon et al. 2010), which is in alignment with the recommendations of the WHO and contemporary health science; any interventions and practices concerning human health and treatments should be evidence-based and validated to ensure quality and positive effect (Taylor & Francis, 2013; WHO, 2013). EBHDL processes are fairly new and the research group ‘Nature, Health & Design’ at IGN is helping to develop a model of a transparent process of EBHDL (fig. 1) (Stigsdotter, 2015; Stigsdotter, 2014).

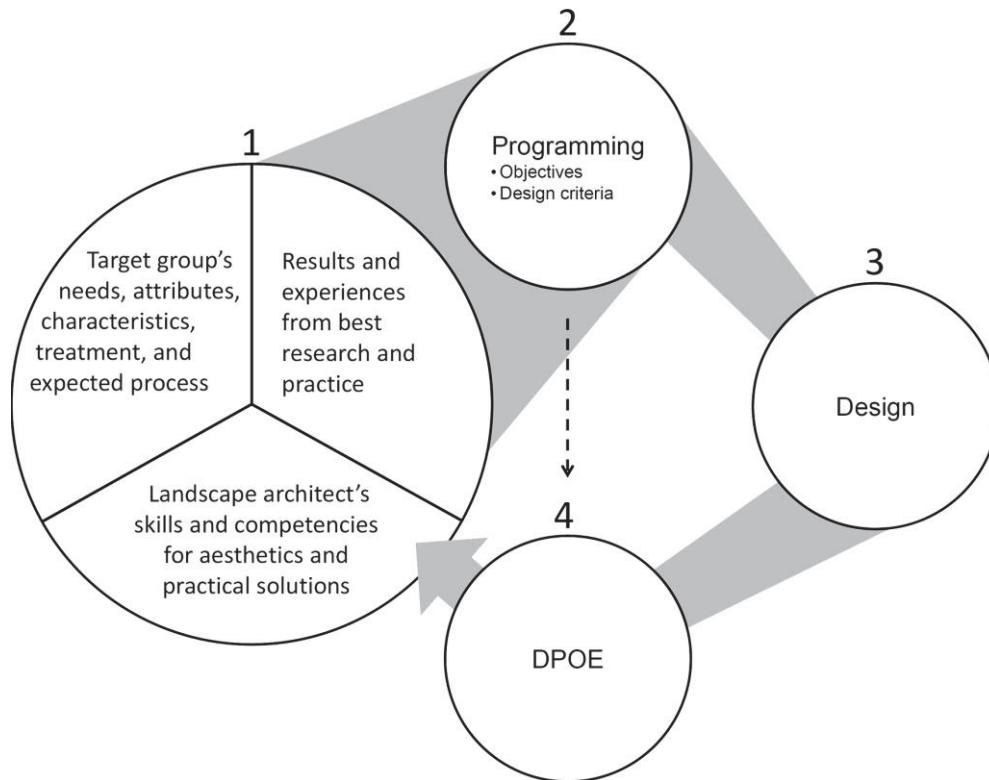


Figure 1. The most current model of the EBHDL process, which is used by the 'Nature, Health & Design' research group (article III)

The EBHDL model has four parts. Part 1 consists of three equally important components that should initially be taken into account: Aesthetic and practical landscape architectural skills and experience; the specific user-, patient- or target group's special needs, wishes and preferences. In case of treatment, the treatment programme and the patient's expected rehabilitation process must be included; Research evidence and valid practical experiences. This initial work constitutes the foundation for the next part of the model (part 2), which is the programming that guides the subsequent design. Here, the intended health outcomes and the objectives of the design should be stated along with how they will be achieved by the design (design criteria) as well as the evidence to support the decisions behind the design. The EBHDL process does not stop when the design (part 3) has been realized as it should be continuously evaluated. This is achieved by a diagnostic post occupancy evaluation (DPOE) (part 4), which evaluates whether the design has fulfilled its original aims and objectives (part 2).

EBHDL is a flexible and ongoing design process, where the design will be based on the state of the art evidence, experience and knowledge. New findings, results and experiences from practice and research are continuously presented and may provide the rationale for changing or adjusting a design to implement most recent evidence of efficient design for a specific user

group. As important as it is to follow the results of relevant research and practice (‘external evidence’), it is just as important to monitor the function and use of a current design output (‘internal evidence’) of an EBHDL case. This is to determine whether the design is being used as intended, whether the outcomes are as intended, and to obtain more knowledge and experiences about EBHDL for the specific user group.

A DPOE is an important tool in the EBHDL process. The findings of a DPOE can lead to constructive and continuous adjustment of the design to strengthen the outcomes and ensure that the aim of the design is met in accordance with most recent external and internal findings and evidence.

Diagnostic Post Occupancy Evaluation (DPOE)

The literature describes different types of POEs, although in relation to therapy gardens, a DPOE is recommended for a comprehensive and reflective evidence-based design process (Marcus & Sachs, 2014). Marcus and Sachs (2014) recommend that a DPOE is conducted over a longitudinal timespan, using mixed-method research and multiple sources of data to provide strong and reliable findings (*ibid.*). A DPOE will illuminate background and thoughts behind the design decisions to clarify the aims and objectives of the design, determine the core area of examination for the specific site, and evaluate the design against its original aims and objectives (Guinther et al., 2014). The DPOE for article III was developed for therapy gardens in particular. It assesses the initial design decisions by examining the effect of a therapy garden and, subsequently, the nature-based therapy programme on a specific patient group’s health outcomes. It has an enhanced focus on the participants’ own experiences of and opinions and reflections on the environment, the operations and health outcomes. The DPOE consists of the following steps: 1) Project context; 2) Examination (of the five core points: a. Environment, b. Experiences of the environment, c. Operations, d. Experience of operations, e. Health and well-being outcomes), and; 3) Findings. The methods for measuring health outcomes can vary depending on the patient group and the intended health outcomes (fig. 2).

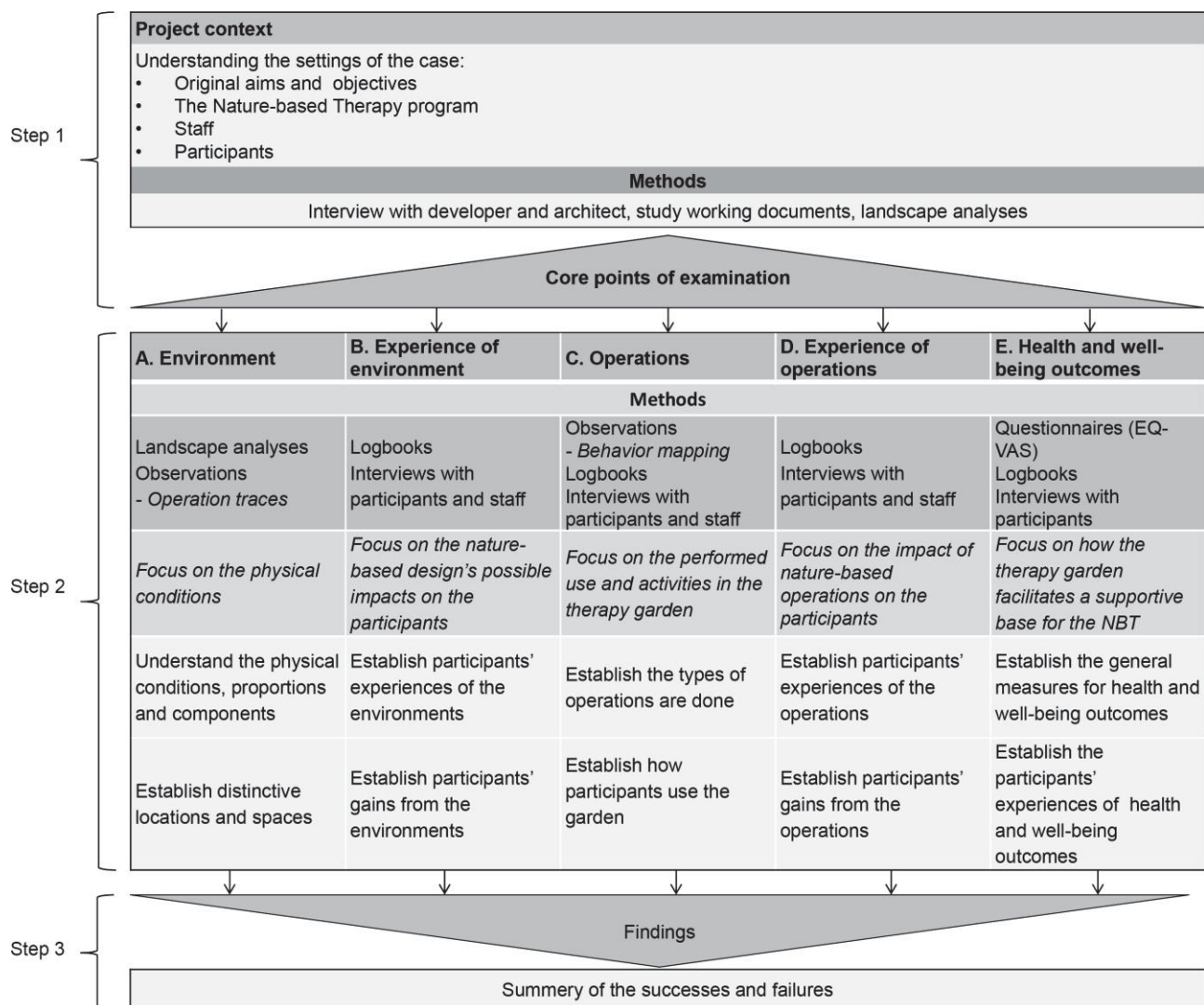


Figure 2. A conceptual DPOE model to be applied to cases of therapy gardens (Sidenius et al., 2017).

Research status in relation to therapy gardens

As mentioned, several studies present evidence for positive health outcomes from participating in NBT in therapy gardens (Hartig et al., 2014; Marcus & Sachs, 2014; Nilsson et al., 2011; Sahlin et al., 2015; Währborg et al., 2014). However, no studies on the health outcomes from participating in an NBT programme in a therapy garden have been conducted in Denmark, while recent reviews of international studies concludes that the available evidence is mainly based on heterogeneous user groups and diverse measures (Annerstedt & Währborg, 2011; Hartig et al., 2014). The reviews find a lack of sufficient assessments of evidence, quality, or causality regarding which specific natural elements (settings, environments, and components) are most beneficial for a specific diagnosis-group. They further conclude that a proper quality assessment of the subjects of NBT to evaluate the use and effect (activities, programme,

outcomes) of nature in NBT can be utilized more efficiently and can be targeted at specific patient groups (Annerstedt & Währborg, 2011; Hartig et al., 2014). Since the referred reviews a sufficient qualitative and quantitative study have been made with positive results have been made in Sweden (Sahlin et al., 2015). However, there is still a lack of comprehensive studies of environments, activities, use and outcome of nature-based therapeutic interventions (therapy gardens) in a Danish context. Additionally, there is a demand for studies and assessments that use measures suitable to several similar cases of nature-based therapeutic interventions as it would make it possible to compare and validate the findings from several cases (Stigsdotter et al., 2011). Together, this requires a comprehensive, systematic and transparent methodological approach (generic applicable) to find evidence and gain knowledge of the environments, activities, use and outcomes of NBT interventions.

Theories on the relationship between human health and natural environments

The PhD project is supported by a theoretical framework, mainly from environmental psychology, on the relationship between natural environments, human health and design.

Aesthetic-Affective theory (AAT)

From an evolutionary perspective, AAT (Ulrich, 1983) explains that humans have not developed biologically since they were adapted to a life in nature as hunter-gatherers. In order to survive, a prompt reaction to possible threats was crucial, and humans relied on their instinctive and immediate ability to assess and respond (affect) to stressors, dangers and/or safety associated with the natural habitat.

According to the theory, humans' affects are genetically coded to scan, evaluate, understand and find safety in natural environments in contrast to modern urban environments. Here humans cannot trust their affects to find safety. Urban environments have unnatural components and constructions, and socio-cultural environments, which require rational thinking for humans to grasp and eventually find safety. Rational thinking is a demanding process, which may lead to stress. It is, therefore, important that humans have access to safe environments that allow the brain and body to relax and replenish their capacity for rational thinking.

Attention Restoration Theory (ART)

ART explains that humans have two types of attention systems: "directed attention", and "soft fascination" (Kaplan & Kaplan, 1989). "Directed attention" is a process that is activated

when the brain needs to sort large amounts of information in order to process the important information and discard the rest. In modern urban environments, or during everyday working situations, humans may be exposed to a vast amount of information which needs to be sorted in order to engage in rational thinking and remain focused. It is believed that the brain receives up to 11 million information stimuli per second in e.g. a busy urban environments. However, the conscious mind can only handle approximately 50 information bits per second (Wiliam, 2006), the sorting process is demanding and, thus, the brain has limited capacity for continuous directed attention. It may result in the becoming overloaded causing stress reactions or mental fatigue (Kaplan, 1995). According to ART, “soft fascination” does not burden the brain because there is no need to sort information and because this type of attention is considered to be effortless. Soft fascination may be awakened in natural environments where there is less information for the brain to sort and process, and where there are no tasks to concentrate on. Kaplan & Kaplan believe that staying in nature can restore the brain’s capacity for directed attention because soft fascination is stimulated, unlike in urban environments where it may be difficult to achieve similar restoration.

For an environment to provide a restorative experience, four components are essential (Kaplan & Kaplan, 1989). The components partly depend on the setting and partly on the individual’s perception of the environment:

- Being away – The environment leads the user to an experience a respite from everyday life, i.e. stimulates the mind to wander off to another place.
- Extent – The environment gives the user a sense of coherence and provides scope for exploration.
- Fascination - The environment is interesting enough to motivate exploration, e.g. observing natural objects (e.g. flora, fauna, and water) and processes (e.g. growth and succession).
- Compatibility - The environment must be compatible with the users’ inclinations for them to relate to it.

Supportive Environment Theory (SET)

SET can be seen as an integrated theory that combines evolutionary, cultural and personal factors to explain the positive relations between natural environments, humans and human health (Grahn et al., 2010; Palsdottir, 2014). Environment is here understood as a context of natural, cultural and social factors that the individual has to manage and understand. An environment is

considered supportive when an individual feels that it is comprehensive, accessible, safe and meaningful. SET explains how humans need supportive environments for physical (senses, muscles, motor functions) and mental development (being able to feel and think), and to maintain a good health (*ibid*). Human’s experience of, preference and need for supportive environments (scope of meaning) vary and depend of the individual’s physical and mental resources and capabilities (executive function) at a specific time (*ibid*). As figure 3 illustrates, people with low executive functions (EF) find it difficult to cope with socially challenging environments, while still being able to manage natural environments.

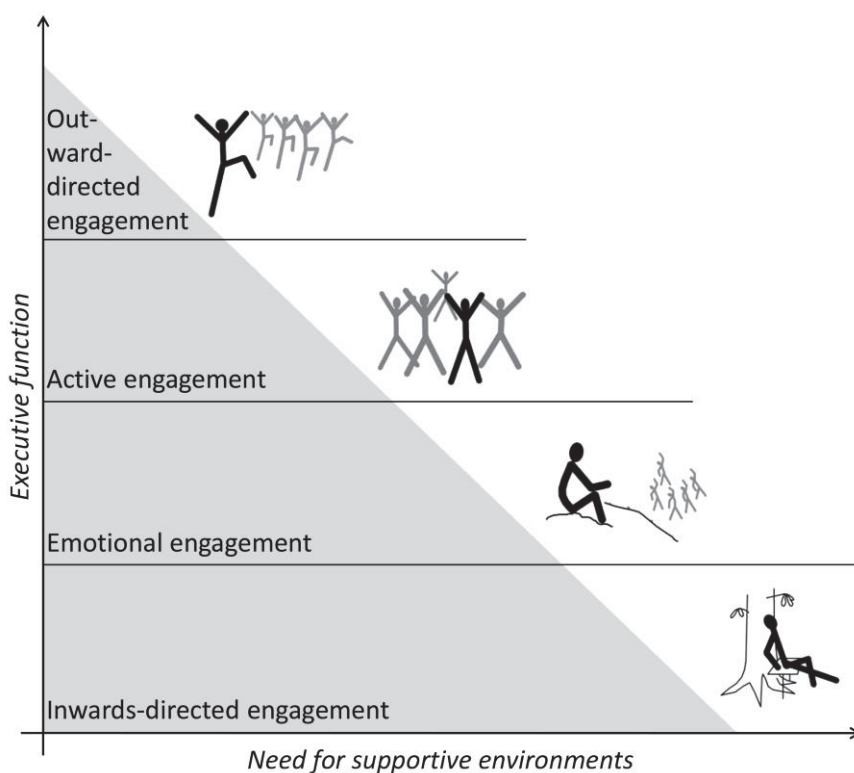


Figure 3. The SET pyramid, modified in line with Grahn et al. (2010) and Stigsdotter & Randrup, 2008)

The SET pyramid shows four levels of EF, where the lower levels entail inward involvement, while the higher levels entail more outgoing involvement (Pálsdóttir et al., 2014).

Therapy gardens

In the research group, Nature, Health & Design at the University of Copenhagen, a ‘therapy garden’ is understood as a natural environment that has been deliberately designed with the intention to be the location for a nature-based therapy programme and to actively and positively contribute to patients’ treatment and wellbeing by; matching to the participants’

treatment process by both supporting and challenging them; and by providing meaningful activities all-year-round (Corazon, et al., 2010; Stigsdotter & Randrup, 2008; Stigsdotter, 2014). A natural environment is understood as a place or setting where vegetation and other natural features are dominant (Steg et al., 2012).

Nature-based therapy (NBT)

In this thesis NBT is understood as a therapeutic practice that takes place in a specially designed or selected natural environment, and uses activities that involves natural objects and nature experiences as therapeutic means to initiate a therapeutic process (Corazon et al., 2011; Corazon et al., 2010).

Based on the three articles (I-III), this thesis explores NBT conducted in the University of Copenhagen's therapy garden Nacadia, which is part of the Nature, Health & Design Lab. located in the Arboretum in Hoersholm, 30 km north of Copenhagen. Here, the landscape design and its potentially effects on the participants' therapeutic process and on health outcomes will be explored in relation to the various constituents of a NBT programme for people suffering of stress-related illnesses.



Photo 5. The lake as seen from a bench (i on fig. 9)

Aim and main research questions

The overall aim of this Ph.D. project is to gain a deeper understanding of landscape architecture in therapeutic interventions for people suffering from stress-related illnesses in a Danish context. The following research questions will be explored:

- A. How do the participants use Nacadia in general? (I)
- B. What type of spaces do the participants prefer in Nacadia? (I)
- C. Do the different seasons and weather conditions have an influence on the participants' use and preferences in Nacadia? (I)
- D. How do people suffering from stress-related illnesses experience the 10-week NBT programme in Nacadia? (II)
- E. Does the design of Nacadia meet its original aims and objectives through the EBHDL process? (III)

Aim of the thesis

Article I – III have different aims and objectives, and each has its own unit of analysis (Patton, 2015; Yin, 2013) to explore the case from various perspectives.

Article III summarises the findings', and also converges the data and the findings from articles I-II.

The aims are:

- A. To study participants' use, preferred locations and experiences of locations in Nacadia, with a focus on the possible influence of the seasons and weather during NBT for people suffering from stress-related illnesses. (I)
- B. To describe the phenomenon of participants' lived experiences with NBT in Nacadia during the course of a 10-week NBT programme. (II)

C. To apply a DPOE to examine the design of the therapy garden Nacadia, including the effect of the NBT programme on the patients' health outcomes in order to identify successes and failures in the design in relation to its original aims and objectives. (III)

The objectives are:

- To determine the participants' use, preferences and experiences of spaces, places and the natural components in Nacadia (I, II).
- To study which factors may have an influence on participants' use, preferences and experiences in Nacadia during the NBT (I, II).
- To study whether, and if so how and why the participants' use, preferences and experiences in Nacadia develop from the beginning to the end of the NBT programme (II, III).
- To explore whether and if so how the components of the NBT have been implemented in the participants' lives (II, III).
- To evaluate whether the design of Nacadia is used and understood by the participants as originally intended during the EBTLTD process of Nacadia (III).
- To evaluate whether the environment and the spatial characteristics of Nacadia actively and positively contribute to the NBT programme and to participants' treatment and health (III).

The above research questions, aims and objectives will be addressed in articles I-III, which form the foundation of this thesis.



Photo 6. The lake as seen from a bench (i on fig. 9)

Methods

Study design

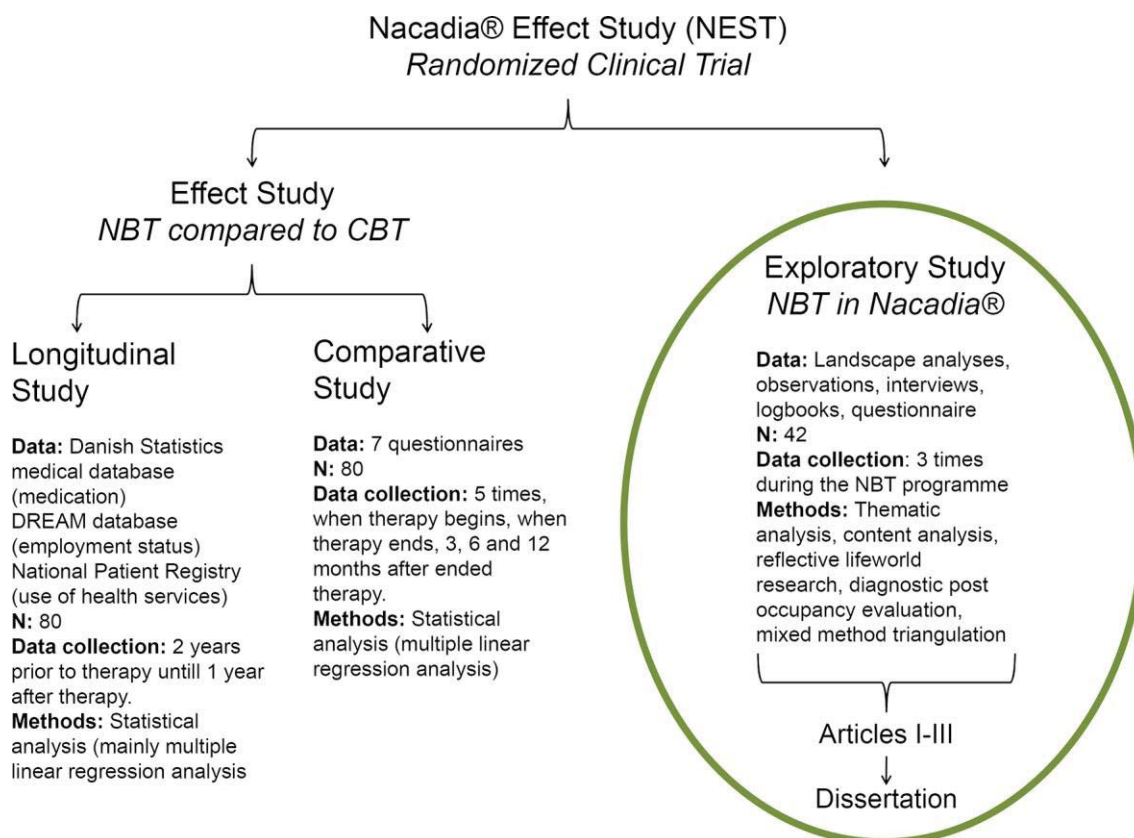


Figure 4. This study represents the explorative part of NEST.

This PhD project represents the explorative part of a major study, Nacardia Effect Study (NEST), which is a randomized clinical trial (RCT) to compare NBT (n=42) with cognitive behavioural therapy (CBT) (n=41) (fig. 4).

The explorative part of NEST is a mixed-method study, the aim of which is to examine, analyse and understand the behaviour of the subjects of a specific group in the given complex context (Bryman, 2012; Creswell, 2014; Venkatesh et al., 2016). It is conducted as a case study that explores in-depth the phenomenon (Creswell, 2014; Yin, 2013) of an NBT intervention (the case). Mixed-method research is used to obtain a variety of data from various sources during several NBT sessions at the location (the therapy garden Nacardia). It consists of three case units (article I to III, fig. 5), initiated with an overall inductive approach that focuses on the subjects' experiences, supported by measures of the various constituents of nature-based therapy in Nacardia (NBTN). The therapeutic setting constitutes multiple components and factors, and the

subjects' interaction with the setting is considered and explored as a contextual whole (the case). The thesis is based on a biopsychosocial assumption that all individuals' experiences are subjective and are based on personal, cultural, historical and biological backgrounds (Melchert, 2015; Nolen-Hoeksema et al., 2014). Such an understanding of humans represents the general view on human health found in contemporary health care science and clinical practice (Melchert, 2015; Pearson et al., 2009; Taylor & Francis, 2013), considering the individuals' experiences in relation to their entire life situation (including biological, cultural, social and environmental aspects). This view further corresponds a holistic approach to human health, which was originally adopted when the therapy garden Nacadia and the NBT programme were being developed and designed (Stigsdotter et al., 2011; Stigsdotter & Randrup, 2008). In health care science, an open and inductive approach is recommended for studying and assessing patients' experience of a given health care treatment and/or setting, e.g. a medical doctor's office, a psychologist's therapy room, or a setting used for NBT (Pearson et al. 2009, Taylor & Francis 2013). For this reason, the original intention was that the first case unit (article I) should have an open inductive approach in line with constructivist grounded theory (Charmaz, 2006; Taylor & Francis, 2013) to explore and develop understanding of the constituents of NBTN without developing any new theory. This was done to gain an overall understanding of the case, which was to be studied further in the subsequent case units.

The second case unit has a lifeworld perspective (Dahlberg et al. 2008), the aim of which is to illuminate patients' experiences and understandings of NBTN to achieve a deeper understanding of the case. During the study, the semi-structured interviews (SSIs) were the main source of data. The findings from the previous case unit (article I) and data from other methods and sources were used to gain more insight into the context of NBTN prior to analysing the SSIs and to corroborate the results.

The third case unit applies a DPOE to examine the quality and effectiveness of the setting, the Therapy Garden Nacadia. Multiple factors are thought to have an influence on patients' use, preferences, experiences, and on the health outcomes of an NBT setting. To gain more knowledge about these factors, the DPOE was conducted using mixed-method research and triangulation to provide reliable findings, as recommended by Guinther et al. (2014), Marcus & Sachs (2014), and Venkatesh et al., (2016). Mixed-method research and triangulation are frequently applied rigorous approaches within health science (Taylor & Francis, 2013). Hence a triangulation of several methods is applied in the third case unit (article III) to cross-check and converge the data sources, thereby resulting in stronger conclusions (Frederiksen, 2013; Taylor & Francis, 2013; Venkatesh et al., 2016).

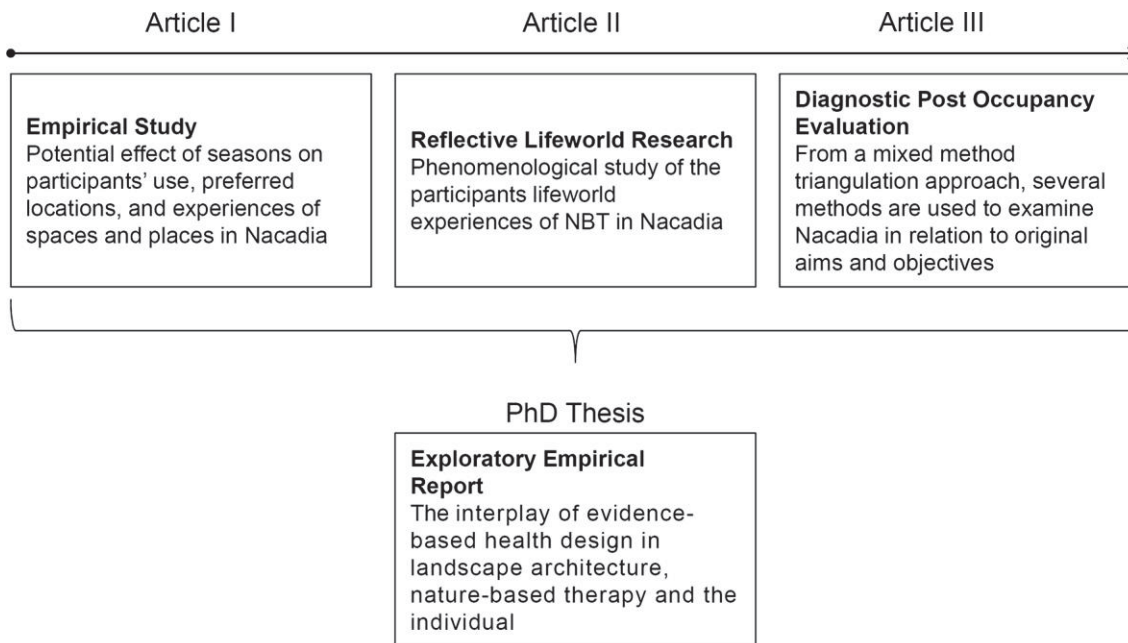


Figure 5. Flow and relations within the case study

The setting

The case to be explored is a therapy garden as a setting for nature-based therapy (NBT) for individuals who are incapable of working due to stress-related illnesses. The location is the University of Copenhagen's therapy garden Nacadia.

The Therapy Garden Nacadia

Nacadia was designed through an EBHDL process during the period 2008 to 2011. Its purpose was to support NBT for people suffering from stress or stress-related illnesses. The EBHDL process was based on the following assumptions:

- Nature-based therapy in a designed natural environment will lead to improved health and well-being for people who have been incapacitated due to stress-related symptoms.
- Not only does the design of the therapy garden support use and accessibility of the garden, it also directly increases the health-promoting processes by facilitating restorative nature experiences.

At the time of the EBHDL of Nacadia, these assumptions were supported by knowledge of how design has an influence on people's well-being (Stigsdotter & Grahn, 2003), and were based on preliminary results and experiences from e.g. the Rehabilitation Garden in Alnarp where

research identified a correlation between being present and engaging in activities in natural environments and human health.

The responsible architect developed a set of criteria to meet the aims and objectives of a therapy garden suitable for NBT for people suffering from stress and/or stress-related illnesses. The criteria were based on state-of-the-art theories (some of which are described in the section ‘Theories on the relationship between human health and natural environments’), evidence and experiences from best practice regarding the relationship between nature and human health in therapeutic settings. Table 1 is summarizing the lists of the design criteria found in Stigsdotter (2014) and Stigsdotter & Randrup (2008):

1. Spatial structure	The garden should be distinct from its surroundings. It consists of a large “outdoor room” with several smaller rooms with walls created by shrubs or green fences, ‘floors’ made of grass, stone or wood and ‘roofs’ formed by treetops, pergolas with flowering climbers, and the open sky.
2. Living building materials	Vibrant and constantly changing plant material is essential for the garden. The amount of greenery is important due to its health supporting qualities.
3. Easy to interpret	The patients must be able to understand what the garden has to offer and what they are able and allowed to do in it.
4. Security	The garden should provide a sense of total security. The green walls of the garden help to achieve this by obstructing outsiders’ view into the garden or physical access. This demarcation must not make the patients feel like they are trapped, but instead it should shut out problems and worries.
5. Level of Safety	During the healing process, the patients must be gradually exposed to areas that are less safe. The fact that Nacadia is located in an arboretum offers an extra ‘semi-safe’ zone, which the patients can visit as they become stronger.
6. Strength of Mind	The design should accommodate patients at all different levels of emotional and cognitive strength and provide a suitable level of experiences in the environment and demands.
7. Mental and physical accessibility	The design should motivate and attract the patients to the different spaces in the garden by minimising barriers in between them, e.g. by making some attractions visible from the other spaces. All parts of the garden should be accessible, and by using different natural paving materials and varied terrain, the patients’ body awareness should be improved.
8. Flexibility and Participation	Flexibility concerns the patients’ opportunities to be creative and participate in planting, maintenance and harvesting, and put their own stamp on the garden.
9. Perceived Sensory Dimensions of Nature	A combination of the nature characteristics ‘refuge’, ‘nature’ and ‘rich in species’, and a low presence or absence of ‘social’, have been interpreted as the most restorative natural environment for stressed individuals (Stigsdotter & Grahn, 2011).
10. Opportunities for nature-based activities	The garden should offer opportunities for meaningful activities year-round. There should be practical activities such as picking fruit and chopping wood, and activities with more symbolic values, such as balancing over a stream to be used as a therapeutic metaphor for starting something new and leaving worries behind. Activities that involve interaction with nature may support health.

Table 1. The Nacadia design criteria (Stigsdotter, 2014; Stigsdotter & Randrup, 2008)

Nacadia is separated from the rest of the arboretum by a fence, which is partly hidden and covered by plantings. To access Nacadia, patients must walk 600 meters through the arboretum to the entrance of the garden. From the entrance (5 on fig. 6), a wooden walkway (6 on fig 6) leads down the slightly sloping terrain and into the garden. Nacadia has the character of a forest garden. Two-thirds of the garden area is covered by canopies, while the remainder is open to the sky. The natural objects in the garden (various types of terrain, trees and shrubs) create distinctive spaces (referred to as “room” in the above design criteria) within the overall area of the garden. For example, one space is defined by tall and dense trees surrounding a pond that reflects their silhouettes and the sky (8 on fig 6). The spaces all have different characteristics. Several seating facilities can be found in the garden. Some are more visible, such as the staircase leading up to the office building. Others are more hidden, such as the bench in the small closed space (13 on fig 6). A little stream (7 on fig. 6) trickles through the garden into a lake with a small island (15 on fig. 6). A wide wooden terrace surrounds the office building and offers a view over the garden (12 on fig. 6). Part of the terrace leads to a four-meter raised platform over the lake. A greenhouse includes a number of spaces with facilities for sitting or lying down (hammock) and some basic kitchen facilities where it is possible to get refreshments such as water, tea or coffee, and a storage space for diverse tools and equipment for garden activities and exercises.

The current study only focuses on the outdoor environments, because it soon became obvious that the green house merely was used for storage purposes and due to the kitchen facilities.

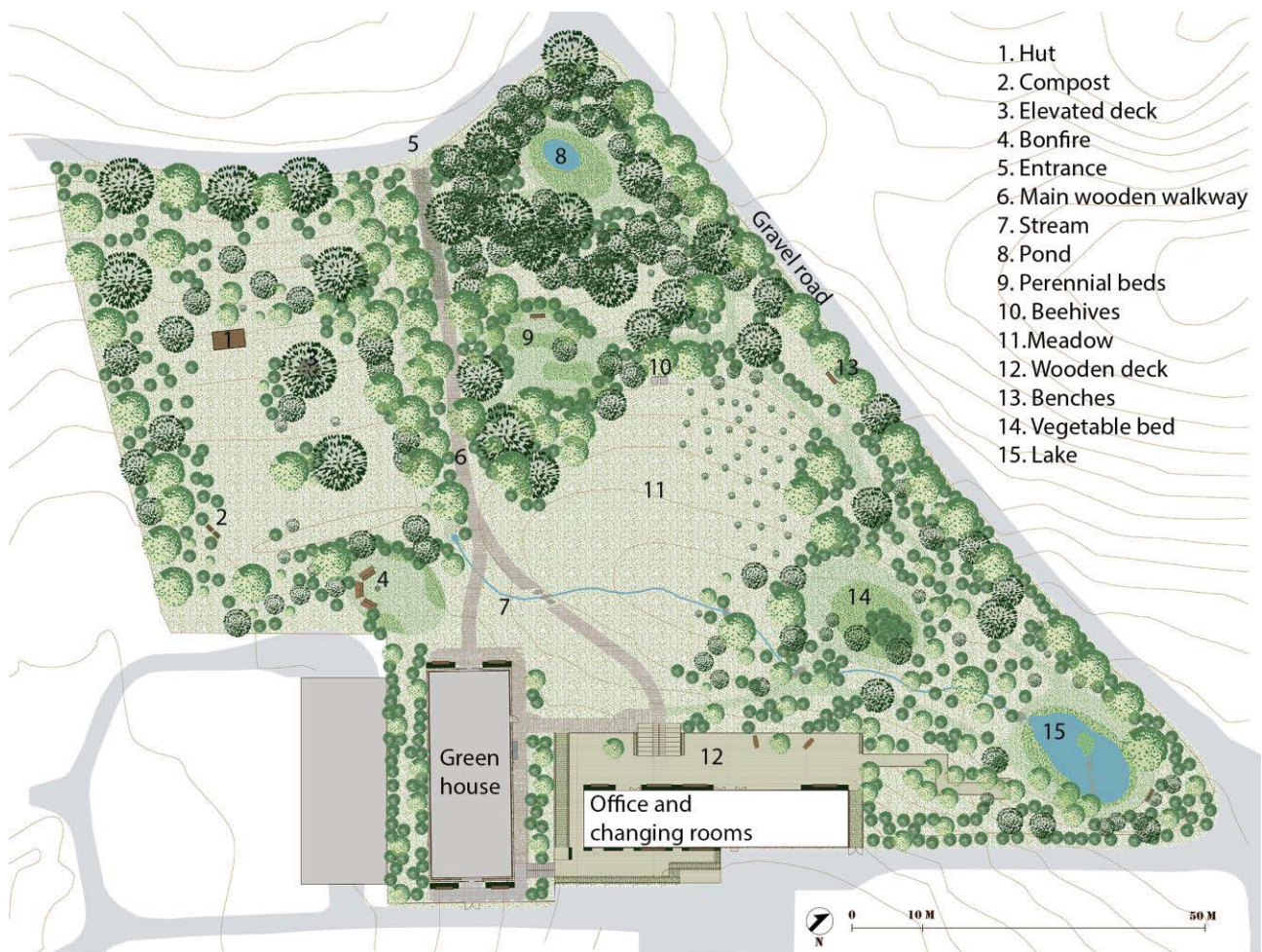


Figure 6. Site plan of Nacadia

The Nature-Based Therapy in Nacadia (NBTN)

As written above, NBT is defined as a therapeutic practice that takes place in a specially designed or selected natural environment, and uses activities that involves natural objects and nature experiences as therapeutic means to initiate a therapeutic process (Corazon et al., 2011; Corazon et al., 2010). The NBT programme used in Nacadia was developed to treat people who are suffering from stress and/or stress-related symptoms. It builds on elements from NBT and from mindfulness-based cognitive therapy (Corazon et al., 2010). A prerequisite for conducting NBT is that the garden design and the NBT programme are closely related (Stigsdotter, 2015). Both the design of Nacadia and the NBT programme have a salutogenic (health creating) focus (Corazon et al., 2010, 2012; Stigsdotter & Randrup, 2008), that emphasis on what is strong and healthy within the individual patient to build up their physical and mental capacity (Stigsdotter, 2015). The desire is to reinforce and develop the strength and capabilities of participants so they are better able to cope with illness, and improve their quality of life (Antonovsky, 1996).

From an explorative perspective, NBTN can be described as consisting of 5 components with an inter-supportive aim (fig. 7): 1. Individual conversational therapy (ICT) using mindfulness-based cognitive therapy; 2. Physical and mental awareness exercises (AE), e.g. meditations and body scan; 3. Garden activities (GA), e.g. chopping wood and collecting herbs; 4. Own time (OT); 5. Homework, to practice the different techniques and methods from ICT, AE, GA, and OT at other settings than Nacadia (Sidenius et al. 2017).

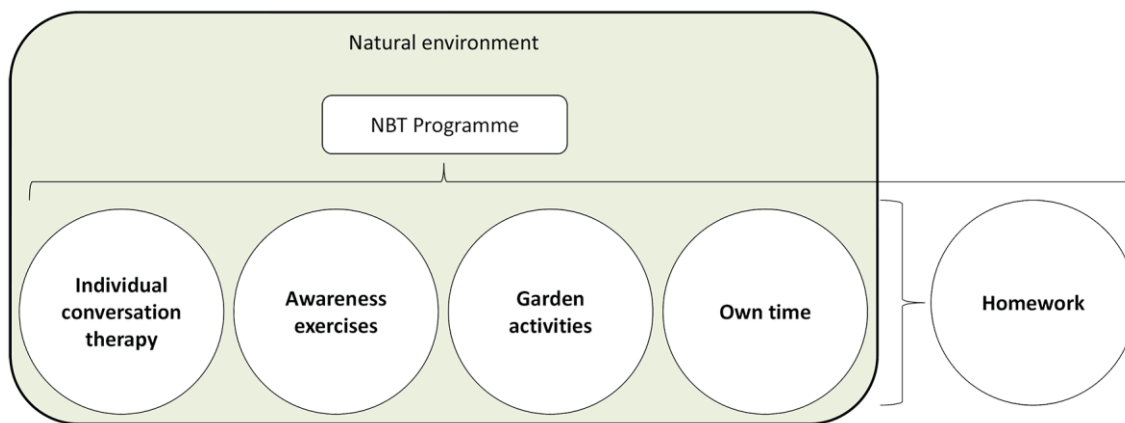


Figure 7. The components of the NBT programme conducted in the natural environment of Nacadia (Sidenius, Stigsdotter, et al., 2017).

Though all NBTN components are intended to be applied to the whole group of participants, each component is flexible, optional and can be adapted to the individual participant's needs. The person-nature relationship during the NBTN contributes sensory experiences and nature-related stories and symbols, and is thought to enhance the relaxation potential and to increase the participants' experiences of being present and in the moment. AEs and GAs were included in the NBT programme to help participants to accept their present circumstances by paying non-judgmental attention to their thoughts feelings and needs (Corazon et al., 2010). Homework is recommended so that the participants continue to use the techniques and methods and implement them in their everyday routines. NBTN is a 10-week programme, 3 days a week, 3 hours a day. During the current project, there was a maximum of 7 and a minimum of 4 participants per group. The NBT programme is the same all-year-round, and the framework of the programme is the same every week. However, each week has a specific theme in accordance with the participants' expected progress. The therapy was performed and managed by two authorised psychologists, both of whom had been trained in NBT. The therapists were supervised by the medically responsible psychiatrist. The GAs were initiated and assisted by a professional gardener in Nacadia (Sidenius et al., 2015; Sidenius et al., 2017).

Subjects

Inclusion and exclusion criteria

Potential participants were informed of the project through announcements in newspapers, online, and through collaborations with social workers, psychologists, psychiatrists, general practitioners, and job centres. The inclusion criteria were: 20-60 years of age; one of the following International Classification of Disease (ICD-10) codes (WHO, 1992) as the primary diagnosis: psychiatric diagnosis of adjustment disorder and reaction to severe stress (ICD-F43.0-9, minus 1 = PTSD). In the current study, this level of stress was considered to correspond to 3-24 months of inability to work. The exclusion criteria were: Other significant diseases or mental disorders, suicidal, social phobia, drug or alcohol abuse. Before admission to the project, an assessment procedure ensured that the inclusion criteria had been fulfilled by each potential participant. In total, 43 participants were found suitable for NBTN and 42 chose to participate.

Sampling

With regards to demographics, the strategy behind the recruitment process was to ensure maximum heterogeneity of the participants (Bryman, 2012; Patton, 2015). However, the inclusion criteria aimed to ensure homogeneous sampling of the subjects with regards to the particular diagnostic group of interest in the study (Patton, 2015). The complete group of participants was in focus during observations to gain a broad picture. However, for the interviews and logbooks, an outlier sampling strategy was used to select subjects to obtain stories from participants representing different personalities within the group of participants (*ibid*). The thesis considers seven groups of participants (N=42) who participated in NBTN during the period from 8th August 2013 to 27th March 2015 (table 2).

Group	Date	N=42
1	05.08.13 - 11.10.13	6
2	14.10.13 - 20.12.13	5
3	03.02.14 - 11.04.14	6
4	22.04.14 - 27.06.14	7
5	11.08.14 - 17.10.14	7
6	13.10.14 - 19.12.14	7
7	19.01.15 - 27.03.15	4

Table 2. Seven groups of participants

Ethical considerations

This PhD project has taken the ethical principles of the World Medical Association's Declaration of Helsinki (World Medical Association, 2013) into account. Before the start it was approved by the Danish Data Protection Agency (J.nr. 2013-54-0344) and by the National Committee on Health Research Ethics (P.nr. H-1-2013-038). All the participants were informed about the project both orally and written, and signed a written consent prior to participation. Participants were further informed of their right to withdraw from the project at any time and were guaranteed that the data would be treated confidentially. During the collection of data and the analyses, ethical principles for qualitative studies were followed (Fog, 2004; Nielsen, 2003). The sources of all quotations used in articles I-III and in this thesis are anonymous.

Data collection instruments, methods and protocols

With the aim of reliable and transparent research, data collection and data protocol procedures were decided and followed to ensure that each of the data collection instruments were used and conducted in the same manner for each of the seven groups of participants, which means they can be repeated in other case studies with similar settings (Creswell, 2014).

Different types of instruments and methods were used to varying extents across the different case units for the articles (I-III) (table 3). For example, behaviour mapping (BM) data (see the section 'Observations') was used in article I and II; in article I for illustrative clustering of the distribution of occupations, while in article II the data was merely used corroborating with preliminary findings from the SSIs to gain a sound understanding of the context before analysing the SSIs.

Instruments

Landscape analysis (LA)	Observations	Interviews	Logbooks (LB)	Questionnaire
Eye height analysis	Behaviour mapping (BM)	Semi-structured Interviews (SSI) with participants	Map to illustrate used locations	EQ-VAS
	Behaviour and maintenance traces	Semi-structured group interview with the therapists	Open questions	
In article III	In articles I, II, III	In articles I, II, III	In articles II, III	In article III

Table 3. The different data collection instruments used in the different articles and the thesis.

Table 4 illustrates the distribution of the participants in seven groups at different times. The table further shows the different kinds of data collected from each of the seven groups.

Group	Date	BM: N=42	SSI: n=14	LB: n=39	EQ: n=36
1	05.08.13 - 11.10.13	6	2	2	4
2	14.10.13 - 20.12.13	5	2	2	5
3	03.02.14 - 11.04.14	6	2	2	5
4	22.04.14 - 27.06.14	7	2	2	7
5	11.08.14 - 17.10.14	7	2	2	6
6	13.10.14 - 19.12.14	7	2	2	7
7	19.01.15 - 27.03.15	4	2	2	2

Table 4. Data collected from the seven groups of participants

Data was collected several times during the course of the project to ensure that data was obtained from each of the 7 groups of participants. This is presented in figure 8, which also shows which data was used in articles I-III.

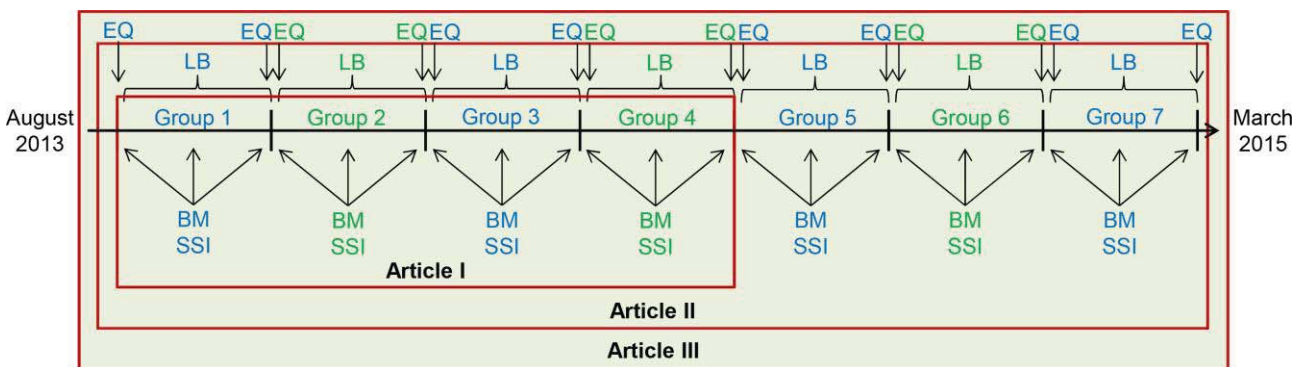


Figure 8. The flow of conducting data collection from the seven groups, August 2013 – March 2015.

Landscape analyses

Spatial LAs were conducted several times during the course of the project from August 2013 to March 2015. This was done to obtain data from all four seasons, and to determine whether there were any developments in the landscape due to maintenance or use.

The LA were conducted using the method of eye-height analysis (Stahlschmidt, 2009). It gave a sufficient understanding of the physical conditions from a human-scale perspective, and showed how Nacadia is divided into several distinctive spaces.

Observations

Behaviour mapping (BM) is a method that is used to study people's use and behaviour with regards to the different components and attributes within a given environment (Moore & Cosco, 2010; Proshansky et al., 1970). First author or a colleague conducted the BM sessions in the 2nd, 5th, or 9th week of the therapy programme for each of the seven groups of participants. Each BM session lasted for 110 minutes and consisted of 5 systematic scanning sessions conducted at 25-minute intervals between 10.15 am. and 12.05 pm. During each scanning session, the same path was followed through Nacadia, and to ensure that each scanning session covered the whole area of Nacadia, scannings were performed from various observation points along the path. While the BM was being conducted, the observations and the attributes were mapped, noted and stored in ArcGIS on an iPad. The attributes were location, time, weather conditions, and type of activity. For other observed variables which were considered worthy of analysis, additional notes were taken, which were eventually used as the basis for the interviews with some of the participants.

Interviews

Semi-structured interviews (SSI) with participants

An interview-guide consisting of open-ended questions was produced. The aim was to gain insight into the participants' personal explanations (Ritchie et al., 2013; Smith et al., 2009). To stay aligned with topics of interest, the questions were coded with references to the main research questions relating to the participants' use, preferences and experiences at the start, halfway through and at the end of the NBTN. Two participants from each of the groups were interviewed. Participation in the interviews was voluntary; however, it was important that the participants had sufficient mental capacity to participate. Using an outlier sampling strategy (Patton, 2015), it was hoped that information-rich stories would be obtained from the participants with both introvert and extrovert personalities. With this in mind, the therapists selected two participants from each of the seven groups for the interviews. For each interviewee, three SSIs averaging 20 minutes were conducted by the author or a research colleague during the 2nd, 5th, and 9th week of the 10-week therapy programme. All interviews were recorded and transcribed for analysis.

Interview with therapists

A semi-structured group interview was conducted with the two therapists to gain insight into how they use Nacadia as part of the NBT and how they have guided participants, observed and reflected upon participants' use, preferences and experiences. The interview was recorded and transcribed, although it was not analysed, but merely listened to and used to gain a deeper understanding of the interplay between the environment and the nature-based therapy programme, and to corroborate the findings during the analysis of the other collected data.

Logbooks

During the 2nd week of the NBT programme, all the participants were encouraged to keep logbooks (LB) regarding their use, preferences and experiences in Nacadia. For each of the days of the NBT programme, there were four pages in the logbook: The first page was a map of Nacadia on which the participants could draw and illustrate how they had used the garden on a specific day. The second page was for writing their reflections on the given question: "At which locations or on which routes did you eventually feel particularly well"? On the third page, the participants were asked to mark one or more of several variable/keywords they considered suitably described the current weather conditions. Furthermore, they were asked to describe why they had gone to the site they had marked on the map. On the fourth page, they were openly asked to write down their thoughts and comments; whether they had experienced change during the day or if they had noticed anything in particular.

Questionnaires

EQ-VAS is a visual analogue rating scale, which is part of the validated full EQ-5D questionnaire (EuroQol, 2017; Pedersen et al., 2015). It is used as a standardised instrument for measuring participants' self-reported health-state on a particular day. In this study, health status was measured during the first week (baseline) of the NBT programme, and once again at the end of the NBT programme (endpoint). The scales were handed out or sent to all the participants as part of the full EQ-5D validated questionnaire. The VAS rating was used as an overall measure of the development in the participants' health status from the beginning to the end of the NBTN.

Table 5 shows how the data from the above described methods were collected or handed in from each participant from the seven groups during the PhD project.

Group	Participant	BM (N=42)	SSI 1 (n=13)	SSI 2 (n=13)	SSI 3 (n=13)	LB map (n=39)	LB text (n=39)	EQ-5D 1 (n=39)	EQ-5D 2 (n=34)
1	5. August - 11. October 2013								
	A	X				X	X	X	X
	B	X				X	X	X	X
	C	X				X	X	X	X
	D	X	X	X	X	X	X	X	X
	E	X	Misdiagnosed						
	F	X	X	X	X	X	X	X	X
2	14. October - 20. December 2013								
	A	X	X	X		X	X	X	X
	B	X	X	X	X	X	X	X	X
	C	X				X	X	X	X
	D	X				X	X	X	
	E	X				X	X	X	X
3	3. February - 11. April 2014								
	A	X		X	X	X	X	X	X
	B	X				X	X	X	X
	C	X				X	X	X	X
	D	X	X		X	X	X	X	X
	E	X				X	X	X	X
	F	X				X	X	X	
	G	Did not show up after assessment procedure							
4	22. April - 27. June 2014								
	A	X				X	X	X	X
	B	X	X	X	X	X	X	X	
	C	X				X	X	X	X
	D	X				X	X	X	X
	E	X				X	X	X	X
	F	X				X	X	X	X
	G	X	X	X	X	X	X	X	X
5	11. August - 17. October 2014								
	A	X	X	X	X	X	X	X	X
	B	X	Did not hand in the logbook or questionnaires						
	C	X				X	X	X	X
	D	X	X	X	X	X	X	X	X
	E	X				X	X	X	X
	F	X				X	X	X	X
	G	X				X	X	X	X
6	13. October - 19. December 2014								
	A	X				X	X	X	X
	B	X	X	X	X	X	X	X	X
	C	X	X	X	X	X	X	X	X
	D	X				X	X	X	X
	E	X						X	X
	F	X				X	X	X	X
	G	X				X	X	X	X
7	19. January - 27. March 2015								
	A	X	X	X	X	X	X		
	B	X				X	X	X	
	C	X				X	X	X	
	D	X	X	X	X	X	X	X	X

Table 5. The data used as the basis for articles I-III of the thesis. X represents collected data.

Data analyses

Analysis of observations

The data from the BM was filtered using ArcGIS to create an illustrative clustering of use of Nacadia based on the different attributes of relevance for article I: Activity types: ICT, GA, OT; general use clustered in winter, spring, summer, and autumn; general use clustered in baseline, mid and endpoint of the course of the NBT programme. The cluster analyses were first and foremost used in article I to gain a general understanding of how Nacadia was being used and to corroborate background information for article II and as part of the mixed methodological approach in article III.

Analyses of SSI

Initially, thematic analysis was applied to the SSIs to identify themes (Howitt, 2013) using a procedure in line with interpretative phenomenological analysis (IPA) (Smith et al., 2009). The IPA process resulted in some sound analytical matrixes with different codes, themes and factors of interest. However, the IPA was not fully conducted. It became clear that reflective lifeworld research (RLR) (Dahlberg et al., 2008), a method with a less interpretative approach than IPA, would be more suitable for analysing the interviews. The participants' narratives were, in general, very detailed in their descriptions of their experiences, so the need for interpretation was less than initially assumed. However, the analytical matrixes from the IPA procedure provided a useful and solid base for RLR. The aim of RLR is to describe phenomena and their meaning without interpretation (Dahlberg et al., 2008). A descriptive presentation of the participants' experiences of NBTN which is as close as possible to their own narratives seems consistent with the participants own lifeworld stories so RLR was chosen to illuminate NBTN from the participants' perspective. For the DPOE (article III), a content analysis was conducted using the preliminary findings from the matrixes to identify patterns and themes in the participants' stories (Patton, 2015) in relation to the core area of evaluation of the DPOE.

Analysis of logbook data

In total, 532 maps and pages of narrative were submitted by the participants. The graphical data (participants' marked locations and/or path on the map) from the maps in the LB were scanned and entered into ArcGIS along with the notes on the weather for the various days. Participants' illustrations and narratives were not systematic as most did not take notes every day of the NBT. They did not always add any of the suggested factors and clearly did not use a fixed

set of factors in their explanations of their illustrations, while towards the end of each of the 7 NBT periods, there were significantly fewer illustrations and narratives. Therefore, it was decided that the graphical LB data would be used merely as an overall illustration of how the participants' use of the garden was distributed. In article III, the graphical LB data was used to corroborate the graphical data from the BM and landscape analysis in order to clarify the division of Nacadia into distinctive spaces.

The LB texts were transcribed in order to conduct the content analysis (Patton, 2015) in relation to the core area of evaluation of the DPOE (article III). Due to the immense amount of data generated, only narratives from 12 participants were used. These 12 participants are those who were also selected for the interviews.

Analysis of data from questionnaires

EQ-VAS was selected as part of the mixed-method approach to show the development in the participants' general well-being. EQ-VAS findings was used to support the findings from BM, SSI and LB (triangulation) to trace general parallels in the development in general health and development of use, preferences and experiences with Nacadia.



Photo 7. The spring of the streams

Results

Summary of findings from article I

The case unit was an empirical study of NBTN to gain an overall impression of how the natural environment was used by the people suffering from severe stress, and to form the basis for further studies of NBTN. The aim was to investigate the participants' use, preferences, experiences with Nacadia and any possible seasonal influences. The focus was on four groups of participants during winter, spring, summer and autumn.

The BM revealed which parts of the garden were used for certain types of activities. Further BM generated a good overall impression of some general behaviour and use patterns to be explored further during the SSIs for getting the story behind the observed patterns.

General use

The distribution of garden activities (GAs), individual conversation therapy (ICT), and participants' own time (OT) during a year in Nacadia can be found in article I, figure 5. GAs were predefined programmed activities which were linked to more or less specific locations in the garden, e.g. GAs are clustered near the pond, where participants could choose to engage in maintenance tasks, and near the greenhouse, where participants could work at work tables. BM alone did not identify the participants' preferred locations for GAs. Interview data disclosed that the participants' current physical and mental capacity determined which programmed GA was chosen, which was mainly based on the amount of physical exertion necessary and the extent of the social interaction.

The locations used for the ICTs can be perceived as borders between two different types of spaces, e.g. an enclosed space bordering a more open space such as the location of the beehives (e on fig. 9).

OT activities are widely distributed around the garden. As with the ICTs, several OT activities were conducted in transition zones between different spaces. Several participants were observed in the more secluded areas of the garden such as the hammock (a on fig. 9), the wooden deck (h on fig. 9), the bench near the pond (d on fig. 9), and the bench near the lake (i on fig. 9).

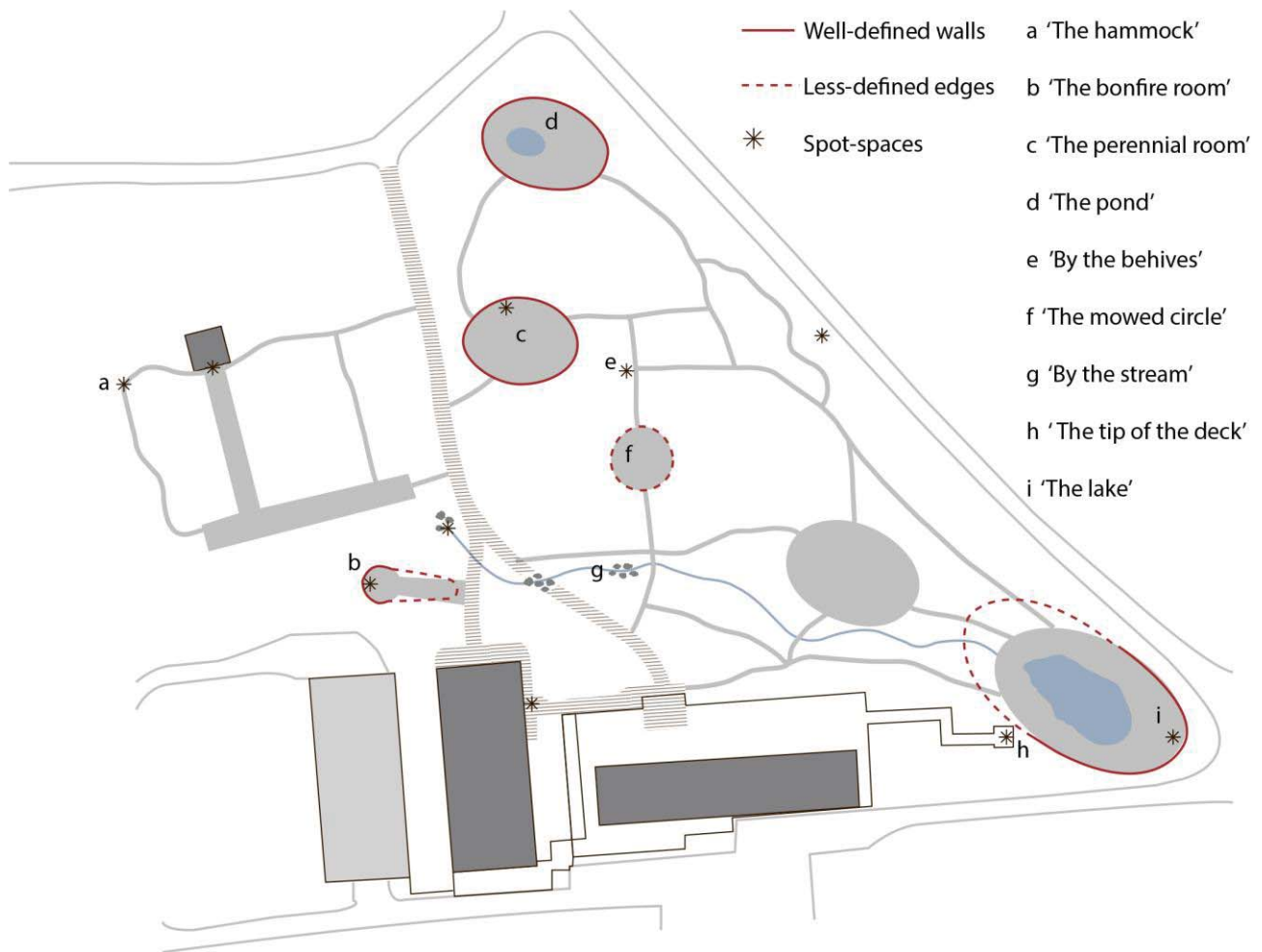


Figure 9. The most distinctive spaces and spot-spaces as found in article III

Preferences

The locations chosen for OTs directly align with the participants' preferred spaces / type of natural setting. In general, the preferred qualities of the locations are: *“Enclosed”*, or *“slightly closed”* but with a *“view out”*, to *“see far”*, and *“see the sky”* to get a *“sense of expanse”*. This resulted in the participants' feeling that their *“backs were covered”* and that they were *“protected from behind”*. Two different types of space were identified to meet these criteria. ‘Spot-spaces’ are where components are defining characteristics, that only nearby can be experienced as a space, for example when sitting up against a hedge or lying/sitting down in tall grass. Such spatial experiences are based on an interaction between the participant and the component, rather than the component defining a distinctive space. ‘Spot-spaces’ offer features that when close by can be perceived as shielding or protective while still providing an outlook. ‘Spot-spaces’ were used by participants to hide, find peace and quiet and undisturbed privacy so that they could be alone with their personal thoughts and *“do nothing”*. Other preferred locations were those that included components (e.g. terrain, trees and shrubs) large enough to define

‘distinctive spaces’, thereby providing the above-mentioned qualities and providing features to experience and explore (fig. 10). This gives the participants the feeling of “*being away*” by allowing them to explore and interact with certain natural features such as the scents, sounds and sights present in the ‘distinctive space’. Spaces that include features making it easier for the participants to work out how to use the spaces and having features facilitating interaction with the natural objects in the spaces seem to be preferred. Such features could be, e.g. simple natural or constructed seating such as: “*...a small stone which is comfortable to sit on*” or “*...a bench where you can hear the birds and the wind in the trees*”.



Figure 10. Illustration of the described physical conditions of a preferred distinctive space.

The influence of the seasons on use and preferences

No seasonally-related conditions have an influence on the participants’ choice of location for the GAs. Overall, no significant difference was found regarding use distribution in relation to the four seasons. The participants did not express any concerns in terms of seasonal conditions. However, the participants need to be adequately equipped to manage the changing weather conditions. When weather determines how a participant uses the garden, it appears to be a challenge for the individual participant, rather than for the participants in general, e.g. low temperature and rain had a more negative impact on participants who expressed low mental capacity. However, the participants seemed well prepared and equipped for the changing weather

conditions during all four seasons. One of the interviewed participant said that there was a lack of suitable places to retreat to in the garden during the winter.

Summary of findings from article II

The second article applies a lifeworld phenomenological approach in order to explore the participants' lived experiences with NBTN to gain a deeper understanding of NBT in natural care settings. Based on the SSIs with the participants from all seven groups corroborated by data from the interviews with the therapists, MB and LB, the following themes of constitutive elements were found to elucidate the essence of the phenomenon: *Another world of relations and environments to habituate to; Becoming more comfortable and developing a sense of belonging; Suitable shelters offer less exposure and a sense of safety and freedom; Sensory experiences reinforced Nacadia as a supportive environment; Increased awareness of destructive mindsets; Spectrum of opportunities meeting individual capabilities and needs; New approaches, more courage to change and to move on.*

Based on these themes, a description of NBTN as a dynamic evolving process was made in article II. The development is here summed up in bullets:

- Participants experienced a sense of uncertainty and even slight discomfort when they began NBTN and were new to the programme and the settings of Nacadia.
- The participants soon became more comfortable with the NBT programme and its procedures.
- A feeling of familiarity with the garden and the practical conditions grew, and a sense of belonging developed.
- The participants became familiar with the garden, and found spaces in the garden that provided suitable shelter and reduced the feeling of being exposed.
- A sense of safety and freedom developed, and along with the sensory experiences in the garden reinforced the perception of Nacadia as a supportive environment.
- Participants' awareness of the various opportunities in NBT increased, which made them more aware of themselves, their relations with others and the world around them.
- Participants became more open to exploring the range of opportunities in the NBT, and became more consciously involved in the NBT exercises and different activities in line with their individual capabilities and needs.

- The participants felt encouraged to develop personal tools, techniques and new approaches that made them feel better equipped and gave them more courage to change and develop unique individual strategies and approaches to life when moving on after NBTN.

Article II further found that there was a linear increase in participants' awareness during NBTN, and a fluctuating development in their mental and physical capabilities. As result of their increased awareness, the individual participants became increasingly able to engage in more beneficial activities, which were in line with their mental and physical capabilities. The flexibility of the NBT programme and the range of opportunities available in NBTN stimulated positive development in all the participants at their own pace and in line with their unique individual needs, preferences, and previous and current life experiences.

Summary of findings from article III

The final case unit was conducted with an aim to develop and apply a DPOE model sufficient for therapy gardens and with an aim to examine whether the original aim and objectives of the EBHDL process of Nacadia is sufficiently met. The study was conducted over a longitudinal timespan, concerned all groups of participants, and used a mixed-method approach with multiple sources of data. The result was that a number of successes and failures were identified in relation to the original aims and objectives of Nacadia.

Successes:

- The participants consider Nacadia to be a safe and protective setting for the therapeutic activities, while it offers various distinctive spaces for hosting all parts (AE, ITC, GA, OT) of the programme.
- During the treatment process, Nacadia gave all the participants freedom to explore and challenge themselves in line with their current capabilities and needs.
- During all four seasons, the participants were able to find and choose spaces and activities that were meaningful to and appropriate for them considering their current physical and mental capacities. They were eventually able to find therapeutic tools they could use for their rehabilitation process.
- The EQ-VAS scale showed a significant positive improvement in general health during the 10-week NBTN programme. The participants experienced improved memory, fewer cognitive problems, felt calmer and had more energy.

Failures:

- Exposure (visual access from outside into the garden) was the most commonly mentioned negative failure experienced by the participants. During the study period, the problem was solved by planting bigger denser evergreens supplemented by woodpiles which were strategically placed alongside the fence.
- Since the participants expressed having a certain attachment to specific spaces in and uses of the garden, it is important to be aware that maintenance may have a sudden impact on the spatial structure of gardens as it may significantly alter the character of certain spaces and the participants' opportunities for certain uses.
- Certain unnatural sounds were considered to be very disturbing. The sound of the wind in the canvass over the bonfire site and the wind shaking the metal nametags on the trees and shrubs were mentioned.
- The presence of less foliage on trees and scrubs in the autumn and winter meant that certain spaces became less well-defined, but this was not referred to as being a significant problem. However, it was commented on by one of the participants.
- Rain and cold weather conditions limited operations a few times. However, it was possible to find alternative spaces and activities and proper equipment made it possible to deal with the conditions.
- The opinions of the staff regarding certain locations in the garden, which had been relayed to the participants, had an influence on the participants' experiences with the locations both positively and negatively.

Article III resulted in a conceptual methodological framework that was adapted and applied to the present case - A generic DPOE model suitable for NBT settings. The model can be adjusted to accommodate different intentions and measures of specific cases (fig. 2).



Photo 8. The stream and the meadow.

Discussion

In this section, the findings are discussed in relation to the research questions, which were examined in articles I-III, and the aim of the PhD project. The discussion is based on the results from all the articles. Further, the methods and the implications of the results of the PhD project for practitioners and for future research are discussed.

Participants' use and preferences in Nacadia

Preferred natural environments for restoration

The main result from article I was a description of the participants' use of the environment and their preferred spaces in Nacadia. In brief, the preferred spaces (fig. 9) are those being enclosed, yet with possibilities for having views over the expanses. Such spaces give participants a feeling of being protected and safe, and they were used for relaxation and to retreat and explore and interact with the natural stimuli in the space such as the scents, sounds and sights. The preference for such spaces is in line with 'Prospect Refuge Theory' which asserts that humans are attracted to environments that offer a combination of views and a sense of enclosure, which provides the feeling of safety and pleasure (Appleton, 1984; Dosen & Ostwald, 2016).

The participants' preferences and their explorations and interactions with the natural objects in the spaces are further supported by Kaplan and Kaplan (1989). They claim that humans prefer environmental settings, where processing the information of the environment is effortless, so that the landscape is experienced as unthreatening, and further hint a promise that there are more information in the setting to explore. Thus, the preferred spaces have a certain level of complexity and mystery, that motivates exploration (Kaplan & Kaplan, 1989; Kaplan, 1987).

Studies from Sweden on nature assisted therapy in Alnarp Rehabilitation Garden, yield very similar descriptions of participants' preferred spaces in a restorative context (Palsdottir, 2014; Pálsdóttir et al., 2014). Furthermore, in Denmark, a study of people's general preference for restorative natural environments led to the description of an 'optimally restorative room' (Stigsdotter et al., 2017), which is very similar to the description in the current study. These empirical validations are considered important support for the theory.

A therapy garden is more than safety and pleasing environments

The above-described preferred spaces were used for calm and sedentary activities for relaxation, which all participants experienced needs for during NBTN. As article III discusses,

and as the original design criteria state, it is important to consider the environment and spaces in a therapy garden in relation to the NBT programme, and in relation to the participants' expected development. The therapy program along with the garden environment should then both support and challenge the participants in all the phases and levels of physical and mental capabilities they experience during their therapeutic processes. Article II found it was very important that the participants could choose, explore and test themselves in the various environments and when engaging in the different activities. This highlights that therapy gardens need to provide more than just safe and pleasing rooms for calm and physically passive activities. The fact that a therapy garden should both support and challenge patients, while being appropriate to their current phase of rehabilitation was well known during the EBHDL process of Nacardia (Stigsdotter & Randrup, 2008; Stigsdotter, 2014) and has been well described by Grahn et al. (2010). Article I found that participants' choice of activities was mainly determined by their current mental capability to manage physical exertion, as well as their current capacity to cope with social interactions. This illustrates that therapy gardens should continuously meet the different needs of individuals by providing different spaces and environments and different kinds of activities. The findings in article II confirm that it is important that a therapy garden offers a broad range of activities to meet the patients' different and fluctuating needs.

Accessibility of natural environments

Even though participants generally expressed a high preference for natural environments, it was with the proviso that the environment should not be too wild because otherwise it can seem intimidating. It is well-documented that when people suffer from mental illnesses they perceive and relate differently to environments and seek security and simpler things to relate to. Further, people with stress-related illnesses have more difficult interpreting environments (Bucci, 2007; Grahn et al., 2010; Ottosson & Grahn, 2008). This illustrates that environments in therapy gardens should have a certain level of affordances to make the environment more easy for the participants to relate to and to indicate what they can do in the environment (Heft, 2010). Affordances are the functional properties of an environmental feature for an individual, which indicate what one can do in the setting (*ibid.*). Signs and explanations may be perceived as too challenging for people suffering from stress. Thus, in therapy gardens, guiding and supporting hints, rather than signs and verbal explanations, can be communicated by using gentle design features of affordances, which will ease patients' understanding and use of an environment. This

can show patients whether and how they can access an area and may motivate beneficial interaction with the environment.

Participants' experiences of nature-based therapy in Nacadia

Capabilities and awareness

From studying the participants' experiences and their development (article II), it became obvious that each of the participants developed at their own pace and path. No linear development was found in terms of an increasing level of mental and physical capabilities (MPC) to cope with more challenging tasks or to conduct increasingly demanding physical or mental activities. In relation to the supportive environment theory (SET) pyramid, this means that there was no development from the bottom to the top during the course of the NBTN, which may otherwise have been expected. Instead, the participants' MPC continuously fluctuated. However, there was a linear increase in self-awareness and awareness of their fluctuating MPC. This means that the participants increasingly chose activities that matched their current level of MPC, which can be interpreted as an increase in executive functions (EF). The SET explains that there is a correlation between a person's 'scope of meaning', a result of the person's state of mental and physical capacities, and the 'scope of action' suitable for that particular 'scope of meaning' (Grahn et al., 2010). Against this background article II found a contradiction between participants' actual MPCs and the 'scope of action' they chose to conduct (fig. 11). The contradiction more often manifests itself at the start rather than towards the end of the NBTN: In the beginning, several participants conducted activities that were not beneficial for their current MPC. Towards the end of the NBTN, the same participants said that they had learned to choose activities which matched their current MPC. The participants became more mindful or self-aware, and became competent at acting in proportion to their actual MPC, which in line with SET can be seen as restoring a beneficial balance between 'scope of meaning' and 'scope of action'

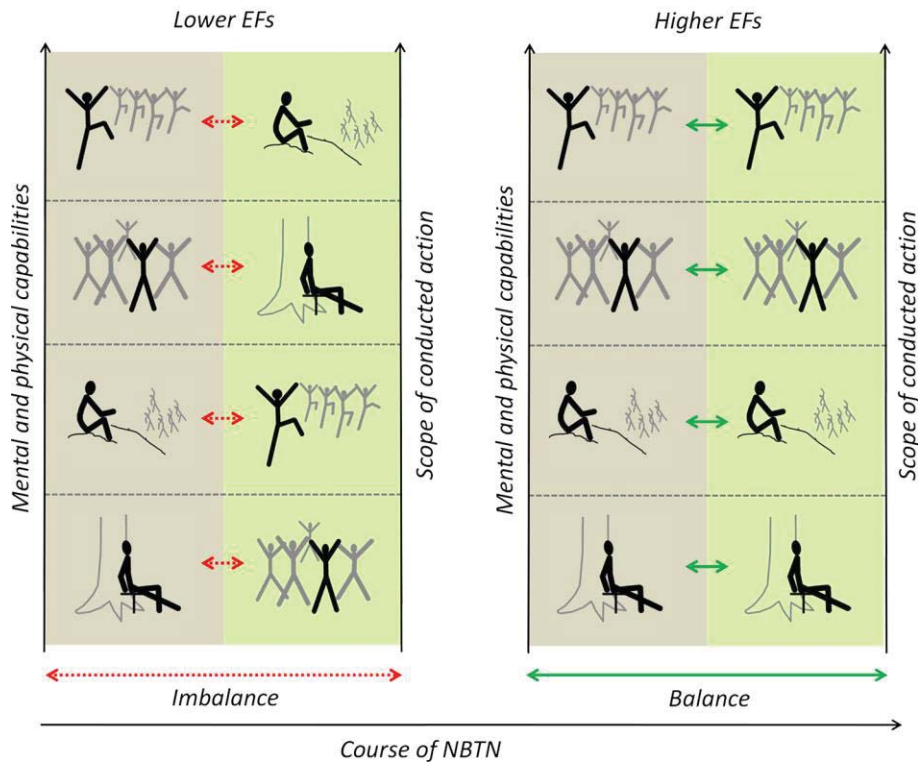


Figure 11. Increased beneficial correlations between participants' capabilities and the activities they conduct.

Considering the participants' narratives regarding their development, it seems sufficient to consider MPCs, 'scope of action' (SoA) and EFs during their development (fig. 11 and 12). In this case, and based on Diamond's (2013) descriptions, EF is understood as being: Self-aware, familiar and confident with NBTN, aware of NBTN opportunities and personal needs, and being able to act accordingly using the tools from the NBTN. Increased EFs will restore a more beneficial correlation between MPC ('scope of meaning') and 'scope of action' (fig. 12).

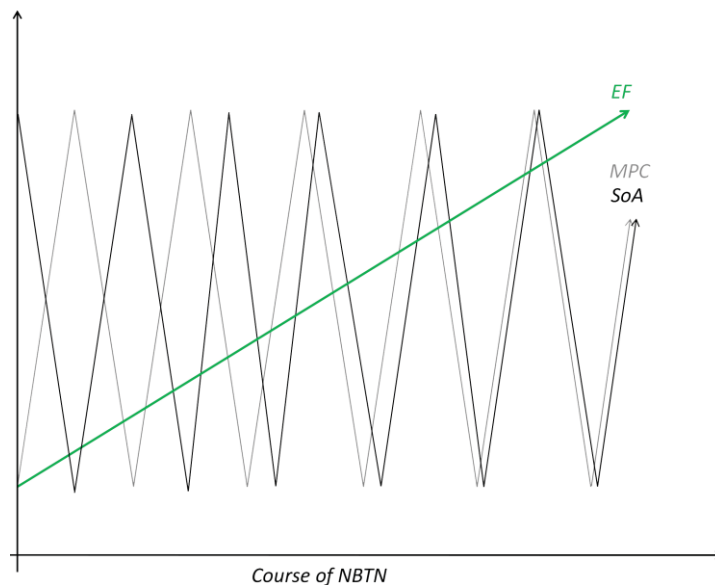


Figure 12. Increased EFs result in increased beneficial correlations between capacities and activities.

Considering the identified developments together with the SET pyramid (fig. 13) will illustrate coherence of mental and physical capabilities, the environment, and scope of action. These need to be balanced by a high level of EFs in order to maintain good mental health; Having low levels of mental and physical capabilities with correlating ‘core of meaning’, leads to a need for a suitable supportive natural environment to conduct a matching level of ‘scope of action’. During the course of the NBTN, the participants developed increased executive functions and were increasingly able to actively choose environments and activities of a more beneficial correlation to their mental and physical capabilities – thus ‘scope of meaning’.

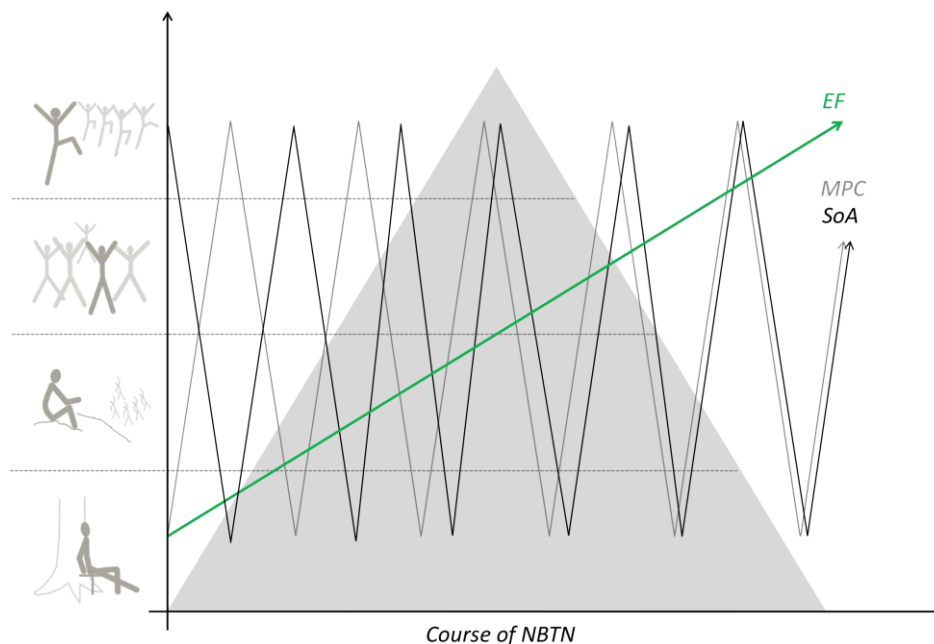


Figure 13. Participants' development in relation to the SET pyramid

The interaction between individual, environment, spaces, ICT, AE, GA, OT, and therapists seems to have resulted in increased EFs. It was essential that NBTN enabled patients to develop their EFs so that they could act beneficially in line with their current MPCs, thereby developing competences, new approaches and strategies to cope with stressful situations.

A therapy garden for people suffering from stress-related symptoms should include a range of environments and activities, and offer flexibility within those in order to hold a board spectrum of individuals and to hold all the individuals' paths and paces of developments.

Nacadia in relation to its original aims and objectives

Article III finds that Nacadia was used as originally intended. The garden was used actively as part of the NBT programme. Physically, the natural objects and natural sensory stimuli were actively used as components for training of the senses and training of physical awareness during the awareness exercises (AEs). The physical awareness gained from AEs could later be recalled during garden activities (GAs) and explored in other contexts. The term ‘embodied cognition’ refers to the fact that learning is better grounded if the experiences are embodied through physical activities (Corazon et al., 2011; Sutton & Williamson, 2014), and that the body can release embodied memories and experiences (Sutton & Williamson, 2014). In relation to this study, the embodied cognition makes it easier for the individual participant to remember and transfer the tools from the NBT to their individual life situations.

The participants also used the garden symbolically. They used the settings and certain natural objects as inspiration or metaphors for reflections and to better understanding themselves and their situation from new perspectives. Both the physical and symbolic use and experiences of the natural environment seemed to strengthen processes of self-discovery and self-awareness as it awakened valuable memories or let to discover and express deeper concepts. E.g. when a participant had a feeling of awe of a distinctive space in Nacadia, which made her see herself as tiny parts of something bigger.

The components of the NBT involving the body, the positive experiences triggered by the natural environment, the flexibility of NBT and the freedom for self-discovery seem to be some of the unique and crucial strengths of NBT, which had a positive influence on the participants’ general well-being. The fact that the participants felt safe and free to explore, and that they could adapt the NBT components to their personal needs, and use them as therapeutic tools in their daily lives demonstrates NBTN, and NBT in general, as an inclusive and accessible form of therapy.

The interplay between EBHDL, NBT, and the individuals

As previously described, each individual approaches, experiences, uses, gains and develops differently based on, e.g. their personality, history, culture, and current capabilities. They develop accordingly, and use and adapt the therapeutic tools from NBT to move on past NBTN. Such therapeutic processes are in line with and support the original holistic approach to human health during the EBHDL process of Nacadia, and the general biopsychosocial understanding of human health found in contemporary health science. NBT in a safe and protective nature-based

care setting offering a broad range of mutually-supportive activities and experiences will equip patients with awareness and personal tools to develop novel approaches for mastering life-situations. Based on participants' various narratives, NBT can be seen as an interplay between the environment (EBHDL), the NBT programme and the individuals (fig. 14).

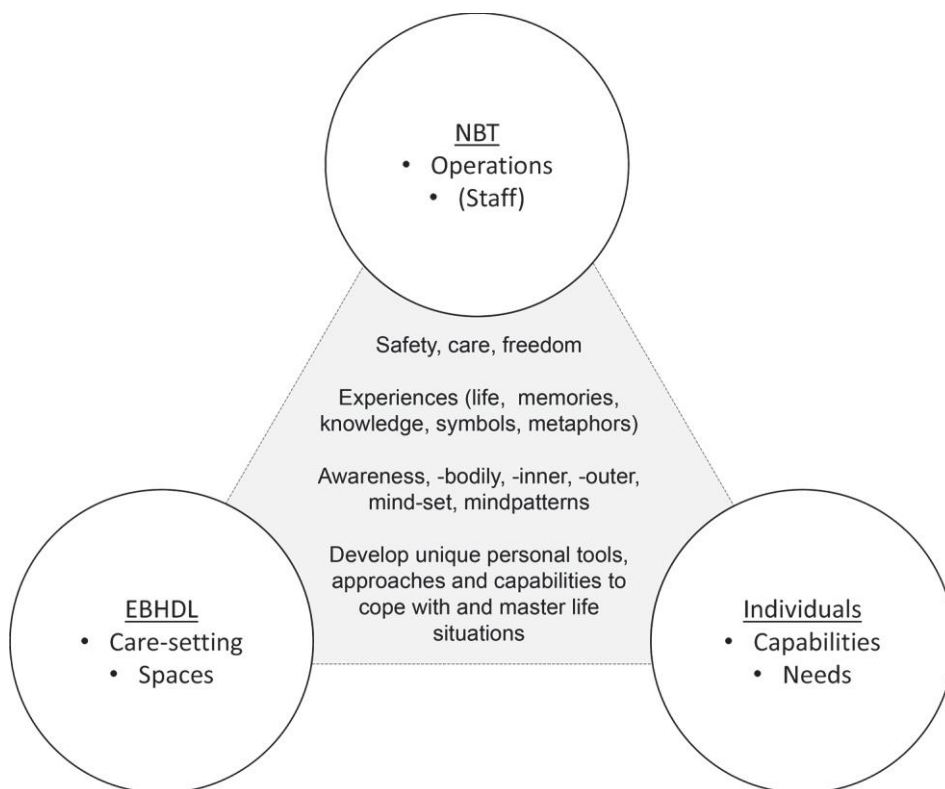


Figure 14. Illustration of NBT as an interplay between the environment (EBHDL), the NBT programme and the individuals.

In the current study of severely stressed individuals, varying needs for support and varying preferences for both the programmed activities (ICT and AE) and the less programmed activities (GA and OT) were expressed by the participants. Further, the extent of the involvement of the staff (therapists and gardener) in supporting, educating and providing guidance in terms of participants' use of the nature-based activities (NBT operations) in the natural environment (interactive care setting) varied depending on the individual participant. The NBTN seems to offer sufficient space for such variety of individuals. The freedom for self-discovery within the interplay of the natural environment and nature-based operations seemed to suit the group of severely stressed individuals well.

Other patient groups may have different needs and capacities and may, consequently, gain more from an NBT programme which has a more targeted and confrontational approach to the NBT operations in the nature-based care setting.

Strengths and weaknesses

This study is part of the larger project, NEST. For this reason, a vast amount of data was collected through various data collection tools. Such mixed-method research is recommended and suitable for the current study because the different data sources validate and strengthen the findings. NEST obviously has broader aims and objectives than this study, which meant that some of the collected data was not relevant. As this study adopts an exploratory approach, the content developed during the course of the project when new topics of interest and relevance were identified. For these reasons, some of the data collection tools could have been tailored to collect more precise data for the study. However, it was decided to maintain the more systematic procedures rather than to modify the data collection tools during the data collection processes. This was also due to ethical considerations to avoid putting too great a burden on the participants, who were already suffering from stress and several from exhaustion. Thus it was decided to keep the original data collection tools rather than add to them or modify them to avoid any unnecessary disturbance or confusion.

The inductive approach initiated in article I may not be considered consistent with the general understanding of “inductive” (Patton, 2015) because the interview guide was relatively short, and the questions were closely linked to the research questions and were, therefore, not as open as is generally recommended in an inductive grounded theoretical approach, as described in Patton (2015) and Smith et al. (2009). The interview guide was deliberately made this way due to ethical considerations and with respect to the participants’ generally low capacity to participate in long interview sessions (as well as having to participate in other data sharing activities in the project). An advantage of conducting semi-structured interviews is that they are flexible. The interview guide was used to maintain the focus on the aims and objectives if a participant exhibited a low capacity to cope, while additional questions could be posed to participants who appeared more able to cope with the interview process. This approach seemed to suit both the interviewee and interviewer, and it saved valuable time for the participants.

Each article has its own unit of analysis with regards to its specific aims and objectives. Methodological triangulation soon proved valuable and necessary; During the SSI, almost all the participants describe episodes where they used Nacadia differently to how they had originally intended because the locations they had wanted to use were occupied by other participants. Hence, a location which appears to be less frequently used according to the BM data may actually be a very favoured location and vice versa. Therefore, the actual use pattern identified from the BM data could not be used to determine the participants’ actual preferred use. BM is, therefore, mainly used to provide a general picture of use regarding the locations. However, the

addition of the narratives from the SSI provides a much more comprehensive understanding of use, preferences and experiences.

Implications for practice and future research

A well-designed therapy garden that meets the previously described criteria can host NBT programmes for different patient and target groups with different capabilities and needs within its safe and protective framework of settings. This clearly demands the preparation of well-organized NBT manuals with regards to therapeutic approaches and nature-based operations specifically organized in accordance with the patient groups' capabilities and needs. For example, certain nature-based activities, which would have been beneficial for stressed people, were negatively received by participants in an NBT programme for war veterans with PTSD (Poulsen, 2015). Due to their background and experiences, they had different perceptions of the natural environments, the nature-based activities, and social interactions, compared to the subjects of current study. Another NBT programme for people who had been diagnosed with Binge Eating Disorder (BED) is currently being planned in collaboration with specialized therapists. The programme will more or less use the same components as illustrated in figure 7. However, the therapeutic approach will be based on Acceptance and Commitment Therapy (ACT) as the group will be able to cope with this slightly more direct therapeutic approach better than the severely stressed individuals and people suffering from PTDS. Further, the GAs will be approached less freely in the NBT programme for people diagnosed with BED. The GAs will have a more thematic and educational approach. This highlights the need for more research to gain knowledge of the different groups of patients in NBT, both with regards to the garden design and the NBT programme.

It would be very useful for practitioners if a generic model of an NBT manual was developed. The manual could be based on the main components of NBT as shown in figure 7: The therapeutic approach, awareness exercises, garden activities and own time tailored to a target group with thorough explanations, suggestions and examples for the practitioners in terms of how to beneficially use the natural environment and objects actively and symbolically in the various NBT components for specific patient groups.

Furthermore, it would be relevant to conduct more research with a focus on the individual components of the NBTN (fig. 7). As we know that nature elements are used both actively and more symbolically, it would be relevant to conduct a study on how the natural elements could be implemented more effectively in the awareness exercises, or how symbolic use of nature could

be used more consciously since it seems to have a positive influence on the participants' process of self-discovery.

Knowledge about possible changes in people's general nature consumption, before and after participating in NBTN may shed more light on their gains, and the quality and effect of the EBHDL and NBT. Therefore, another important case to explore is the participants' general nature consumption before and one year after participating in NBTN. This could further be used to strengthen future NBT programmes.

In the light of current collaboration with municipalities to develop therapy gardens and NBT programmes, it is considered high relevant to conduct cost-benefit studies both in relation to the current management and operation of the garden, and longitudinal studies to determine whether the different nature-based preventive and treatment programmes actually result in savings for the public health-care system.

Current PhD project offers some insight and understanding of a specific user groups' experiences, interactions and needs of natural environmental characteristics in a context of care settings. In relation to restorative natural environments, it was found, that the participants of current project have preferences for certain characteristics similar to the preferences expressed in a study on health promoting environments targeting female Danish students (Stigsdotter et al., 2017). Very roughly considered, it suggests that the insight and understanding of the participants' experiences, interactions and needs can be applied to projects in other context than care settings. E.g. when planning urban green environments, it may be valuable to incorporate some basic features to the design for enhancing a feeling of safety to promote relaxation, thus restoration. In general it may add to an understanding of humans' experiences of natural environments, which can be valuable for landscape architects to have in various cases.

The PhD project can give landscape architects insight to a dynamic EBHDL working process sufficient for cases concerning target groups with distinctive needs. The DPOE model has been suggested and applied as a concrete tool for monitoring use and effect after occupation of a setting to examine the outcomes. The DPOE model would benefit from further validation.

Currently, municipalities across Denmark show great interest in starting therapy garden projects. The results from current PhD project could be relevant for these projects. However, for municipalities with aims to work evidence-based, collaboration with NH&D research group could be beneficial for all. The collaboration could result in developing sufficient landscape architecture of therapy gardens based on the EBHDL working process; to develop NBT programmes targeted different patient groups; and to conduct DPOEs to examine quality and health outcomes. A novel collaboration is already initiated with Kolding municipality and the

architect company Arkitema. Collaborations with more municipalities could lead to further development and enhancement of the EBHDL and DPOE models, as well as development of sufficient NBT manuals for different patient groups.

Conclusion

Using a mixed-method approach to corroborate the data and findings, this thesis has explored NBT in a therapy garden in a Danish context. It builds knowledge, beginning with studying the participants' use and their preferences regarding the natural environments (spaces), followed by gaining a deeper understanding of their use by analysing the participants' own stories of their experiences with NBTN. Finally, the findings were used to thoroughly evaluate whether the design had met its original aims and objectives. The theoretical framework which originally formed the basis of the design of Nacadia and the development of the NBT programme was validated by participants during a 10-week NBT programme in Nacadia. Further, the original aim and objectives of Nacadia were successfully met as a significant positive health outcome was measured, which was supported by the participants' shared experiences of moving on with their individual therapeutic tools that they had developed during NBTN. Certain points considered to be of special interest for further development were identified, e.g. the symbolic and metaphoric value of certain natural environments and certain components were identified as being very important in that they supported the participants' development. Minor shortcomings of the design were also identified. Exposure to the areas surrounding Nacadia was experienced negatively in certain locations in Nacadia. However, the problem had almost been solved by the end of the study. The findings from this PhD project add to the knowledge base regarding the design of good therapy gardens by proposing a model of a good EBHDL process and a generic model for DPOE of therapy gardens to ensure positive health outcome. With regards to the use of natural environments as health-care facilities, it further details relevant points that health professionals and practitioners should be aware of when developing and planning treatment programmes in therapy gardens.

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Article I

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A YEAR IN THE THERAPY FOREST GARDEN NACADIA® PARTICIPANTS' USE AND PREFERRED LOCATIONS IN THE GARDEN DURING A NATURE-BASED TREATMENT PROGRAM

Ulrik Sidenius^{1*}, Ulrika K. Stigsdotter², and Anne Dahl Refshauge²

¹Section of Landscape Architecture and Planning, Department of Geosciences and Nature Resource Management, University of Copenhagen

²Section of Landscape Architecture and Planning, Department of Geosciences and Nature Resource Management, University of Copenhagen

*Correspondence author:
us@ign.ku.dk

ABSTRACT

Severe stress is a growing international problem, and therapeutic interventions, which suit contemporary culture, have been called for by, e.g. the World Health Organization (WHO). Research has found increasing evidence for positive effects of nature-based therapy (NBT) on people suffering from mental illnesses. However, adequate empirical research on specific diagnosed patient groups receiving NBT is lacking. The therapy forest garden Nacadia® was designed during an evidence-based health design (EBHD) process, and a 10-week NBT program for people incapacitated due to stress-related symptoms was developed. The current study focuses on participants' use and preferred locations in the nature-like settings of Nacadia®. The participants' (N=27) behavior was mapped, and the apparent use and preferences were noted using behavior mapping (BM). Semi-structured interviews (SSI) were conducted to gain more in-depth information from some participants (N=8). BM and SSI were conducted three times during each of four 10-week therapy sessions during a year in the garden. The findings from BM and SSI were corroborating assessed. The participants show and express preferences for certain characteristics of nature-like environments such as semi-enclosed locations with possibilities for sensing widths, while still feeling protected and safe enough to relax and eventually "just being" or interacting with certain components offering sensory stimulations. Environments with such qualities can be found in Nacadia® during all four seasons. However, a few participants expressed minor difficulties in finding more than a few areas in the garden which meet their specific needs and preferences during the winter. A change or development of the participants' use and preferences was noticed during the time-line of the NBT program, which may be of interest for future studies.

Keywords: Sick leave, nature-based stress therapy, ICD10 F 43, qualitative case study, semi-structured interviews, behavior mapping, nature preferences, health design

1. INTRODUCTION

The World Health Organization (WHO) reports that mental disorders are one of the main challenges to public health in the EU, and estimates that 25% of the inhabitants are affected each year (1). It is expected that stress-related illness will be one of the greatest threats to public health in the western world in 2020 (2). In Denmark, stress and stress-related symptoms are significant, and have become more frequent causes of inability to work and sick leave in recent years (3). Diagnosing individuals suffering from severe stress is based on multidimensional stress-related symptoms (4) in accordance with ICD-10 (5). Stress puts a major economic burden on the public welfare system as well as having a negative impact on the quality of life of the stressed individuals and their relatives (1,3).

Efficient stress management, both at the public and individual level may improve quality of life, productivity and can even reduce the number of suicides (1). This has motivated global, national, regional and local demands for innovative interventions for the prevention and treatment of stress (1,2,6-8). These demands are focused on evidence-based and effective treatments (1).

1.1 Nature and Human Health Relations

Using the relation and synergies between nature and human health in a health promoting or treatment process is nothing new. It has been practiced for thousands of years across cultures and continents (9). However, the positive relations between nature and human health have been rediscovered (10). Generally, nature and natural elements are understood to have salutogenic (health promoting) values (11). According to the WHO and current scientific health recommendations for treatments, interventions ought to be evidence-based and validated (1,12).

Landscape architects consider the impact of nature on human health in a holistic context of general use as well as treatment procedures. The general aim is to identify efficient, validated and applicable evidence for the design process (13).

1.2 Nature-Based Therapeutic Interventions

During recent decades, there has been an increasingly, albeit diverse use of nature within the concept of nature-based therapies (NBT) (14-16). NBT is an intervention initiating a therapeutic process with activities implementing natural elements and nature experiences in a special designed or chosen natural environment (17).

1.3 Research Status

According to a recent systematic review of controlled and observational studies of NBT there is still a lack of sufficient assessments of evidence, quality, or causality regarding which specific natural elements (settings, environments, components) are most beneficial for a specific diagnosis-group (14). The review concludes that a proper quality assessment of the subjects of NBT to evaluate the use and effect (activities, program, outcome) of nature in NBT can be utilized more efficiently and can be targeted at specific patient groups (ibid). Stigsdotter et al. (2011) suggest that a randomized controlled trial (RCT) is the most recognized method for evaluating the effect of an NBT intervention (15). The authors suggest applying a triangulation approach to evaluate an NBT intervention (ibid). Further, it is recommended that the settings for nature-based treatments should be an evidence-based health design (EBHD) of the landscape. As EBHD is a dynamic ongoing process, a crucial constituent is a post-occupancy evaluation (POE) of the designed settings, which is an empirical evaluation and validation of the design as well as the NBT program (17).

2. The Therapy Forest Garden Nacadia®

2.1 Nacadia®

The therapy forest garden Nacadia® covers an area of 1.1 hectare and is located in Hørsholm Arboretum in the part hosting a variable collection of trees and shrubs of North American origin. Nacadia® is on a slightly sloping terrain with a difference of approx. 3 meters from the highest point in the north part to the lowest point in the south-east corner. Nacadia® is a nature-like setting with a forest-like appearance. Approx. 2/3 of the area is covered by tree canopies while the remaining 1/3 is open. The design of

Nacadia® was an interdisciplinary dynamic working process which included landscape architects, psychologists, occupational therapists, medical doctors and gardeners (18,19). The aim of the EBHD was to make an aesthetic and functional (actively supporting the NBT) design, founded on scientific evidence and practical experiences.

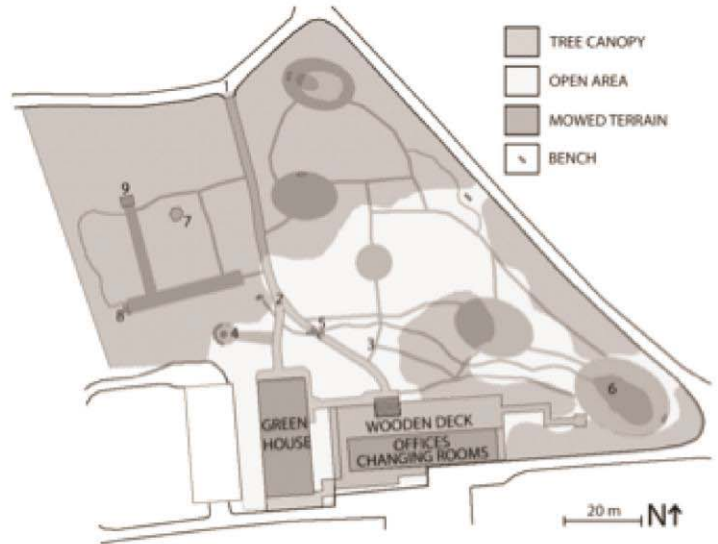


Figure 1. Basic physical attributes of Nacadia®

1: Entrance, 2: Main path, 3: Minor paths, 4: Bonfire, 5: Stones, 6: Water, 7: Wooden deck, 8: Compost, 9: Hut

2.2 The Nature-Based Therapy Program

The therapeutic approach is mindfulness-based cognitive therapy. Nature components are used as therapeutic tools in the therapy to provide sensory experiences of nature, nature-based activities (NBA), nature-related stories and symbols (17). The therapy program can be divided into four components; individual therapeutic sessions (ITS), mindfulness exercises (ME), garden activities (GA) and participants' own time (OT). Two psychologists and a gardener lead the NBT program. All NBAs are optional.

The use and activities of interest for this study were those for which the participants were free to a great extent to decide the location: ITS, GA and OT.

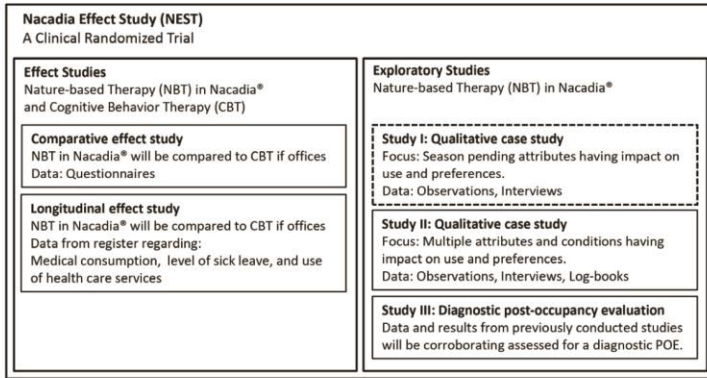


Figure 2. Studies currently being conducted in Nacadia®

The current study (I) (fig. 2) is the initial and explorative study of a larger randomized clinical trial (RCT) entitled Nacadia Effect Study (NEST), the aim of which is to compare NBT (n=40) and Cognitive Behavior Therapy (CBT) (n=40). The subjects are a broad representative group (e.g. gender, age, socio-economic background) of homogeneous diagnosed patients, who participate in one of two well-defined therapy programs with well-defined end points as recommended (14,15).

The aim of the overall explorative study is to investigate the use, preferences, and impacts of the design of Nacadia® during NBT from a multi-methodical approach (12).

The aim of current study is to investigate the participants' use, preferred locations, experiences and seasonal influences during NBT in Nacadia®.

2.4 Participants

The individuals who are participating in NEST are severely stressed and are unable to work because of their symptoms, which have been diagnosed in accordance with ICD-10. Psychologists and those medically responsible have evaluated whether the potential participants meet the inclusion criteria, ICD-F43.0-9, minus 1 (1 = Post Traumatic Stress Disorder), and would gain positively from participation. A randomization process decided whether the participants would receive NBT or CBT. Current study concerns four groups of participants (N=27) who received NBT in Nacadia® in the period from 3rd February 2014 to 19th December 2014 (table 1).

Group	Date	Season	BM: N=27	SSI: n=8
1	03.02.14 - 11.04.14!	Winter / Spring	6	2
2	22.04.14 - 27.06.14	Spring / Summer	7	2
3	11.08.14 - 17.10.14	Summer / Autumn	7	2
4	13.10.14 - 19.12.14	Autumn / Winter	7	2

Table 1. Data collected from four groups of participants

3. METHODOLOGY

Based on the grounded theory approach (12,20), the aim is to obtain the participants' explanations for why certain locations are preferred to others.

3.1 Data collection

To obtain a representative picture of the participants' use, data were collected in Nacadia® for a year, during the 2nd, 5th and 9th week of each of the four 10-week therapy sessions (table 1).

3.2 Behavior Mapping

The observation method was behavior mapping (BM), which is used to study people's use and behavior in a given environment (21,22). During the BM, the observed participants' locations were mapped, and the attributes in relation to the season, and type of activity, GA, ITS and OT were noted. Observational data were entered by GIS on an iPad. BM scanning sessions were performed at 25 minute intervals from 10.15 a.m. to 12.05 p.m. During each scanning session, the observer followed the same path through Nacadia®, and sub-scannings were performed from various strategically selected observation points alongside the path to cover the whole area of Nacadia®.

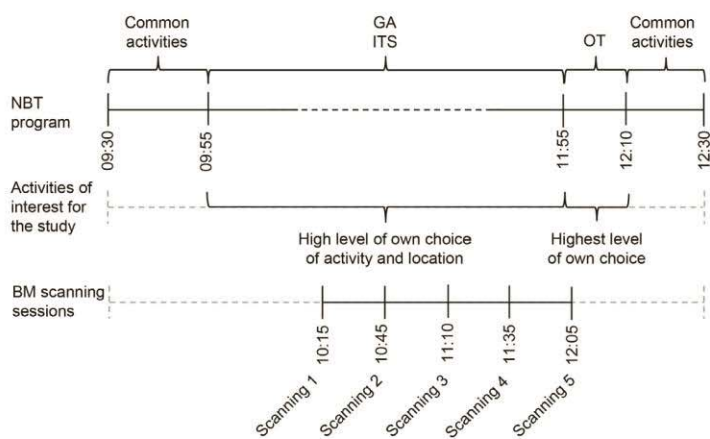


Figure 3. The selected period for conducting BM scanning on days when the data were collected.

The time span chosen for BM was the duration of the therapy program which included the activities of interest for the study (fig. 3). Additional notes taken during the observation process were used as the basis for SSI with some participants.

3.3 Semi-Structured Interviews

The therapists selected two participants from each group for the interviews based on the aim of obtaining stories from an introvert and extrovert personality, and on whether the therapists had concluded that the participants had sufficient mental strength to attend the interviews.

An interview-guide consisting of open-ended questions was written for the semi-structured interviews (SSI), the aim of which was to gain insight into the participants' personal experiences of their use and preferences regarding activities and locations (23,24). Three audiotaped and transcribed SSI averaging 25 minutes were conducted with each participant.

3.4 Ethical Considerations

NEST has been approved by the Danish Data Protection Agency and by The National Committee for Health Research Ethics. The participants received both verbal and written information about the research project and signed

informed consent prior to participation (25,26). When quotes are used in the following, the participants are anonymized.

3.5 Assessing Data

The mapped area from BM was filtered using GIS to create an illustration of the locations for the activity attributes; GA, OT, and ITS in relation to seasons during 2014. SSI were assessed using thematic analysis to identify themes (27) to illuminate the preferred types of locations for different types of activities in Nacardia®. Themes regarding preferences were sought and assessed for possible season-dependent variations. The analytical process of the SSI transcripts had 3 stages:

1. Identifying themes in relation to the main topics from the interview guide:
 - Activity types: GA, ITS, OT
 - Location of activity
 - Physical attributes of location
 - Experiential values of location

These were color-coded in the transcriptions.

It was noted when a specific location was referred to as favorite.

1. Linking the identified locations to activities, physical attributes, and experiential values. Locations mentioned as favorites were linked to referred attributes, and experiential values.
2. The SSI transcriptions were further assessed to identify participants' narrative explanations regarding their use and preferences with reference to season-dependent variations. Such explanations were marked for possible quotations.

Additional explanations referring to participants' expressed choice of use and general preferences were noted and marked as implications and material for further studies.

In line with an interpretative phenomenological analysis process, the SSIs were used corroborating (28) to explain and discuss the BM findings (24)

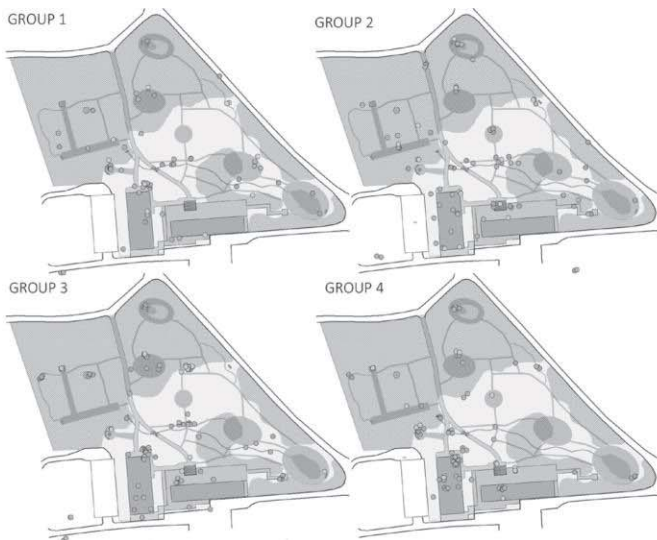


Figure 4. Distribution of general use during four seasons

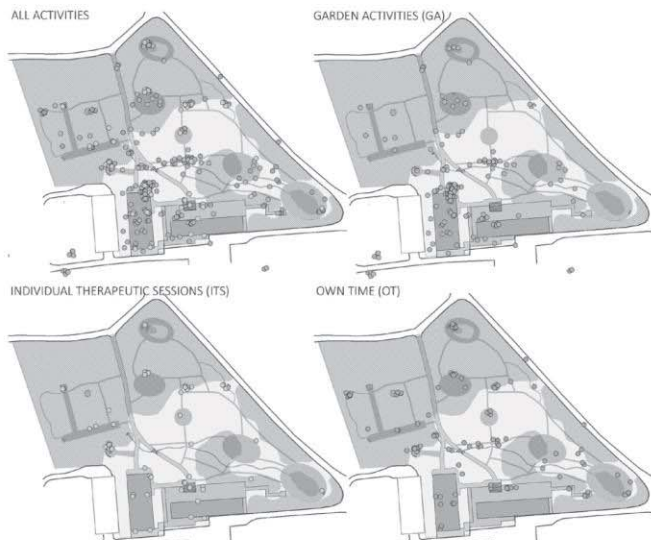


Figure 5. Distribution of GA, ITS, and OT during a year in Nacadia®

4. FINDINGS

4.1 General use found from BM

In general there are found no significant difference in distribution of activities in relation to season (fig. 4). However, from the generated illustrations of locations for the different types of activities differences was obvious (fig. 5).

The GAs were observed in most locations in, and a few outside, the garden. All the observed GAs were predefined programmed activities linked to a more or less specific location in the garden, e.g. the several observed GAs were clustered near the pond in the north-west corner of the garden where participants conducted maintenance in or around the pond; the GAs clustered near the corner of the greenhouse where participants were working at tables either inside or moved outside, and; the GAs clustered near the stream where participants were conducting various maintenance tasks in or beside the stream. Thus, the BM alone did not provide any indications of participants' preferred locations for conducting GAs as these are predefined in the program for the different days of the BM.

The participants were motivated to choose for themselves a location for the ITSs where they would felt comfortable. It was, therefore, assumed that the BM would clearly reveal the general type of location preferred for the ITSs. The locations of the ITSs were near edges (fig. 5). For example, several ITSs were observed taking place on benches or chairs up against the walls of buildings. Others were observed at specific locations which could be perceived as being transitions between two different types of area (e.g. a closed area bordering a more open space).

In general the OT activities were not physically demanding, e.g. resting, reflecting, writing in log-books, meditating, etc. The participants chose which OT activity to do and were urged to select a location they liked and which made them feel most comfortable. As can be seen in fig. 5, the selected locations for conducting the OT activities seem to be widely distributed around the garden. However, there seemed to be a tendency for conducting OT activities on same types of preferred locations as for ITSs, e.g. several OT activities were conducted on the edge of areas or in transition zones between different areas. What seemed to differ from the observed locations of the ITSs was that some OTs activities were conducted near the stream and in the circular area of mowed grass. Several participants were observed in the more hidden areas of the garden such as in the hammock located in the north-west part of the garden, on the deck chairs in the south-east part of the wooden deck, on the bench near the pond, and on the bench near the lake (fig. 5).

4.2 Season-dependent use found from BM

BM data sorted according to season (fig. 4) illustrate that the general use during winter and spring is slightly less widely distributed over Nacadia's area, when compared to summer and autumn, in particular GAs (not shown in fig.).

4.3 General use found from SSI

It was possible to gain information from the SSI which sheds light on how participants choose from the selection of GAs. Moreover it was possible to identify some important determinants of their choice of GA. The GAs vary from very physically demanding tasks such as woodcutting and transporting gravel by wheelbarrow, to less physically strenuous tasks such as picking or collecting flowers or herbs. Usually a participant's degree of mental capacity determined which of the programmed GAs was chosen with regards to the level of physical exertion: "Just today I did not have as much energy and luckily this was a limited task... I did not want to do so much today. There is some turmoil in the mind".

As well as the level of physical exertion, participants' current mental capacity also had an influence on their choice of GA in relation to social interactions, which were often perceived as being potentially hazardous. A participant doing a moderately physically strenuous task stated: "Once one of the others came and (asked, ed.): "can I just have a look at what you are doing"? I felt a little disturbed in some way, and I said: "yes, you can just come in and look, but then you must go again". Another participant, who exhibited good capacity to perform physically exacting GAs, did not have as much capacity for social interactions, said: "I want peace to do it. When too many are involved – No, it's not so good".

During the SSI, no participants mentioned any noticeable seasonal or weather-related factors having an influence on their choice or location of GAs. Therefore, data from the SSI do not provide any further information for consideration in relation to the illustrative clustering of GAs described in section 4.1. The participants' choice of GAs seemed to be determined by: 1. whether they had the capacity to manage a high level of physical activity or not, and 2. whether they had sufficient capacity to handle social interactions or not during the GA.

Seasonal variables and environmental attributes seem to have a negligible influence on the choice of GA or its location. However, the SSI with the therapists and the data from the participants' logbooks will be used to analyze other factors with a potential influence in future studies.

The tendency found in the BM regarding the selected locations for ITS having the character of edges or transitions between one area and another seem to be confirmed by the SSI. One participant mentions that her ITS was conducted while sitting up against a wall because she had found shelter there. Another participant decided to sit on the ground up against a big tree, while another participant described how he decided to sit in a chair at the edge of the woods as it gave him a feeling of "calmness" while experiencing "spaciousness". He describes a location where he had participated in an ITS: "What is nice about the bench is the good view from there, and you are sitting in the sun, and yet it is not completely open in front of you. So you are a bit in like the private sphere".

Participants were found to have many considerations regarding their choice of location for their OT. The choice of locations for OT directly aligns with the participant's preferred locations.

Based on the participants' commonly used narratives of their preferred type of nature-like settings, the overall physical proportions of such settings are: "Enclosed", or "slightly closed" but with a "view out", to "see far", and "see the sky" to get a "sense of expanse". A participant said that the proportions of his preferred location made him feel like his "back was covered" and that he was "protected from behind".

Participants commonly expressed how the proportions of a nature-like setting and its attributes result in their feeling "protected", "stable", "safe", and "hidden". Such experiences in the nature-like setting could lead the participants to "find peace", "quietness", "calmness" and "undisturbed" "privacy", and allowed them to "relax" and "gather their thoughts" and "just be" and "do nothing". Furthermore, the preferred locations may have certain environmental attributes which allow participants to engage in specific activities such as: "enjoying the sun", "looking at or listening to the water", "observing the birds' activity", or exploring as a participant tells while describing her experience of her preferred location: "There is this small stone which is good to sit on when the sun is shining... There is currently a shrub that smells fantastic... with lots of bees around it... It is very nice to listen to and smell".

The observed and described activities which were conducted in the preferred locations are limited to physically inactive ones such as just sitting or lying while “just being” as two participants described it, “doing nothing”, “relaxing” and “gazing into the sky.

A specific preferred feature, rather than a location, was the stream which trickles through Nacadia®. Several participants’ descriptions of what they found valuable of the stream can be summed in to; a meditative calming experience of rippling water to explore by listening, looking and/or touching. Participants refer to the attributes of the stream from several locations it flows through.

One participant said that her preferred location should: “not be totally wild” because “nature can be too fierce sometimes and I do think that it can be a bit scary”. This opinion seems to be shared by other participants as one explains that he prefers if a location is “civilized adjusted” and added ...”if there is no path, I don’t know if I would dare go there or should go there or how”. The need for a certain level of “civilized adjustments” is further supported by a third participant for whom some type of seating facilities seem to be a crucial feature for her when choosing her preferred location: ...”I needed to sit on the grass on a pillow”, ...”there is a small stone which is comfortable to sit on”. Thus, locations with features which may ease use of the location or facilitate some interaction with the environment seem to be preferred. Such features may simply be seating constructions such as ...”a bench where you can hear the birds and the wind in the trees”, or it could be pure natural components providing suitable conditions for meeting a user’s current need: “You are a bit hidden and... it is soft and there is a good tree to lean up against”, as a participant described a wilderness-like location.

There seems to be two different types of preferred location. One is preferred for hiding away to find peace and quiet, to be alone with personal thoughts and away from demands to “do nothing” or reflect. Such locations are limited to specific point-locations rather than whole areas or rooms defined by terrain, edges or ceiling. Such point-locations are mainly found at the edge of closed areas bordering open spaces because these edges offer the right proportions to motivate a feeling of being a bit “enclosed” and “protected” while still providing a good view over an open expanse.

Another type of location seems to be preferred for the purpose of “getting away” from the others, though retreating with a more exploratory approach to find experiences of sensory stimulations. Such locations seem to have proportions which define a distinct area or a room of components which as a whole provides the accommodating attributes to experience and explore and

reduce the user’s sensation of being exposed by “shielding” the distinct area from the other environments: “It’s a bit cozy, it is not too enclosed, you can look at the perennials and if the sun is shining you will get some sun there. You can also... sense those expanses a bit”.

4.4 Seasonal Influences Found from SSI

One participant explains: ...”It was really because I was freezing and had no mental surplus. I was physically tired in my body today. I simply couldn’t be bothered to take those mats and sleeping bags. If it had been the summer, then I would have just gone out and sat outside, and at any other time I would have preferred that. But because it was awfully cold and I did not have the energy to sit and freeze. So I lay down in there (the hut, ed.). Then I could hear the sounds from outside. I just needed it to be warm”. To the same content she added: “Now we have received warm clothing, it helps considerably”, referring to her use of Nacadia® during the winter. However, this participant’s experience is not considered to be representative with regards to her experience of winter conditions because during her SSI she explained that, in general, she is extra sensitive to cold temperatures. In general, participants were observed outside even on the coldest days of BM and mostly used the indoor facilities to make coffee, fetch tools for activities, etc. One participant commented in winter: “I never imagined I could sit outside in February and relax and meditate. I think both in relation to cold and warm days it’s about adapting a little and taking precautions”. With reference to the cold weather conditions, another participant commented: “I was curious to see how it would be in the garden in winter - a bit of a cold crappy time. But it’s actually a really, really nice place to be, in spite of the fact that nature perhaps is not as inspiring as it is in the summer”.

When another participant was asked if the cold temperatures prevent him from using certain locations he answered: “There are no places which I avoid using”. Even after being motivated to reflect on whether seasons other than late autumn/winter would be better, he concluded that summer would be too warm for him. After considering which season would be best for NBT in Nacadia®, a participant during the winter said: “Every season has its charm. I think it probably doesn’t matter. Summer is more pleasant, but I would not swap the time I had”.

In general, it was found that participants do not mind the seasonal conditions, although they need to be adequately equipped to manage the conditions. Only during a BM session in August was more than one participant observed inside the greenhouse during OT activities. The explanation was: “It was raining quite a bit and I was freezing so I chose to cover up myself in there”.

However, on the same day, another participant was interviewed and expressed no problem with the weather. She did not even mention it, but said that she had been active during the GA of the day and had also stayed outside at the location of her GA during her OT.

The levels of mental capacity seemed to have a greater influence on the participants' use of Nacadia® than the seasons. At least when weather seems to determine a participant's use, it appears to be a challenge for the individual participant, rather than for the participants in general. This may be caused by inner conflicts contributing to a low level of mental capacity making it hard to meet the perceived high level of challenge posed by weather conditions. While the other participants (and the exemplified participant on other days) with higher levels of mental capacity seem capable of coping with any challenging weather conditions.

Rain and cold temperature were the weather-depending factors mentioned. Another seasonal depending factor mentioned and worth noting here, is that certain attributes of the physical dimensions of the garden, such as density of foliage, are affected by the changing seasons: ...“I think that in the summer it is obvious that you can be sitting anywhere, but in winter there should probably be more places taking into account that the sun or the light should shine down. Then you would not get the experience of “my place is taken””. With that she refers to her experience of a lack of suitable places to retreat to in the garden outside during winter and that she has experienced difficulties retreating to her preferred location because it was already occupied by other participants. It can be argued that the various levels of challenges which some participants may experience more than others as a result of seasonal factors, in general, suit the NBT program and the garden design well because the aim of the NBT and the Nacadia® design is to offer different levels of challenges to suit the participants' different levels and development of mental capacities during the NBT program.

5. DISCUSSION

5.1 Theoretical Discussion

The above descriptions of preferred locations and experiences are supported by theories and models of relations between nature and human health. The most obvious alignments are to Appelton's prospect refuge theory (29) which strongly relates to all participants' descriptions of preferred proportions and experiences of being in a sheltered refuge with a good prospect. The found characteristics of the preferred nature-like environments in Nacadia® can further be associated with Grahn and Stigsdotter's findings from 2010 in

relation to stressed peoples' preferences within the eight perceived sensory dimensions (PSD) (30).

The found relation between the level of mental capacity and choice of activity suits the supportive environment theory (SET) pyramid, which has four levels of executive functions, the lower part of low capacity of executive functions by inward involvement, and the high level shows high capacity of executive functions by active or outgoing involvement (31).

The tendency observed and found from SSI, that participants retrace or avoid the hazards of social interaction, aligns with Ulrich's (1999) explanation of how people suffering from stress instinctively seek out sheltered areas, and do not want to be social (32).

Further, a noticeable demand for certain guidance of how to use the nature-like environments in Nacadia® was found; one asked for “civilized adjustments” and paths, while another disliked totally untouched nature. It may demonstrate a greater need for settings of affordance which are easy to interpret (33) since people are known to experience and interpret circumstances and environments from their current mental status (29), and people suffering from stress find it more difficult to interpret environments (34).

5.2 Implications for Future Research

While conducting and assessing the BM and SSI, several factors which had an influence on use and preferences were noted, besides the factors of relevance for the current study. Further, a development in participants' use and preferences from beginning to end of the NBT period was noticed. As the BM and SSI were conducted at the start, in the middle and at the end of the NBT periods, but were assessed for each of the four groups as a whole, these notations motivate another assessment of the data with baseline and end point to explore factors which influence the developments in participants' use and preferences.

Good general descriptions of physical proportions and components and mental experiences of locations to be considered preferable were found from the BM and SSI. This gives a good indication for further studies of larger quantity of data from a larger group of participants to get more near characterizations of nature-like environments for settings suitable as frame for performing NBT.

5.3 Methodological Considerations

The amount of conducted BM could be considered relatively low. However, due to the participants' incapacitation and diagnosis, and in accordance

with the code of ethics, data collection must disturb the participants as little as possible. For this reason, the limited time period was selected for BM, although it includes the activities with most opportunities and possibilities for participants' choice of activity and location.

During the SSI, almost all participants describe episodes during which they have used Nacardia® differently from what they like because the tasks or locations they would have preferred to use were occupied or disturbed by other participants'. Thus, a location seeming less used on BM data may actually be a very favored location and vice versa. BM was used to provide an overall and guiding illustration of locations with narratives from SSI to add for a more comprehensive explanation about use and preferences. Sometimes the SSI guide was followed more closely than at other times. If certain participants had low levels of energy to engage too much to the in-depth questions, it seemed suitable for both interviewer and interviewee that the SSI were flexible while at the same time making it easy to stay aligned and focused on the relevant topics from the SSI guide.

6. CONCLUSION

The participants show preferences for nature-like locations with certain characteristics such as enclosing proportions with possibilities for sensing expanses while still feeling protected and safe to relax and just being or to retreat for interacting with certain attributes and components such as scents, sounds and sights which can be found in the preferred types of nature-like environments. Environments with those preferred qualities can be found in all four seasons. However, during the winter, the participants expressed minor difficulties in finding more than just a few locations in the garden which met their specific needs and preferences.

Seasonal factors did not have a significant influence on participants' use and preferences of physical attributes or experiences of preferred nature-like settings in Nacardia®. Weather conditions had an effect on use and choice of NBA both during the summer and winter. However, there seem to be an association between participants who describe having a low level of mental capacity and who are susceptible to weather conditions – low temperature and rain. In general, the participants seemed well prepared and equipped for the changing challenges of weather conditions during all four seasons.

7. ACKNOWLEDGEMENTS

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Article II

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“I look at my own forest and fields in a different way”: the lived experience of nature-based therapy in a therapy garden when suffering from stress-related illness

Ulrik Sidenius ^a, Ulrika K. Stigsdotter ^a, Dorthe Varning Poulsen ^a and Terese Bondas ^b

^aDepartment of Geosciences and Natural Resource Management (IGN), Faculty of Science, University of Copenhagen, Frederiksberg, Denmark; ^bFaculty of Professional Studies, Nursing and Health Sciences, Nord University, Bodø, Norway

ABSTRACT

Evidence confirms that nature-based therapy (NBT) has a positive effect on people with mental illnesses. However, there is a lack of evidence on the meaning of NBT for specific patient groups. The Nacadia® Therapy Garden was designed according to an evidence-based design process, and an NBT programme was developed. The aim of the study was to illuminate the phenomenon of participants' lived experience of the NBT in Nacadia. Fourteen participants took part in semi-structured interviews (SSIs), and by way of reflective lifeworld research, the SSIs were analysed to identify and describe the meanings of the phenomenon. The essence of the phenomenon was found to be a process of adopting a searching approach to NBT and Nacadia to become familiar with the conditions. This familiarity stimulated the development of confidentiality and attachment to Nacadia. Feeling protected, safe, cared for, and not exposed was important, and motivated feelings of freedom, reduced demands, and increased the ability to access and try a spectrum of NBT activities. It encouraged participants to develop personal approaches and coping strategies to implement in their everyday lives for moving on.

ARTICLE HISTORY

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KEYWORDS

Phenomenology; reflective lifeworld research; ICD-10 F43; supportive environments; restorative experiences; nature-like setting

Introduction

This study is part of a larger study, which includes, among other things, a randomized clinical trial (RCT) comparing nature-based therapy (NBT) to cognitive behavioural therapy for people suffering from stress-related illnesses. The focus of this study is on participants' lived experiences in the University of Copenhagen's Nacadia® Therapy Garden, during a 10 week NBT programme. It is based on semi-structured interviews (SSIs) with 14 participants.

Background

Mental disorders are one of the main challenges to public health in Europe, with around 25% of the population being affected every year according to the World Health Organization (WHO, 2013). It is considered that stress and stress-related illnesses will be one of the greatest threats to public health in the Western world by 2020 (WHO, 2005). Stress and stress-related symptoms are a major, and in recent years increasing, cause of work incapacity and sick leave in Denmark (Netterstrøm, 2014). From a medical perspective, Netterstrøm (2014) defines stress as, “[...] a state in the organism characterized by physiological responses with activation of the sympathetic nervous system,

immune system and energy mobilization and mental activation due to strain of a psychological, physical, chemical or biological kind [...]” (p. 14). Stress is not regarded as an illness and, therefore, the diagnosis of individuals suffering from stress is based on multidimensional stress-related symptoms (Aldwin, 2009), which are categorized in the International Classification of Diseases, 10th revision (ICD-10) (WHO, 1992). From a phenomenological perspective, people who suffer from illness, e.g. stress-related illnesses, have had their relationship with the world disturbed. Ill individuals lose their undisturbed freedom, which involves exclusion from “life” (Gadamer, Gaiger, & Walker, 1996). Dahlberg, Dahlberg, and Nytsröm (2008) describe it thus: “When we are in pain and weak, our bodies become obstacles that keep us from immediate engagement with the world. Illness alters one's attachment to the world” (p. 44).

This study focuses on individuals with stress-related symptoms which are so severe that they have resulted in their being incapable of working. According to the Danish Stress Society (2016), there is limited evidence of efficient specific treatment interventions for stress. The most recently available advice for practitioners from the Danish Health Authorities suggests that various forms of cognitive treatment, together with

CONTACT Ulrik Sidenius  us@ign.ku.dk  Section of Landscape Architecture and Planning, Department of Geosciences and Natural Resource Management (IGN), University of Copenhagen, Rolighedsvej 23, G302, DK-1958 Frederiksberg C, Denmark

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initiatives such as relaxation exercises, physical activity and, eventually, job training, can help the patient to cope with stressful situations (National Board of Health, 2007). The increasing number of citizens who are incapable of working and who are on sick leave owing to stress-related symptoms puts a burden on the Danish welfare economy, and threatens the quality of life of the stressed individuals and their relatives (Netterstrøm, 2014; WHO, 2013). There is a global, national, regional, and local demand for innovative interventions to prevent and treat stress-related symptoms (European Communities, 2005; Eplov & Lauridsen, 2008; National Board of Health, 2014; WHO, 2013, 2005). The demand is directed towards evidence-based and effective treatments (WHO, 2013). Evidence-based safe and humane interventions which involve multidisciplinary professional collaboration are needed (WHO, 2013). If society could cope with the burden caused by stress, quality of life and productivity would be improved and the number of suicides reduced (WHO, 2013).

Natural environments and elements supporting treatment

Based on the WHO's definition of health as: "[...] a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity [...]" (WHO, 1948, p. 100), awareness of a more biopsychosocial and multispectral approach to human health has been increasing in recent decades in health science and clinical practice, as well as in the population in general (Melchert, 2015; Pearson, Field, & Jordan, 2009; Taylor & Francis, 2013; Todres, Galvin, & Dahlberg, 2007). This multispectral view facilitates more explorative research approaches regarding innovative as well as traditional types of treatment.

The increasing amount of research from several disciplines collectively confirms the fact that natural environments are a resource in relation to human health, and further acknowledges nature-based treatments (Annerstedt & Währborg, 2011; Grahn, Ivarsson, Stigsdotter, & Bengtsson, 2010; Hartig, Mitchell, De Vries, & Frumkin, 2014; Marcus & Sachs, 2014; Stigsdotter et al., 2011). However, in a review study published in 2011, Annerstedt and Währborg found that research conducted in the field of NBT is mainly based on heterogeneous diagnosed individuals. Furthermore, while they found that evidence of nature's therapeutic effect on human health and well-being is strong, they identified a need for more research on the effect and utility of natural environments for specific patient groups. Therefore, the WHO and the European Union's request for evidence-based and effective treatments, the need for evidence-based safe and humane interventions in a multidisciplinary

professional discourse, and the need for research on NBT offered to heterogeneous diagnosed individuals form the background for the present study. The study focuses on homogeneous diagnosed individuals who are incapable of work because of stress-related symptoms, and who have participated in a distinctly described NBT programme with well-defined endpoints. The article analyses the participants' lived experiences of the NBT intervention.

Aim

The aim of this study is to describe the phenomenon of participants' lived experiences of the NBT in Nacadia during the course of a 10 week NBT programme.

Method

To increase our understanding of the NBT in Nacadia, we use a reflective lifeworld research (RLR) approach, where we discover, elucidate, and describe the general and individual life meanings of the phenomenon of NBT. This approach was developed by Dahlberg et al. (2008), and the current study is based on their guidelines, whereby the studied phenomenon should guide a dynamic methodical stance to reach a sound and broad understanding of the phenomenon in its context (Dahlberg et al., 2008). By applying this approach, this study aims to illuminate the essence of NBT in Nacadia during a 10 week treatment programme, and to describe the essence of the phenomenon and its constitutive elements. Essence is here understood in line with Dahlberg et al. (2008) as that "something" the participants experience as the phenomenon, "i.e. the phenomenon's style, its style of being" (Dahlberg et al., 2008, p. 247). The constitutive elements are considered to reflect the meanings of the phenomenon. Together, these constitutive elements have various nuanced meanings that are present in the essence of the phenomenon (Dahlberg et al., 2008).

Setting: NBT in the Nacadia Therapy Garden

In this study, a therapy garden is understood as a garden designed with the intention of actively and positively contributing to the clients' treatment and well-being (Koch et al., 2008; Stigsdotter, 2014; Stigsdotter, 2015). The garden design is intended to fit the therapeutic process by supporting and challenging the clients by offering various nature experiences as well as providing meaningful activities all year around (Stigsdotter, 2014). The garden design and the therapy programme are closely related; thus, the design of a therapy garden is the premise of the NBT (Corazon, Schilhab, & Stigsdotter, 2011; Stigsdotter,



Figure 1. Plan of the Nacadia Therapy Garden .

2014; Stigsdotter et al., 2011; Koch et al., 2008). The Therapy Garden, Nacadia (Figure 1), was specifically designed to support NBT offered to individuals with stress-related illnesses.

NBT is defined as an intervention that initiates a therapeutic process with activities that incorporate natural elements and experiences of nature in a specially designed or chosen natural environment (Corazon, Stigsdotter, Jensen, & Nilsson, 2010). The NBT programme used in Nacadia was developed as a treatment programme targeting people incapable of work owing to stress and/or stress-related symptoms. It builds on elements from NBT and mindfulness-based cognitive therapy (Corazon et al., 2010).

The NBT programme in Nacadia consists of five components with an inter-supportive aim (Figure 2): (1) individual conversation therapy, which uses mindfulness-based cognitive therapy; (2) physical and mental awareness exercises, e.g. meditation and body scan; (3) garden activities, e.g. chopping wood and collecting herbs; (4) own time; and (5) homework to practise the different techniques and methods from individual conversation therapy, awareness exercises, garden activities, and own

time. Although all of the NBT components are intended to apply to the whole group of participants, each component is flexible and optional, and may be adapted to the individual participant's needs. The person-nature relations possible during the NBT in Nacadia are thought to contribute sensory stimulation and nature-related stories and symbols, and are thought to enhance the potential for relaxation and increase the participants' experiences of being.

The NBT programme in Nacadia lasts for 10 weeks. It takes place on 3 days per week, for 3 h per day (Table I). During the current study, there was a maximum of seven participants per group and a minimum of four. The NBT is the same all year round, and the framework is the same every day. However, every week has a specific theme, in accordance with expected progress. The daily therapy was performed and managed by two authorized psychologists who are both trained in NBT. The therapists were supervised by a medically responsible psychiatrist. The garden activities were initiated and assisted by a professional gardener.

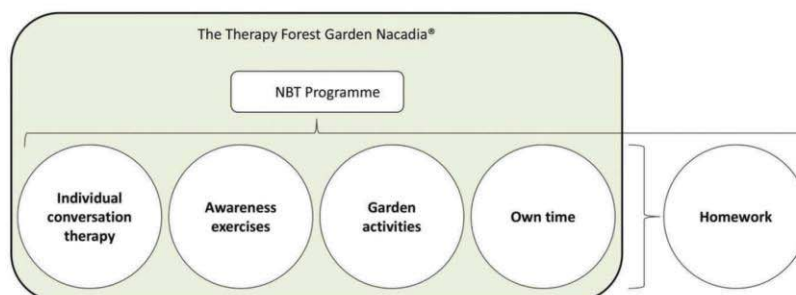


Figure 2. The components of the nature-based therapy (NBT) programme conducted in the Nacadia Therapy Garden.

Table 1. Overview of the parts of the nature-based therapy in Nacadia.

Treatment	Nature-based therapy
Environment	Nature-like setting: the Nacadia Therapy Garden
Therapists	Two authorized psychologists; one assisting gardener
Treatment period	10 weeks, three times per week, 3 h per day
	96 h
Treatment set-up	Groups of up to seven participants

Participants

In total, 42 people in seven groups participated in the NBT at Nacadia during the period from 5 August 2013 to 27 March 2015. The inclusion criteria were that the participants had to be 20–60 years of age and have one of the following ICD-10 codes (WHO, 1992) as their primary diagnosis: psychiatric diagnosis of adjustment disorder and reaction to severe stress (ICD-F43.0–9, minus 1 = PTSD). This level of stress was considered to correspond to 3–24 months of inability to work. Potential participants were excluded if they were suffering from any other significant diseases, mental disorders or social phobia, were suicidal, or had alcohol or drug misuse problems. Before their admission to the project, the potential participants were assessed to ensure that they fulfilled the inclusion criteria.

Data collection

Owing to ethical considerations, data collection should put as low a burden as possible on the participants and, thus, the strategy was to obtain stories that were as information rich and broad as possible from as few participants as possible. Participation in the study was voluntary and the therapists aimed to ensure that the interviewees had sufficient mental capacity to attend and were willing to share their experiences. Based on the above, the therapists selected two participants from each of the seven groups whom they considered to be suitable. The 14 participants were interviewed for 20 min on average, in the second, fifth, and ninth weeks of the NBT programme. An interview guide consisting of open-ended questions was produced with topics directed at the aim of the study, and questions about the participants' lived experiences of the phenomenon, which initially explored the participants' general impressions with open questions, e.g. "What is your impression of Nacadia?", which were followed by more direct questions, such as: "What do you prefer to do in Nacadia?" and "How would you describe your favourite place(s) in Nacadia?" To gain more in-depth data regarding their experiences, the direct questions were eventually supplemented by follow-up questions, such as: "Can you give me an example?" and "Can you

describe your experiences from that place more?" The interviews were conducted by the first author or a research colleague. All interviews were recorded and transcribed.

Other types of data were gathered to gain more insight into the context of NBT in Nacadia, and to understand it better before the analyses of the interviews with the participants. These corroborating data were: interviews with the two therapists, observations, and participants' private logbooks. An interview with the therapists was conducted to gain insight into their use of Nacadia during NBT, and into how they have guided participants, and observed and reflected upon the participants' use and experiences. Observations were made using behaviour mapping (BM), a method suited to study people's behaviour in relation to different components and features in an environment (Moore & Cosco, 2010; Proshansky, Ittelson, & Rivlin, 1970). A more in-depth description of the BM process can be found in Sidenius, Stigsdotter, and Dahl Refshauge (2015). During the BM processes, notes were taken if anything was considered valuable to reflect upon during the analyses of the interviews. The logbooks provided the participants with four pages per day for illustrating their use on a printed map and for writing their stories about their current use and experiences.

Ethical considerations

The study followed the ethical principles of the World Medical Association's Declaration of Helsinki (World Medical Association, 2013). It was approved by the Danish Data Protection Agency (J.nr. 2013-54-0344) and by the National Committee on Health Research Ethics (P.nr. H-1-2013-038). The participants received both oral and written information about the study and they signed to acknowledge informed consent before participation. They were informed of their right to withdraw from the study at any time and they were guaranteed confidentiality regarding the information. During the data collection and subsequent analysis and interpretation, ethical principles for qualitative studies were taken into account (Fog, 2004; Nielsen, 2003). With regard to the quotations used in this article, the sources are anonymous.

Analysis

The interviews were analysed by the authors and the data and findings were discussed and corroborated in a dynamic and open "spiral" process. This process was in line with Dahlberg et al. (2008) and their concept of the analytical flow: the whole–the parts–the whole (Figure 3). The authors approached the participants' narratives by restraining their pre-understandings and assumptions of the phenomenon, and further curbing

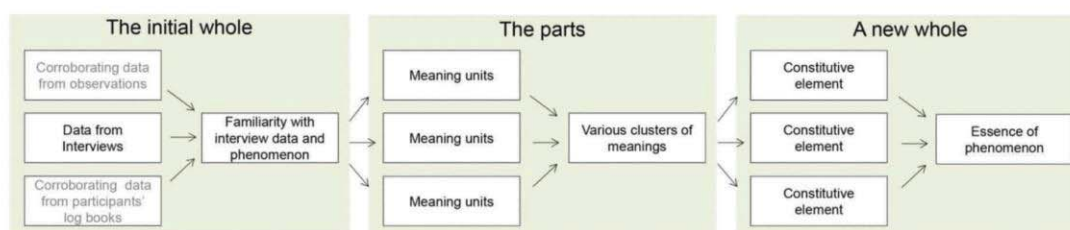


Figure 3. The analytical concept. The conceptual figure illustrates the process of data analysis and synthesis as conducted for current study by using reflective lifeworld research.

their evolving understanding of the meanings as these developed. Such bridling was done with the intention of maintaining a critical reflective stance to the whole phenomenon when meanings began to evolve (Dahlberg, 2006). Initially, the interviews were listened to and read to gain an overall impression and to become familiar with the participants' narratives and with the phenomenon (the initial whole). Secondly, parts of the text that contained meaningful content regarding the participants' lived experiences were highlighted and set into a matrix to gain an overview of the diverse meaning units and to find clusters within these (the parts). The clusters of meanings were organized in a new matrix so that descriptive constitutive elements could develop, and an understanding of the essence of meaning and, thus, the phenomenon, could be described (a new whole).

Findings

The rich descriptions indicate that the essential meaning of the phenomenon, participants' lived experience of NBT in Nacadia, can be captured very well by the phrase: "I see my own forest and fields in a new way". It is a dynamic, evolving process of exploring and developing to see and live life from new perspectives and approaches. When the participants began NBT and were new to the programme and the settings of Nacadia, they experienced a sense of uncertainty and even slight discomfort. However, the participants soon became more comfortable with the NBT programme and its procedures. Thus, a feeling of familiarity with the garden and the practical conditions grew, and a sense of belonging developed. The participants became familiar with the garden, e.g. each found locations in the garden that provided suitable shelter, which could be used to make them feel less exposed. This led to a sense of safety and freedom, which together with the sensory stimuli in the garden reinforced the feeling that Nacadia was a supportive environment. This increased the participants' awareness of the various opportunities in NBT, and motivated more awareness of themselves and their relations with others and the world around them. The participants became more open to exploring the spectrum of opportunities in the NBT. They engaged in the

NBT exercises and different activities to the extent of their individual capabilities and needs. This further encouraged them to develop personal tools, techniques, and new approaches that made them feel better equipped and gave them more courage to change and develop unique individual strategies and approaches to life for moving on after the NBT.

The following descriptions of constitutive elements will further elucidate the essence of the phenomenon: Another world of relations and environments to habituate to; Becoming more comfortable and developing a sense of belonging; Suitable shelters offer less exposure and a sense of safety and freedom; Sensory experiences reinforced Nacadia as a supportive environment; Increased awareness of destructive mindsets; Spectrum of opportunities meeting individual capabilities and needs; New approaches, more courage to change and move on.

Another world of relations and environments to habituate to

Each participant experienced the new settings of Nacadia differently and expressed various impressions. In the groups, an overall sense of hesitant anticipation of what was going to begin was often noted. The participants experienced starting the NBT as a challenge as there was a lot of new information, etc., to deal with: "Trying something new has been a challenge for people like me. The first few times I was here, it was very new and a little dangerous. I wasn't quite used to it". However, the participants' overall initial attitude to NBT was positive and optimistic, and it was viewed as an opportunity and a necessary step on the path towards becoming better able to cope with the challenges in daily life.

In the beginning, the participants usually thought that the physical environment of Nacadia was "welcoming", "beautiful", "fantastic", and a "magical world of its own". Besides the new environment of the garden, the participants also had to adjust to the new practical conditions for participating in the NBT, and whatever reorganization of daily routines that required, e.g. travelling to Nacadia three times a week, and the facilities at Nacadia, such as restrooms

and locations for storing garden equipment, etc. The NBT programme was also mentioned as part of the new conditions to adjust to, and participants speculated as to whether there were any expectations, routines, and rules of which they should be aware.

The most pronounced challenge that needed to be overcome was getting to know, and getting on with, the other participants in Nacadia. In the second week of NBT, a participant said the following: “I have not completely understood the guidelines—how much we should talk to each other—why you are here, what you feel and stuff (...) It’s a little strange to walk around with seven people that you know you will be around for the next ten weeks, three times a week (...) But it is really fine”. Some were worried about the disturbances other participants might cause them. The concerns regarding other participants were not expressed as problems, but rather as a certain cautiousness towards other participants during the process of becoming familiar with how to get along with them during the NBT. Those who saw their other participants as possible risks of disturbances in the beginning, seemed to become aware of using different opportunities in the NBT setting to cope with potential disturbances later in the NBT period. One participant said: “The various offers here support both [social and solitary need]. So, when I feel good, I choose something social and when I don’t feel so good, I choose something more withdrawn where I can be myself”. All the participants expressed different social needs and capabilities, and that these varied from time to time. Although it took several participants some time to develop strategies to cope with the presence of others, and to get along with the other participants, most participants adopted suitable tactics to satisfy their varying individual social needs during the 10 week NBT.

Becoming more comfortable and developing a sense of belonging

The nature-like environment soon gave the participants peace of mind and allowed them to wind down: “When you are here, it is a world apart. It works quietly and I decrease in pace and become calm”. Such a feeling of calm was experienced by some as physical and mental comfort. Even at the beginning, several participants expressed experiencing calmness of mind and body: “... you find such calmness and you can feel your body—reflect, become aware, feel your body, calm down totally”.

The experience of being cared for was also mentioned and seemed important, as one described: “There is a tremendous care for one another and from the therapists. It’s a five star hotel stay. There is so much care”. Another participant explained how she felt that the therapists helped the participants to become familiar with using NBT components efficiently for personal

development: “The therapists make you aware of what is going on in your mind, thought patterns and help to change your behaviour, the way you think, tools to approach tasks differently. It’s quite effective”.

The care, support, and guidance, and the well-organized and well-maintained practical conditions—the experience that things were under control in Nacadia—seemed to be important in the participants finding comfort, safety, and peace of mind.

Some participants stated that they found they were comfortable with some features in the garden, and how they became familiar with and connected to the garden by developing certain routines in the environment: “I have different shrubs and trees that I keep an eye on to see how they are doing (...) I have developed a connection to the place. And I’m happy every time I go there. It has been a revelation to see and follow”. Such a relationship was described by another as “belonging”, and seemed to be strengthened by the fact that participants had the opportunity to have an influence on the garden during the activities, e.g. during maintenance, planting, and harvesting, and were able to follow the subsequent developments resulting from their activities. This gave them a feeling of responsibility for the garden, which motivated a feeling of attachment and ownership: “Now I feel that this garden is also my garden. I feel that I have taken some responsibility for the maintenance of the garden. I have a co-responsibility, which I like. It’s a place where I have put some heart, a lot of thought, and gained enormously in return”.

Suitable shelters offer less exposure and a sense of safety and freedom

The perception of being less exposed and being sheltered from the outer world in the fenced-off garden seemed to be an important part of creating a safe environment where the participants could begin to use and explore different NBT exercises and activities. Most participants described experiencing a feeling of freedom to choose, explore, and use NBT in accordance with their personal needs at any time while in Nacadia, e.g.: “We are allowed to approach it like children, try to think, what was it like to be a child, to explore and be curious”. The experience of being as free as a child seemed to be partly stimulated by a feeling of having no external obligations and feeling a diminished level of external expectations or demands, which was strengthened by the support and care of the therapists and peers. This freedom gave the participants space to explore, select and try, or not try, activities: “For the first time, I haven’t done any activity, and it was also great. I didn’t feel guilty about it. The others are buzzing around with bees, and streams, and all possible tasks. I just sat there. I have never done that before, but it was actually OK”. Thus,

the freedom made the participants more aware of how different activities and locations in Nacadia suited their personal current needs, e.g.: “I’ve been to different places to see how they affect me. In the beginning, I went for something visual, something that was pleasant. But now I prefer something that feels good and it’s very much the senses that decide”.

Sensory experiences reinforced Nacadia as a supportive environment

As time passed, Nacadia was experienced as an overall frame for the different components of the NBT. One participant explained: “It’s the combination, the place is just the frame around what we do during those awareness exercises and meditation. It is probably the individual components that work the best, but the whole, the whole also makes a good framework”. He explained how he had come to understand NBT as being comprised of mutually supportive components. He thought that the garden represented a frame for NBT, which strengthened the various NBT exercises, as he added: “It would be something else if we sat in a room in the middle of the city—it wouldn’t be as good as here”. It appears that the nature-like environment was experienced as an overall supporting framework in the sense that it made the exercises, activities, and therapeutic conversations more accessible. The overall settings of Nacadia made the participants feel calm, safe and, therefore, more receptive to the NBT: “One is attentive and somehow focused on something or other in nature. That is probably it, opening up all your senses and beginning to listen and smell and see much more—being more aware of the present”. An example of nature’s role as a supportive setting is illustrated by a participant’s description of why he preferred his individual conversation therapy sessions to be conducted as “walk-and-talks”: “So we have done that every time. It’s great to walk around and talk—more natural things and just to go for a walk and talk”. In this case, the nature-like setting facilitated conditions which made it possible for him to choose a set-up that made it easier for him to talk in depth about personal matters. Another participant suggested that the garden settings made a walk-and-talk session a positive and motivating experience because nature presented scenes and offered various experiences which eased any existing tension. Nature provided sensory stimuli which led to both physical and mental relaxation that stimulated increased responsiveness and greater openness to opportunities, and a greater ability to accept.

Increased awareness of destructive mindsets

On several occasions, participants shared stories of how they gained a new level of self-awareness.

Some participants said that during the NBT activities they had become aware of falling into destructive patterns of mindsets with feelings of pressure to perform and deliver, and/or a sense of competing. They became aware that such patterns and corresponding ways of acting were identical to the mindsets and working habits they had often experienced during everyday situations, e.g. at work, and recognized such patterns as being destructive and causing stress.

During NBT, they became increasingly attentive to those patterns and increasingly aware of what triggered them. A participant shared her experience with the NBT activities: “I experienced that I had some performance anxiety. I had to make a beautiful bouquet though I’m not a florist—I had to do it on time, and what were the requirements? Many of those patterns (...) follow you in nature, but you can then let go. So I caught myself in it”.

Participants further shared experiences of stepping out of their habitual mindset and usual considerations by sitting alone during their own time, and shared how such experiences could be stimulated by certain physical conditions and the atmosphere at specific locations in the garden, e.g.: “It’s absolutely fantastic. It’s both the light and also those tall, tall trees. It’s enclosed, but you can still look out. You feel a bit in awe when you walk in there. You feel quite small and insignificant when you sit there—but that is also very nice sometimes”. It led to a sense of something beyond human scale, role, and measures, and gave the participants an opportunity to consider themselves and their situation from a new perspective and to let go of normal thinking and self-judgement. In this way, many participants used the nature-like settings in Nacadia as a catalyst to step out of their habitual mindset, motivate self-reflection, and gain a new self-awareness.

The increased self-awareness seemed to give the participants strength to challenge themselves and to act upon their current needs. A participant exemplified how she acted in accordance with her current experience of bodily disturbance one day: “I was so restless in my body—a bit frustrated and a little tired and annoyed. So I just sat here and observed. There was no wind and absolute quiet—this peace slowly seeps into the body. So I had no need to get rid of energy in that way”. Previously, this participant said that she had a habit of being very physically active when she felt restless. This exemplified how participants during NBT became aware of themselves and new alternative approaches to coping with bodily and mental needs.

Spectrum of opportunities meeting individual capabilities and needs

It is important to note that not all participants on all days found it easy to find suitable places to go or

activities to do. On days when their minds were in turmoil, a few participants expressed experiencing difficulties in finding a location suitable for their needs, although this was the exception rather than the rule. It seemed that as the NBT progressed the participants increasingly used the opportunities in Nacadia to act more consciously in accordance with their current needs: "In the beginning I thought: 'I should do something'. But the therapists have repeatedly said: 'Try and feel what you want right now, or can handle right now, need right now'". When the participants described the different opportunities, they referred to "opportunities" as various activities, locations, and choices within them, e.g. whether to interact, be physically active, be physically or mentally challenged, and the extent of the sensory stimuli. In general, the participants were able to choose activities and locations that suited their individual current needs: "There are plenty of opportunities to find whatever suits each of us, otherwise, you just have to find it".

The participants' mood, capabilities, and needs continuously changed. Furthermore, each participant's experiences were independent of other participants' experiences. For example, towards the beginning of the NBT, one participant (A) had a lot of energy and chose a physically challenging activity: "I also like to exert myself a bit, to get a little sweaty, right? So I chose the scrubbing brush and scrubbed algae off the bench". On the same day, another participant (B) said that her energy level was low and she was not in a good mood and, therefore, chose a less challenging activity: "I have just had some days where I have pushed myself a bit too hard. And then I thought, I should not do anything hard". Participant B also chose to spend time inside the greenhouse because of her sensitivity to the weather conditions. In contrast, participant A stayed outside and did not mention the weather at all. Both participants expressed that they had the opportunity to meet their respective capabilities and needs on that specific day.

As well as experiencing contrasting needs, participants experienced contrasting meanings. On the same day, two participants explained their different reasons for choosing and not choosing, respectively, to do a particular activity (placing wood-chips next to a hammock) and how they experienced contrasting meanings linked to this: "Today I didn't have as much energy as I have had previously. And luckily, not so much needed to be done. So that fitted well together. My mind is a bit restless". Because the participant was experiencing disturbing thoughts at the time, he preferred to perform repetitive, physically demanding activities, while he avoided activities that were more mentally challenging. The other participant explained how she chose another activity that seemed

meaningful to her: "Putting wood chips under the hammocks—that I opt out of because I think it's not important. I like it when things have a purpose". Despite individual differences, both of the participants found opportunities that suited their specific contrasting needs, which gave them individual, meaningful, and supportive experiences.

New approaches, more courage to change and move on

Having become familiar with NBT and having seen and/or tried NBT activities, the participants gave more attention to considering how to choose and approach activities that suited their current physical and psychological capabilities. One explained: "Deliberately I didn't choose tasks which I knew would be very physical activities because I'm really tired. Activities that require too much physical strength I just couldn't grasp. I reject those where you need instructions and where it gets complex". The general approach to the activities became increasingly explorative in character, with the aim of identifying activities that felt most meaningful and beneficial to the individual participants. One of the participants explained how he had obtained personal benefit from the NBT activities with his unique approach to gaining peace of mind: "It is a rhythm in the work—it may lead to peace of mind with a rhythm in the work. And it's also a pleasure to see something being built up. To have a result". Another shared how he had deliberately selected a garden activity which he had previously avoided because he had previously fallen into a negative habitual mindset during the activity. However, towards the end of NBT, he felt equipped to challenge himself and attempt a new approach rather than his habitual mindset and working habits during the activity: "I have a tendency to go in and make things more efficient and do things as quickly as possible and just finish. But that's one of the things I'm working on, there's no reason to rush things. So it's just nice, nice and easy—and that's something that has probably changed very significantly in me".

Participating in the NBT made several participants aware of new alternative approaches to daily tasks and habits. Almost all of the participants talked about how they had become aware of such new approaches in the safe and protected environment during NBT. One participant was fearful of tall trees and dark and enclosed rooms. However, by the end of the NBT, she explained that she had developed more courage and had gained tools to challenge her own fear of tall trees by exposing herself little by little to the fear in Nacadia. This demonstrated how she had become more self-aware and capable of acting in line with a new constructive approach. Her next goal was

to gradually expose herself to dark and enclosed rooms as a further step in her personal development. Another participant explained how she had started to reflect on her usual approach to working tasks during activities in Nacadia: "Whatever garden task it is, I learn something from it. It may be like a trip back in time, where I can see how I handled things before: 'How hard can it be?', but then all of a sudden I can recognize that there is also another way of approaching things". Another participant talked about how she had become more aware of her routine and less constructive approach to different tasks in her daily life, and how she then began to use a different approach: "I look at my own forest and fields in a different way. I've become aware that there is a little more: 'it has a different colour today' or 'the light is falling in a different way today'. I have also used it at home with all the household chores you have: 'How important is it that I do the hoovering today? Do I feel like doing it now or should I instead sit down with a book?' So I am more present".

During some interviews that were conducted 1 year after NBT in Nacadia, some participants shared their insights into how they have implemented the therapeutic tools in their daily lives. For example, some participants took their usual walks in their local green environments, such as forests, parks, and neighbourhoods, but at a slower pace to find new sensory experiences there, which helped them to achieve a more aware state of mind, as they had learned during NBT. One participant explained that he had installed a small fountain in his garden which made calming rippling sounds like those he had experienced from the stream in Nacadia. The experience of the sound of the water helped him to achieve a calmer state of mind during meditation or relaxation at home. He also said that after NBT he kept a pinecone in his desk drawer at work. If he had too many disturbing thoughts, he would pick up the cone, close his eyes, feel its texture in his hands, and listen to the crackling sounds and smell the scent of resin from the cone. Experiencing these sensory stimuli for a few minutes helped him to attain a calmer state of mind and forget the disturbing thoughts.

Almost all of the participants expressed experiencing development and general improvement in their well-being during the course of the NBT, and almost all of them expressed experiencing changes in their daily life, e.g.: "I think that things are gradually improving. And I'm becoming happier. Everything is easing a little and daily life is becoming easier. Those ordinary everyday things that before were completely overwhelming, they almost get done by themselves now". One participant did not directly communicate an improvement in his general well-being. However, along with his peers, he stated that he had gained useful tools to use again in the future. Although the

participants' stories differed, all of them talked about how NBT had made them aware of new approaches for moving on in life: "It's as if we've learned some kind of strategy to how life can be lived in a slightly different way than before we came in here or before we became ill. And we have probably learned, through what we have done, and from each other and the therapists—and perhaps in fact also from nature".

Discussion

A wholeness of environments, relations, individuals, and opportunities

The participants seemed to experience the constituent parts of NBT in Nacadia: the nature-like settings, the garden activities, the exercises, the therapists, the peers, and themselves as individuals, to interact as "wholeness". The different constituents offer flexibility and mutually supportive experiences that provide the participants with an inner freedom to explore, find, gain, and develop. This diverse wholeness may be interpreted as being a prerequisite for the participants to become more aware of themselves as a "human whole". It enables the participants individually to find what specifically supports and stimulates them in their own time and pace, which motivates them to feel physically and mentally relaxed and open to the NBT components and those sensory experiences that support positive associations, memories, and reflections. This is in line with the original overall salutogenic ambition of the project: to emphasize what is strong and healthy within each individual (Antonovsky, 1996). Furthermore, it seems to be consistent with the more holistic understanding of human beings and human health found in contemporary nursing and health science (Melchert, 2015; Pearson et al., 2009; Taylor & Francis, 2013; Todres et al., 2007). The understanding and the experiences of wholeness can be elaborated from a lifeworld perspective, which suggests that the body is constantly perceived and perceiving so that the surrounding world becomes meaningful as it is experienced through the body as it carries out our living actions (Dahlberg et al., 2008; Merleau-Ponty & Smith, 1996). This explains how humans experience and relate to contextual world situations in order to understand and make meaning of them, and how the mind, body, and the surrounding world make up a lived relationship of wholeness. From a lifeworld perspective, our attachment to the surrounding world is disturbed when we become ill (Dahlberg et al., 2008). Therefore, when a participant increasingly experiences himself or herself, the NBT settings, and the constituents as a whole during NBT, it can be seen as a sign that he or she is in a state of recovering, as

his or her “body” apparently has developed to become stronger and better able to deal with and connect with the surrounding world.

Experiences of Nacadia

The participants described an increasing attachment to Nacadia, and terms like “belonging” and “ownership” were used. Such developed emotional bonds to Nacadia can be characterized as positive place attachment (Manzo & Devine-Wright, 2014). Place attachment can phenomenologically be defined as “any environmental locus in and through which individual or group actions, experiences, intentions, and meanings are drawn together spatially” (Seamon, 2014, p. 11). This definition covers the various interdependent perspectives of participants’ stories and reflections of their lifeworld experiences of NBT in Nacadia.

When the participants described their experiences of being in Nacadia or at certain locations in the garden, they used the exact terms, or very closely related words, used by Kaplan (1995) to characterize a restorative environment: fascination, being away, extent, and compatibility. These components are related to attention restoration theory (ART) (Kaplan, 1995; Kaplan & Kaplan, 1989), according to which the restorative effect is thought to occur as the environment facilitates a relaxed state of mind which is dominated by effortless spontaneous attention focused on the constantly changing fascinating, but calm, stimuli, which provides a respite from directed attention (Kaplan, 1995). Based on the participants’ experiences and use of terms, Nacadia could be characterized as a restorative environment according to ART.

Freedom to develop

Once they had become familiar with the NBT, all of the participants felt that they had the space and freedom to explore, experiment, and develop. The different components of the NBT programme gave the participants the opportunity to discover which components (“therapeutic tools”) suited them best; something which could change during the course of the NBT. At the same time, they discovered new approaches to the different NBT components. The participants all expressed having found their personal approach, routines, and preferences regarding the components of NBT, with the aim of gaining unique tools for “moving on”. Flexibility seems to be a strength of NBT. All participants experienced a sense of freedom and flexibility regarding NBT so that it could be adapted to their current personal capabilities, needs, and preferences.

The safe and free framework of the nature-like setting seems to have made the various exercises, the garden activities, and the conversational therapy

more accessible, and made it possible for all participants, regardless of their background, to explore and develop their unique therapeutic tools.

In addition, the combination of different physical and mental NBT exercises and activities may strengthen the grounding of the participants’ experiences gained during NBT. In the literature on embodied cognition, learning (in this case experiencing the NBT tools) is grounded better if the gained experience is embodied (Corazon et al., 2011; Sutton & Williamson, 2014). This means that a concrete action that is experienced through the associated bodily sensations and mental associations will be grounded more firmly, so that eventually the body may be a cue for triggering personal embodied memories of the experiences (Sutton & Williamson, 2014). Thus, an NBT activity that a participant feels is beneficial is thought to be better remembered and recalled because it is experienced both cognitively and bodily and, thus, is embodied and grounded through a broader range of sensations and associations. Eventually, the embodied experiences can be more easily transferred from the NBT setting to everyday life situations.

Participants’ development

Throughout the 10 weeks of NBT, the participants expressed experiencing varying levels of physical and mental capabilities, which were reflected in their behaviour and choice of activities. During the 10 week timespan of NBT in Nacadia, the participants’ capabilities seem to fluctuate, and even decrease in a few cases. However, the participants experienced increased self-awareness of their own current capabilities so that they could act more in accordance with them. This may be explained by the participants becoming more grounded in their bodily sensations, thus raising their awareness of their bodily needs. Mehling et al. (2012) describe body awareness, when beneficial to health, as being mindful, non-judgemental awareness and a sense of self, grounded in physical sensations in the present moment. Such increased self-awareness may have equipped the participants to be more conscious of acting, rather than neglecting, when they experienced low capabilities. Therefore, low capabilities may be experienced and expressed towards the end of an NBT programme as often as at the beginning. Thus, the development of participants’ well-being can be said to have increased linearly during NBT, despite experiencing low capabilities towards the end. This development may be interpreted as an improvement in the participants’ executive function, which refers to independent and purposeful behaviour, and a person’s capacity to prioritize, plan, and carry out a duty (Diamond, 2013; Jurado & Rosselli, 2007). A Swedish study at the

Alnarp Rehabilitation Garden by Pálsdóttir et al. (2014), focusing on clients' (who were suffering from severe stress or depression) experiences of nature-based rehabilitation in relation to the role of the natural environment, also found a general improvement in their executive functions.

Strengths and limitations

Participants were recruited from an RCT group of participants for the 10 week NBT, which limited the sampling. However, as we wanted to understand the complex phenomenon of NBT as fully as possible, we needed to collect rich descriptions to help us to gain an understanding of life as it is lived by the participants who are experiencing the complex phenomenon.

Thus, all the informants had participated in NBT, and we successfully included informants with different background characteristics (gender, age, and occupational, marital, and health status), which contributed to the variation.

We were aware that some of the informants might be less capable of sharing their story in depth on certain days owing to their stress-related symptoms. Furthermore, we also had ethical considerations in mind—that we should place as low a burden as possible on the informants. The sample size may be considered small in relation to the aim of exploring a complex phenomenon; however, the informants were interviewed three times during the NBT and were broadly representative with regard to background characteristics, while we found their narratives to be very rich.

The SSIs were conducted by the first author or a colleague, who had a similar academic background in landscape architecture and therapy gardens and, thus, similar pre-understandings of the phenomenon. Before conducting the interviews, we discussed and arrived at a common understanding of the content and style of the interview manuscript to ensure that the topics of the aim of the study were sufficiently explored.

A possible limitation of the study was that the SSI guide had to be brief and focused on the aim of the main study, because of the participants' symptoms and in accordance with the code of ethics. At certain times, some participants were not able to express and share their experiences owing to their stress-related symptoms. However, if a participant was unable to fully answer in-depth questions, it was possible for the interviewer to adapt the SSI guide to reflect the participant's capabilities, while at the same time staying focused on the relevant topics of interest for the study. Despite the fact that some of the interviews were brief and the results were less information rich than others, all the interviews were useful and the descriptions were detailed enough to give the

interviewer and researchers a good insight into the participants' perspectives on their lived experiences of NBT.

Dahlberg et al. (2008) describe the need for a variety of complementary methods when dealing with complex phenomena from a lifeworld approach to obtain rich data to counter the ambiguity of people. Further, they stress the importance of carefully selecting methods to obtain the aimed-for knowledge accurately and effectively (Dahlberg et al., 2008). BM, the participants' written logbooks, and the interviews with the therapists were applied to obtain additional data to support the interviews with the participants. The BM process gave the researchers a good insight into how the garden was being used. During the observation process, the first author noted the participants' actions and behaviour, and gained a preliminary understanding which facilitated further exploration during the analysis of the participant interviews. The participants' logbooks further strengthened the researchers' idiographic understanding of the individual participants before analysing the various narrative styles. Such a mix of methods is time consuming, but may be considered a strength as it allows the researchers to analyse the participants' narratives in corroboration with their background knowledge of the phenomenon acquired from other sources, and to enrich their understanding of the studied case, the individual participants from an idiographic approach, and the group of individuals' lived experiences of the setting.

A strength of the study is related to the research team. Two of the authors are landscape architects who have solid knowledge of therapy gardens and how physical environments may interrelate with NBT. They also had a pre-understanding of Nacardia, although they strived to constrain their preconceptions in accordance with the phenomenological RLR approach. This strengthened the researchers' understanding of the participants' narratives of their experiences. To enhance the reliability of the results, two authors from physiotherapy and nursing science took part in the study in order to contribute to and enrich the understanding of the phenomenon and the participants' stories. The author from nursing science had no previous connection to the garden or NBT, although she had vast experience of conducting phenomenological research.

This study contributes deeper knowledge of patients' varied and sometimes paradoxical lived experiences of an NBT intervention. Together with the RCT, it adds to the understanding of NBT interventions.

Conclusion and implications for practice

This study contributes new knowledge of participants' lived experiences of 10 weeks NBT in the Therapy

Garden, Nacadia, through a dynamic interplay of methods, researchers, and participants. We have explored the experience of NBT in a nature-like setting for people incapable of working owing to stress-related symptoms. By conducting an in-depth RLR analysis from a lifeworld phenomenological approach, we have learned that NBT in Nacadia is experienced as a process of habituating, becoming familiar and comfortable, and exploring and developing within the NBT conditions and settings. The participants experienced a feeling of being shielded and cared for in a supportive setting; this gave them a feeling of safety and freedom, which facilitated physical relaxation and peace of mind. Being comfortable with the NBT components made the participants more aware of selecting activities in accordance with their current individual capabilities and needs. The participants seemed to gain more courage to explore new approaches for making changes, and applying and implementing gained coping strategies from NBT in everyday situations for moving on.

The participants' overall development can be described as an increasing self-awareness leading to an improved ability to act in accordance with their current experienced bodily and mental capabilities and needs.

The flexibility of the NBT programme and the spectrum of opportunities in NBT facilitate the positive development of all participants at their own pace, in line with their unique personal preferences and previous and current experiences of life.

This study has cross-disciplinary value for the field of landscape architecture, and for medical, nursing, and therapeutic sciences and practices. Landscape architects may use the results to guide evidence-based design processes for supportive environments, while physicians, nurses, and therapists may gain insight and inspiration for NBT procedures from the patients' perspective. Furthermore, the findings motivate cross-disciplinary collaborations between designers and clinicians with regard to NBT.

When NBT interventions or practices are developed, it is important to keep in mind that it must be possible for each participant, regardless of personal background, to find suitable shelter to become comfortable, and feel safety and a sense of belonging at a level that allows them the freedom to discover at an individual pace. Furthermore, it is of high importance that an NBT intervention or practice offers a spectrum of opportunities of activities, experiences, environments, and choices to meet the individuals' current fluctuating capabilities and needs.

Scientifically, the findings may inspire new studies in the field of evidence-based health design within landscape architecture. For example, it may be interesting to interview the participants not just during NBT, but also after 6 months and 12 months. It would be useful to learn more about the participants' reflections on

NBT and how they implemented what they learned from NBT in their daily lives in the long term.

As phenomenological RLR, this study describes the lived experience of the participants and what they consider to be meaningful, but has no focus on causality or effect. Therefore, additional studies which apply different methods are needed to gain a fuller understanding of NBT in Nacadia and develop more knowledge of NBT for people who are incapable of work owing to stress-related symptoms.

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ORCID

Ulrik Sidenius  <http://orcid.org/0000-0002-6976-6181>
 Ulrika K. Stigsdotter  <http://orcid.org/0000-0001-6744-2311>
 Dorthe Varning Poulsen  <http://orcid.org/0000-0001-8547-5424>
 Terese Bondas  <http://orcid.org/0000-0002-1023-6223>

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Article III

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Article

A Diagnostic Post-Occupancy Evaluation of the Nacadia® Therapy Garden

Ulrik Sidenius *, Patrik Karlsson Nyed, Victoria Linn Lygum and Ulrika K. Stigsdotter

Section for Landscape Architecture and Planning, Department of Geosciences and Natural Resource Management, University of Copenhagen, 1958 Frederiksberg, Denmark; pakn@ign.ku.dk (P.K.N.); vic@ign.ku.dk (V.L.L.); uks@ign.ku.dk (U.K.S.)

* Correspondence: us@ign.ku.dk; Tel.: +45-2118-9323

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Abstract: The design of the Nacadia® therapy garden is based on a model for evidence-based health design in landscape architecture (EBHDL). One element of the model is a diagnostic post-occupancy evaluation (DPOE), which has not previously been fully developed. The present study develops a generic DPOE for therapy gardens, with a focus on studying the effects of the design on patients' health outcomes. This is done in order to identify successes and failures in the design. By means of a triangulation approach, the DPOE employs a mixture of methods, and data is interpreted corroborating. The aim of the present study is to apply the DPOE to the Nacadia® therapy garden. The results of the DPOE suggest that the design of the Nacadia® therapy garden fulfills its stated aims and objectives. The overall environment of the Nacadia® therapy garden was experienced as protective and safe, and successfully incorporated the various elements of the nature-based therapy programme. The participants encountered meaningful spaces and activities which suited their current physical and mental capabilities, and the health outcome measured by EQ-VAS (self-estimated general health) indicated a significant increase. Some design failures were identified, of which visual exposure was the most noteworthy. The DPOE model presented appears to be efficient but would nonetheless profit from being validated by other cases.

Keywords: natural environments; landscape architecture; health design; evidence-based design; nature-based treatment; stress-related illnesses

1. Introduction

The use of gardens in healthcare has a long history [1,2], and today there is an increasing interest in, prevalence and use of therapy gardens as health facilities [3]. An increasing body of research spanning multiple fields indicates that participation in nature-based therapy (NBT) in therapy gardens [3–8] result in positive health outcomes. In Scandinavia this has raised political awareness of the benefits of using nature areas in healthcare and as treatment facilities. In Denmark, several municipalities currently run or are planning therapy gardens. Hitherto, Danish therapy gardens have mostly been private initiatives. Currently, there is a demand across the municipal health authorities in Denmark for efficient and evidence-based treatment in general, including NBT [9]. An evidence-based approach has the potential to provide suitable measures for bringing about improvements to the health outcome of a range of patient groups. With respect to NBT, an evidence-based approach has the potential to increase the likelihood of the effectiveness of this form of treatment. For this reason, several municipalities have sought support in the evidence-based health design in landscape architecture (EBHDL) for arguments put forward at governmental level for therapy garden projects. Over the course of the past decade, evidence-based design has evolved into health design, which is a branch of both architecture and landscape architecture. In Denmark,

an often cited definition of health design in landscape architecture is: the conscious design of green spaces and gardens such that they in some way support health processes (and nature-based treatment programmes) and result in improved health outcomes [10]. The design of the therapy garden is of great significance, and there are examples of gardens which have negative effects on patients. For instance, a survey found that 22% percent of patients at a care unit overlooking a garden which featured abstract design components reported an overall negative reaction to the garden [2]. Accordingly, health design in landscape architecture may benefit from an evidence-based design approach.

Evidence-based health design in landscape architecture (EBHDL) has evolved from other disciplines that have used evidence-based models to guide decisions and practices in their respective fields [11], e.g. evidence-based medicine (EBM) and evidence-based clinical practice (EBCP), in which clinical practitioners make decisions concerning the treatment, care and practice of individual patients based on current best evidence from research (EBM) and practice (EBCP) [12–14]. The Center for Health Design defines evidence-based design (EBD) as: “The process of basing decisions about the built environment on credible research to achieve the best possible outcomes” [15]. EBHDL is based on definitions of EBD, although EBHDL specifically focuses on the design of landscapes, gardens or other natural environments with the aim of maximizing positive outcomes in terms of clients’ health and well-being. However, the process of EBHDL does not end when the design has been realised, since systematic and efficient evaluations are required in order to secure, maintain, and enhance positive health outcomes [3,10,16,17].

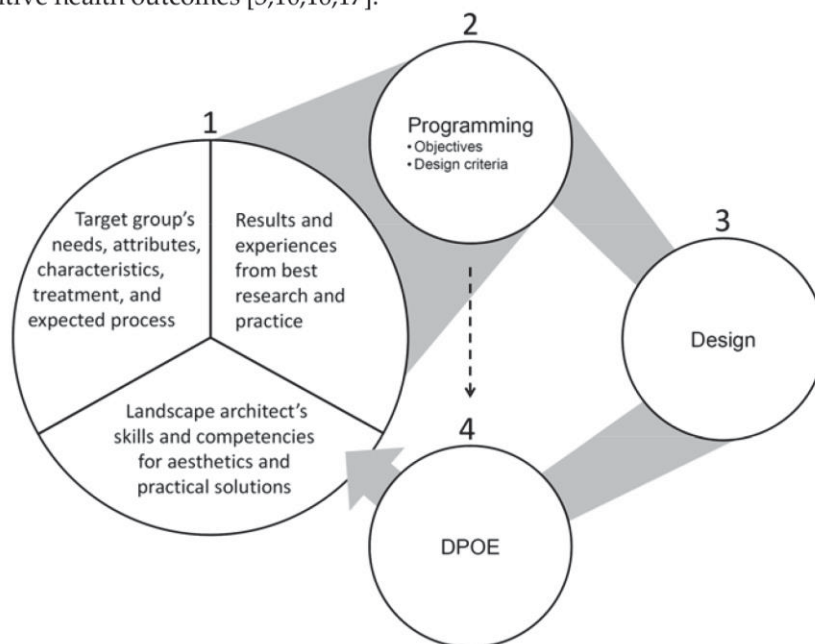


Figure 1. The evidence-based health design process in landscape architecture. DPOE: Diagnostic post-occupancy evaluation.

EBHDL is regarded as continuously explorative, evolving, and cyclical process of gaining experience, knowledge, and evidence from a current case in order to enhance patients’ health and well-being during treatment. An EBHDL model (Figure 1) developed by the University of Copenhagen aims to describe the process transparently [10]. The model consists of four parts. The first part comprises three equally important main components which must initially be considered: 1) Aesthetic and practical expertise with and experience of landscape architecture; 2) the specific user, patient or target group’s special needs, wishes and preferences; with respect to treatment, the treatment programme and the patient’s expected rehabilitation process must be taken into consideration; and 3) research evidence and relevant practical experience. These basic elements constitute the foundation for the next part of the model (part 2), which consists of the programming that guides the subsequent design. Here, the desired health outcomes and the objectives of the

garden should be stated, together with details of how they will be achieved by means of the design (design criteria), as well as evidence to support the decisions on which the design is based. Evidence-based health design is, however, a process. A key aspect of this model is that the process does not stop when the design (part 3) has been realized. The idea is that the garden is continuously evaluated. This is achieved by means of part 4, which is a diagnostic post-occupancy evaluation (DPOE), which evaluates whether the design has fulfilled its aims and objectives (part 2).

Regarding post-occupancy evaluations (POE) of therapy gardens, Marcus and Sachs [3] recommend making use of a diagnostic POE (DPOE), which should be conducted over a longitudinal time span using triangulation of mixed method and multiple sources of data to provide strong and reliable findings for a comprehensive and reflective evidence-based design process [3].

The DPOE will illuminate the thinking behind the design decisions in order to clarify the aims and objectives of the design, determine the appropriate core area of examination for the specific site, and facilitate an evaluation based on the original aims and objectives of the case.

Different types of DPOEs are presented in the literature published on the subject. Guinther et al. [16] describe DPOEs in relation to healthcare settings in general, while in Hopper [17] and Marcus and Sachs [3], DPOEs are described in the context of landscape architecture and nature-based therapeutic settings, respectively. The DPOE in the current study is designated for therapy gardens and, for this purpose, a new form has been conceptualized (Figure 2) which draws inspiration from the above-mentioned DPOEs. This is motivated by the definition of the concept of therapy gardens, according to which the design of the garden and the nature-based therapy programme are closely related [18]. For this reason the DPOE utilised in the present study (Figure 2) places an increased focus on patients’ experiences of and opinions and reflections on the garden environment, the different operations, and the potential impact on their health outcomes. The similarities and differences between the DPOEs employed in the present study and the aforementioned DPOEs are presented in Table 1. The differences are motivated by the current DPOE, which is designated as a therapy garden, and according to which the number of participants and the operations are predefined in the NBT programme. For example, Hopper’s [17] DPOE is designated as landscape architecture in general, Guinther’s DPOE [16] examines built healthcare settings in general, including all possible user groups, and Marcus and Sachs’ DPOE [(3)] examines healing gardens, which do not have a specific patient group or NBT programme.

Table 1. The various methodological frameworks applied in diagnostic POEs based on relevant recommendations.

	Project context analyses	Site analyses	Observations, behaviour traces	Observations of maintenance	Observations, occupancy counts	Observations, behaviour mapping	Interviews with users	Interviews with staff	Interviews with designer	Interviews with developer	Questionnaires
Guinther et al. [16]	X	X			X	X		X	X		X
Hopper [17]	X	X	X			X	X	X	X		
Marcus & Sachs [3]	X	X	X	X		X	X	X	X		
Present DPOE	X	X	X	X		X	X	X	X	X	X

The aim of the current DPOE is to assess the initial design decisions in therapy garden projects by examining the effect of a therapy garden, and subsequently a nature-based therapy programme, on a specific patient group’s health outcomes. The DPOE consists of the following steps: (1) Project context; (2) examination of the five core points: Environment, Experiences of the environment, Operations, Experience of operations, and Health and well-being outcomes; and 3) findings (Figure 2).

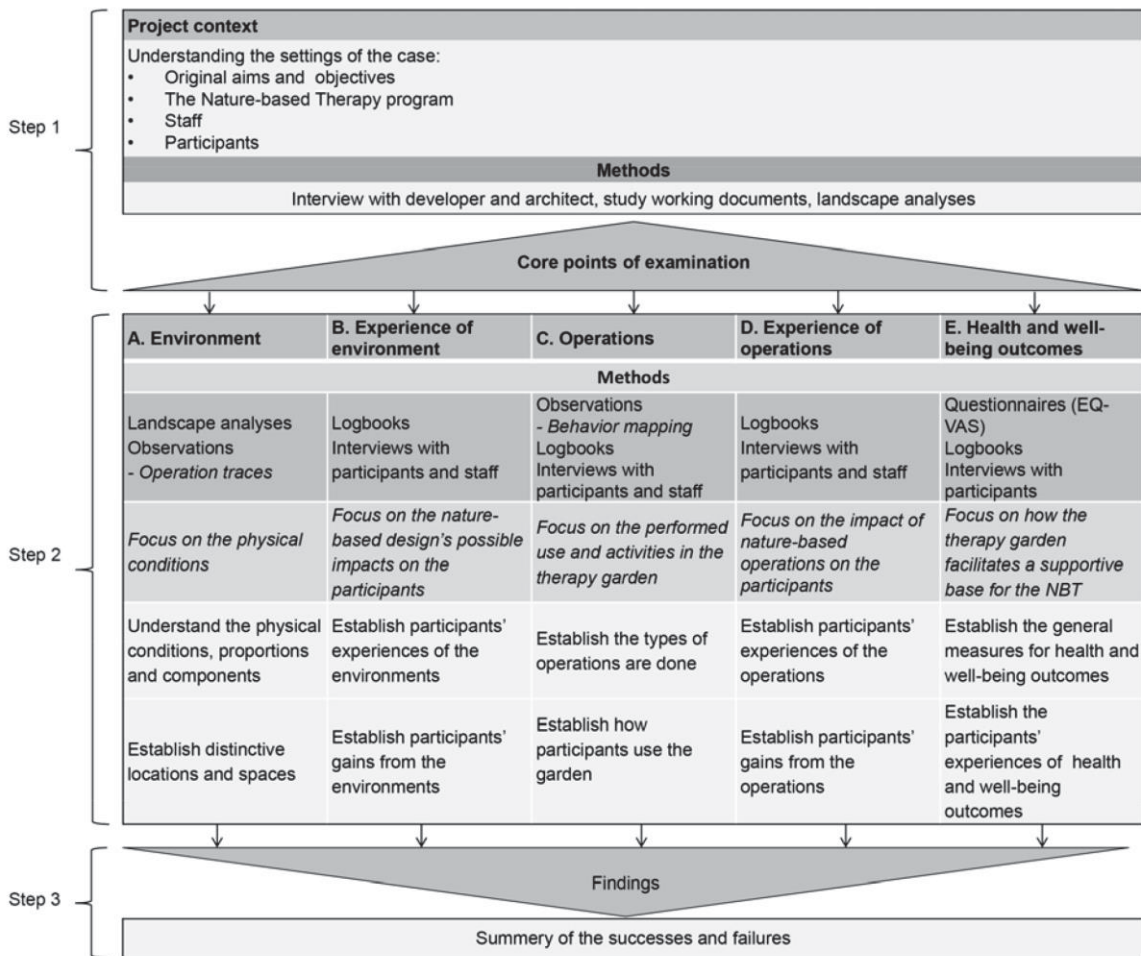


Figure 2. A conceptual DPOE model for therapy gardens.

1.1. Presentation of the Case

This study is a DPOE of the University of Copenhagen’s therapy garden, Nacadia®, which is located in the Arboretum in Hoersholm, approximately 30 km north of Copenhagen. The garden was designed according to the above-mentioned EBHDL model and was opened in 2011. It covers an area of 1.4 hectares and is located in the section of the arboretum that is home to a collection of trees and shrubs from North America. The terrain is slightly sloping from the highest point in the northern end to the lowest point in the south-eastern corner, lending it a slightly parabolic form. Nacadia® has a forest-like appearance.

The design of the garden is targeted at individuals who are suffering from stress-related illnesses. In the design phase, an NBT programme was developed [18]. The NBT consists of the following five components: Individual conversational therapy, which is based on mindfulness cognitive therapy; Garden activities; Awareness exercises; Participants’ ‘own time’, and; Homework, the aim of which is for the participants to apply some of the experiences acquired in the therapeutic setting to their everyday situations [18,19]. The participants were divided into seven groups of 4–7 individuals for a 10-week NBT program, which ran from August 2013 to March 2015. The NBT programme was managed by two therapists who were assisted by a gardener.

1.2. Aim

The aim of this study is to apply the DPOE model (Figure 2) to the design of the therapy garden, Nacadia®. In comparison with the original aim and objectives of Nacadia®, the current DPOE aims to assess the possible impact of the environment and the operations which comprise the NBT programme on patients’ wellbeing in order to identify possible successes and failures of the design.

The original aims and objectives of Nacadia® were identified by applying step 1, 'project context', of the DPOE model (Figure 2), which will result in the identification of the 'core points of examination'. This was followed by step 2, examining the five core points. In step 3 'successes and failures' were identified on the basis of the examinations.

2. Materials and Methods

2.1. Data Collection

The data collection follows the DPOE model, including the five 'core points of examination' set out in step 2.

2.1.1. Project Context

The analysis of the project's context will provide an understanding of the context of the case to be examined. It includes an overall understanding of the context of the setting, the original objectives of the landscape design and operations, and the intended health outcomes. According to the EBHDL process model, this analysis should be presented in the programming phase (e.g. as parts of working documents). The aims and objectives of the present study were described in two publications. The main sources of information were a booklet entitled 'The Concept Manual of Nacadia®' [20], which describes the design process and the design, articles describing the nature-based therapy programme and operations [18,21], and informal interviews with the developer, the designer and the staff.

Core Points of Examination

The DPOE was conducted using a mixed-method triangulation approach. Triangulation is used to compare and contrast multiple methods and data sources in order to strengthen the validity of the interpretations [22]. In order to address the 'Core points of examination', the following five methods were employed (Figure 2): Landscape analysis, systematic observations, logbooks, interviews, and Euro Quality of Life Visual Analogue Scale (EQ-VAS). Some methods were used to examine several of the core points.

2.1.2. Landscape Analysis

Different methods of landscape analysis can be used to study aspects of a geographical area in order to understand its content, design and use [23]. In order to examine the physical conditions of Nacadia®, a spatial landscape analysis was conducted several times over the course of the project from the summer of 2013 to the autumn of 2016, so as to account for potential seasonal variations, and to evaluate possible changes over time. The spatial landscape analysis was conducted as an eye-height analysis [23] because this method provides an understanding of the physical conditions and spatial proportions of the environment from a human-scale perspective and serves to identify how the garden is divided into different spaces.

2.1.3. Behaviour Mapping

Behaviour mapping is an observation method which is suited to studying people's behaviour in relation to different components and features of an environment [24,25]. Behaviour mapping was conducted systematically at the baseline at the midway point and at the end of the 10-week NBT programme for each of the seven groups. During each observation session, behaviour mapping was performed at 25-min intervals from 10:15 a.m. to 12:05 p.m. The chosen time span for conducting this behaviour mapping was the duration of the therapy programme, which included the operations which were of interest for the purposes of the study. Observations were not conducted during the awareness exercises because the latter were conducted at the same specific locations each time, and therefore did not need to be explored further in terms of their location.

During each behaviour mapping, the observer followed the same route through Nacadia® and sub-scannings were performed at various observation points along the route so as to take in the whole of Nacadia®. The observational data was entered by GIS on an iPad. The data collected included point-locations of the participants, sun and shade conditions and the operation types: 'Garden activities', 'individual conversational therapy', and 'own time'. The behaviour mapping data was filtered using GIS to illustrate clustering in the distribution of the operation types.

Additional notes taken during the behaviour mapping were used as the basis for interviews with some participants. Additionally, 'operation traces' (traced within the garden's physical conditions by users of the garden) [26] were noted if any significant changes in the environment were observed which appeared to have been caused by participants' operations or by maintenance.

2.1.4. Interviews

Semi-structured interviews were conducted with the therapists to gain an insight into how they use Nacadia® during NBT. These interviews have been used as the basis for understanding the project context and the operations.

Fourteen volunteers, two selected from each of the seven groups, were selected by the therapists based on their capacity to participate in semi-structured interviews. The interviews lasted on average 20 minutes and were recorded and transcribed. A content analysis was conducted in order to identify the participants' experiences based on their narratives [27] concerning aims, objectives and core points of examination of the DPOE. The focus was on the participants' experiences of the environment, their use of it, health outcomes and the possible interplay between these aspects. The interview data was employed so as to gain a more nuanced understanding of the findings of the behaviour mapping and to support interpretation of the results of EQ-VAS. The narratives shed light on the participants' own experiences, opinions and reflections on the environment, the operations, their interactions with the latter, and the possible impacts of these factors on their wellbeing.

2.1.5. Logbooks

In the second week of the NBT programme, the participants were encouraged to keep logbooks. These logbooks contained a map of Nacadia® for each day of the therapy programme. The participants were encouraged to illustrate their use of the garden using the map, and in addition the logbooks contained three pages of open questions which prompted the participants to write about their use and experiences of Nacadia® each day.

Following the NBT programme there were 532 maps and pages of participants' notes. The participants did not systematically provide illustrations and narratives since most did not take notes every single day. Towards the end of each period the participants provided significantly fewer illustrations. Consequently the illustrations from 40 of the participants were merely used to illustrate how the participants' overall activities were distributed across the garden. The logbook illustrations were entered in GIS to provide an illustration of the general distribution of use. The narrative logbook data provided by the 14 participants who also took part in the interviews was assessed by means of content analysis [27] with respect to the core points of examination.

2.1.6. Questionnaire

EQ-VAS is forms part of the validated questionnaire EQ-5D [28,29]. It measures participants' self-assessed general state of health on a given day. It is used as a standardized instrument for measuring health values using a VAS rating scale (0–100) to elicit valuations of the health of participants [28], where 0 = worst imaginable state of health and 100 = best imaginable state of health. In the present study the scale 0.0–10.0 was used instead of 0–100. EQ-VAS is commonly used in healthcare studies, is simple and easy to fill out and generally has a high response rate [29], and for these reasons it was considered suitable for the current study. During the first week of the study (baseline) and at the end of the NBT programme, the EQ-VAS was handed out or sent by post to all

of the study participants. The VAS ratings ($n = 33$) are used to gain an overall estimate of the development in the participants' self-assessed health status over the course of the NBT programme.

2.2. Ethical Considerations

The current study follows the ethical principles of the World Medical Association's Declaration of Helsinki [30]. The Danish Data Protection Agency (J.nr. 2013-54-0344) and the National Committee on Health Research Ethics (P.nr. H-1-2013-038) have approved the study.

The participants were provided with oral and written information about the study. The participants gave written consent prior to participation. Further, they were informed of their right to withdraw from the study at any time and a guarantee regarding confidentiality of information was given. When carrying out data collection, analysis and interpretation, ethical principles of relevance to qualitative studies were taken into account [31,32]. The sources cited in this paper are anonymous.

3. Results

The diagnostic post-occupancy evaluation (DPOE) was applied with the aim of evaluating the design in relation to the original goal and objectives of Nacadia®. The findings are presented in accordance with the three steps of the DPOE model (Figure 2), starting with the 'project context' followed by the five 'core points of examination', concluding with a summary of the results regarding 'successes and failures'.

3.1. Project Context

3.1.1. Original Goal and Objectives of Nacadia®

Nacadia® belongs to the University of Copenhagen and serves as a site for research, demonstration and education. The overall research goal of Nacadia® was to test and, ultimately, modify and adjust the design of the garden so as to improve the intended health outcomes. Accordingly, the garden was designed to facilitate research [20,21].

Nacadia® was designed to be a health facility for the nature-based treatment of participants suffering from stress-related illnesses. The objectives of the design of Nacadia® are [20,21]:

- To be closely linked to the NBT programme
- To match participants' treatment process by both supporting and challenging them
- To provide meaningful activities ranging from physically active to mentally restorative, and from concrete to symbolic activities, all year around
- To actively and positively contribute to participants' treatment and wellbeing

The initial intention was to meet these objectives by employing a set of design criteria based on research results and documented experiences from therapy garden projects. The design criteria may be summarized thus: Spatial structure; Living building material; Easy to interpret; Security; Levels of Safety; Strength of Mind; Mental and physical accessibility; Flexibility and Participation; Perceived Sensory; Dimensions of Nature; Opportunities for nature-based activities (for more information concerning the design criteria, see: Stigsdotter and Randrup [20] and Stigsdotter [(21)]).

The main physical components of Nacadia® are presented in Figure 3. The design incorporates six built components: The hut, a wooden elevated deck in a tree, the main wooden walkway, an entrance gate with a pergola, a greenhouse, and an office building surrounded by a large wooden terrace. The office building and the greenhouse were not actively used in the NBT and are, therefore, not included in the DPOE. Approximately 2/3 of the garden area is covered by tree canopy, while the remaining 1/3 is comprises grass meadows. Water features of various kinds are present: a spring, a stream, a pond and a lake with an island.

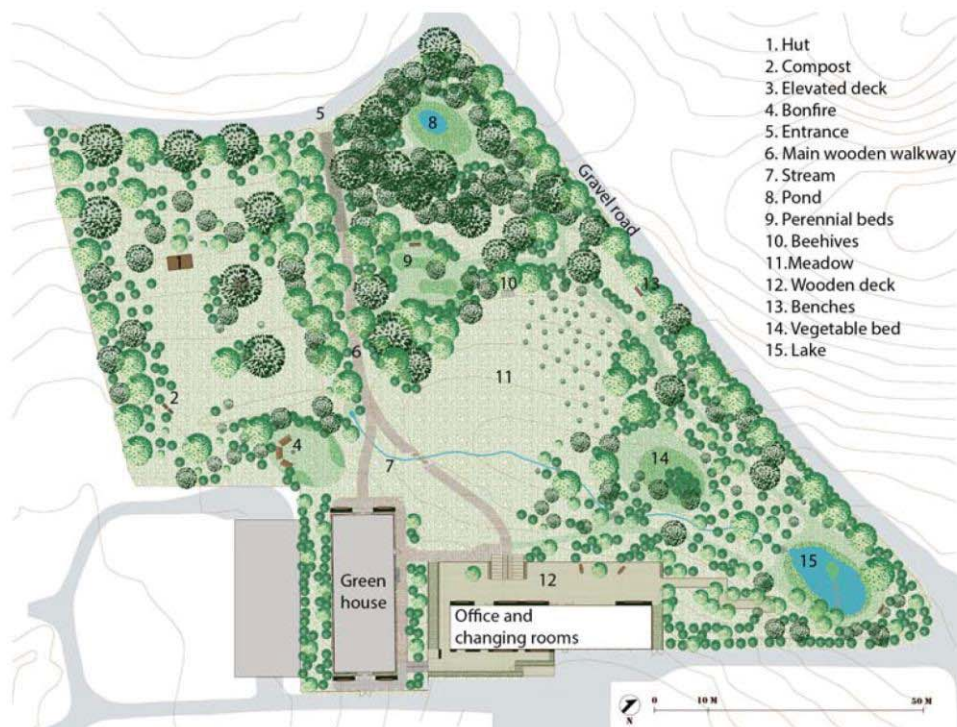


Figure 3. Plan of Nacadia® detailing its main physical components.

3.1.2. The Nature-Based Therapy Programme at Nacadia®

The nature-based therapy at Nacadia® (NBTN) is an intervention that initiates a therapeutic process made up of activities that incorporate natural elements and nature experiences [18,21]. The NBTN programme was developed to treat people suffering from stress and/or stress-related illnesses. It builds on elements of nature-based therapy and mindfulness-based cognitive therapy [18,21]. It is a 10-week therapy programme comprising therapy sessions 3 days a week from 9:30 to 12:30. The first week is an introductory week, while the final week is a transition week. The NBTN consists of the following five components: Individual conversational therapy based on mindfulness-based cognitive therapy [18,21]; garden activities; awareness exercises (e.g. meditation and body scan) based on a mindfulness-based stress reduction principle [33]; participants' 'own time', which gives the participants an opportunity to explore and reflect; homework, the aim of which is for the participants to transfer some of their experiences from the therapeutic setting to their everyday lives [18].

3.1.3. Staff

The NBTN programme was run and managed by two certified psychologists who are both trained in NBT. The therapists were supervised by a medically responsible psychiatrist. The garden activities were initiated and supported by a professional gardener at Nacadia®.

3.1.4. Participants

The participants were drawn from a broad demographic (i.e. diverse in terms of gender, age and socio-economic background). The inclusion criteria were: 20–60 years of age, unable to work due to stress or stress-related symptoms for a period of 3–24 months (defined as suffering from severe stress according to the Danish healthcare system), no other significant or untreated physical ailments at the root of the symptoms, not suicidal, and no substance abuse.

The participants passed an assessment procedure to ensure homogeneous diagnosis in accordance with ICD-10 [34]: ICD-F43.0-9, minus 1. 43 individuals were considered suitable for

participation in NBTN. One did not attend, while another was found to have been misdiagnosed during the NBTN, although this individual nonetheless completed the NBTN. Thus 42 participants completed the 10-week NBT programme in Nacadia®. The participants were divided into seven groups of 4–7 participants for the purposes of participation in the NBTN programme from 05.08.2013 to 27.03.2015.

3.2. Core points of Examination

3.2.1. Environment—Focus on the physical conditions (Figure 2A)

The physical environment is understood as the various components (e.g. trees, bushes, terrain, buildings) which make up the garden and its various distinctive spaces.

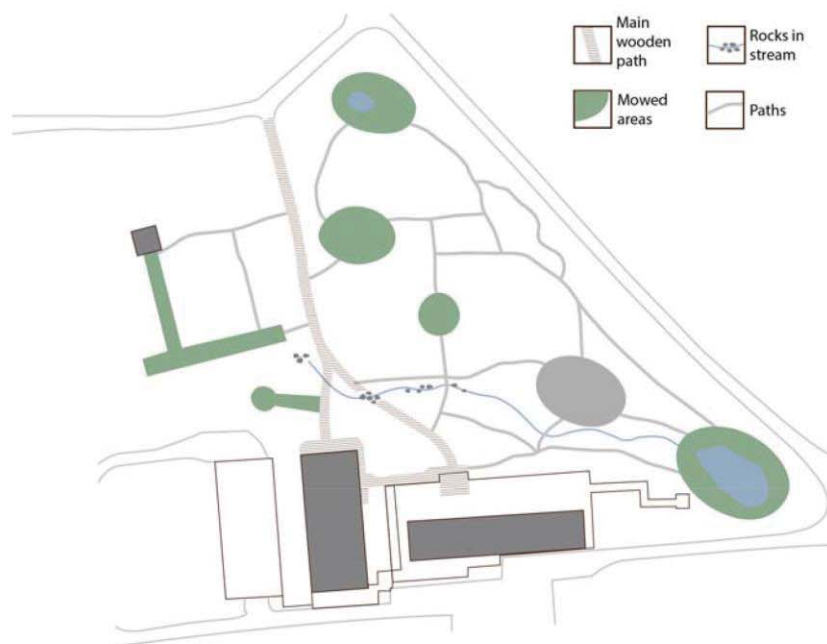


Figure 4. Physical conditions: Components of the terrain.

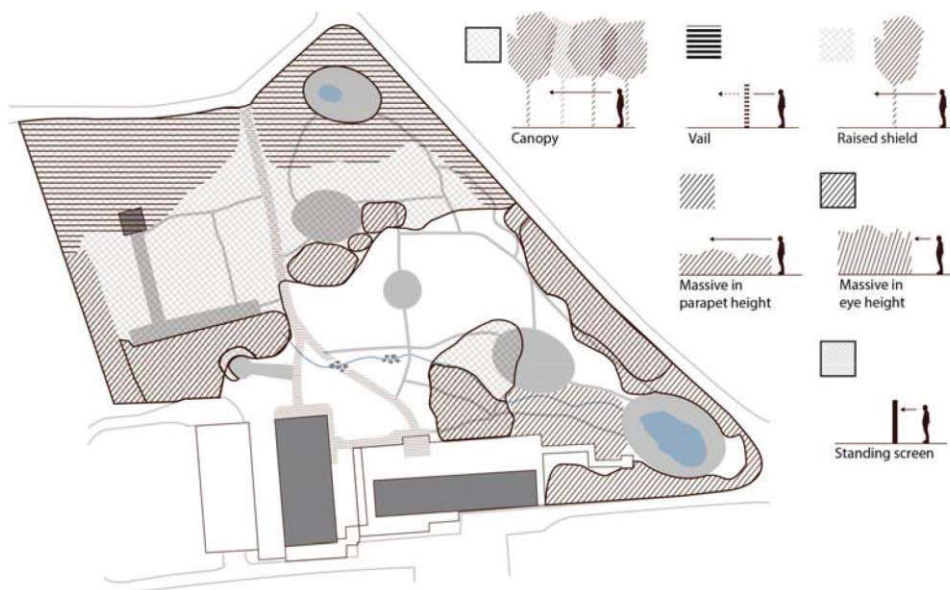


Figure 5. Physical conditions: Components which define walls and roof.

The Physical Conditions, Proportions and Components

The landscape analysis established that the terrain is slightly sloped with the highest points situated at the edge of the garden and the lowest point located by the stream in the middle of the garden. This results in a slightly parabolic terrain shape centered around the middle of the meadow. Figure 4 illustrates the various components which make up the terrain: paths, water features and mowed areas. The areas that are not marked consist of groundcover vegetation, which ranges from unmown grass to wilderness-like forest floor. Based on the eye-height analysis, Figure 5 illustrates the different types of natural components distinctive enough to define discrete spaces.

Operation Traces

Specific maintenance practices and changes made to the environment by the staff, sometimes assisted by the participants, had a certain impact on the physical structure of the garden. Figure 6 shows the most notable changes that were observed in the garden during the period spanning its use by the first group and through to the last group of participants. Evergreen trees and shrubs have been planted along the fence, and woodpiles have been placed at strategically selected locations to block the view into the garden from the outside. New paths have been constructed to reflect the participants' most frequently used routes through the garden. Furthermore, sudden significant observed changes (e.g. mowing of the tall meadow grass) resulting from maintenance procedures are marked in Figure 6.

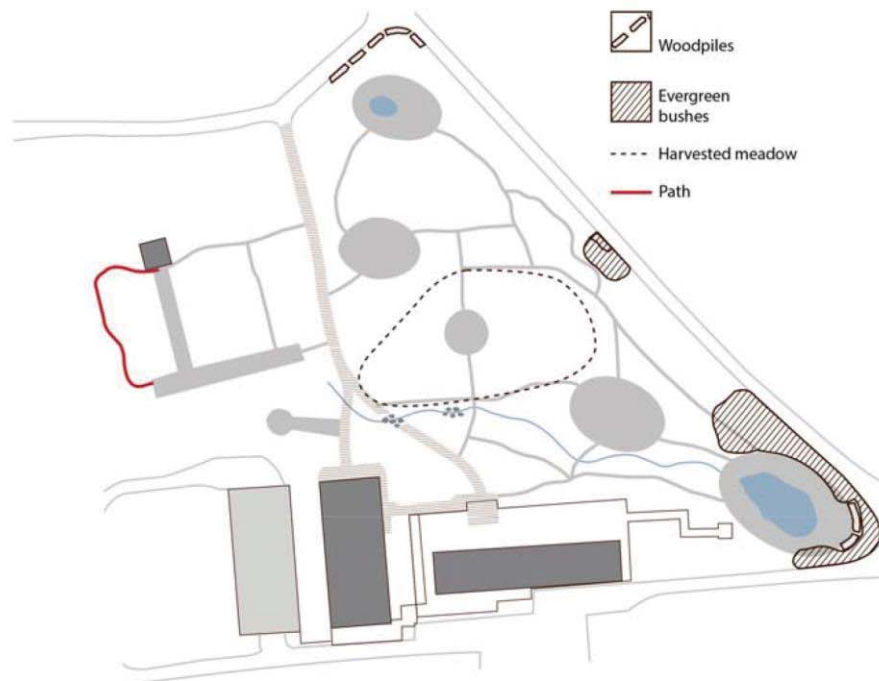


Figure 6. Operation traces resulting from maintenance tasks carried out by staff assisted by participants.

Distinctive Spaces

The spatial landscape analysis, the illustrative data from logbooks (Figure 7A), and the graphical data derived from the observations (Figure 7B) are, in the present study, merely used to provide a general understanding of how Nacadia® as an overall environment hosting a number of spaces (Figure 8).



Figure 7. Graphical data from logbooks (A) and behaviour mapping (B) illustrating the general use distribution in Nacadia®.

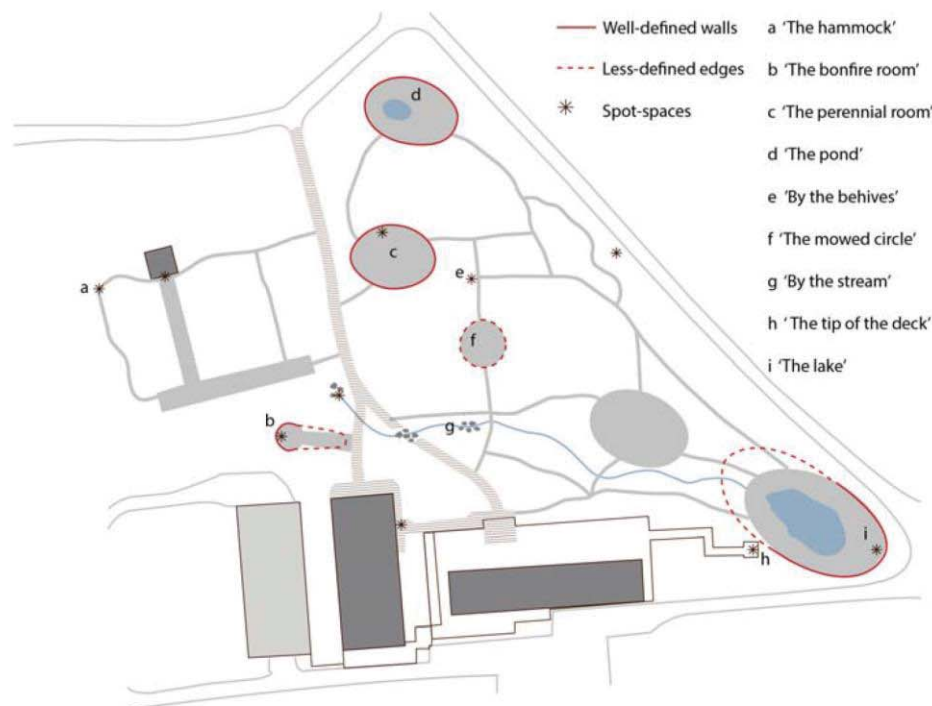


Figure 8. The spaces experienced as most distinctive, and spot-spaces identified by means of the landscape analysis, observations, interviews, and logbooks.

Distinctive spaces are understood as sub-locations within the garden in which certain elements are significant enough to be perceived as boundaries that demarcate a discrete space. Certain preferred spaces in Nacadia® were not defined by boundaries as such, but rather were places between spaces, which are thus conceived of as ‘spot-spaces’. These are components that create conditions that can only be experienced as a space nearby, for instance when sitting in a corner between two small shrubs, or when sitting up against a building or lying/sitting down in tall grass. The spatial experience depends on the relationship between the participant and the component, rather than the component representing a boundary for the space. Thus, several spot-spaces may be present in one distinctive space.

3.2.2. Experiences of the environment—the potential impact of the nature-based design on the participants (Figure 2B)

Participants' experiences of the environment and beneficial outcomes

In general, the physical environment was described as *"organic and not too streamlined"* giving *"a sense of wilderness"* and of variation in features (e.g. components, sensory experiences, and scenery). The garden was experienced as having an appropriate size which allowed participants to retreat and engage in activities without being too disturbed by one another. Key experiences of the environment included natural sensory stimuli, such as listening to the sounds of birds and the rippling water, feeling the warmth and inhaling the smell of the bonfire. The participants reported experiencing a feeling of being protected, safe and feeling as if they were in *"another world"* with no demands placed upon them and with a sense of freedom: *"It is like a refuge here", there are "no obligations" and "no demands or expectations, and there is nothing that you have to do"*.

The overall environment comprises a safe and liberating framework for the activities carried out at Nacadia®, stimulating participants to feel peaceful and calm in their bodies and minds and enabling them to relax and let go. This enables them to challenge themselves and develop in the context of the environment and activities.

Participants' Experiences of and Beneficial Outcomes from the Distinctive Spaces

The participants mentioned several locations which they perceived as distinctive spaces in Nacadia®. They said that there were *"many little places"* in Nacadia® which they considered *"Really good"* because *"there are new things to discover every time you are here"*. The distinctive spaces which were most frequently described in positive terms were (in no particular order): 'the perennial room' (Figure 8c), 'the lake room' (Figure 8i), and 'the bonfire room' (Figure 8b). Key experiences in these spaces are that the participants felt enclosed or *"slightly closed"*, albeit with an opportunity to *"see far"* and get a *"sense of expanse"*. It made the participants feel as if they were protected from behind, and gave them a feeling of privacy such that they felt peaceful and consequently found it easier to engage in the 'own time' activity.

Some of the locations which were experienced positively-comprised spots-spaces (see section Distinctive Spaces). The spot-spaces most frequently described as being used in 'own time' activities were 'the hammock' (Figure 8a), 'the tip of the deck' (Figure 8h), 'by the beehives' (Figure 8e), and 'by the stream' (Figure 8g). The key features in these spot-spaces were the components that created small enclosures, yet still provided a view of the surrounding area or of the sky. The essential quality of spot-spaces thus appears to be the that they create a protective and safe refuge which allows participants to find peace and quiet and be alone and away from everyday demands, which gave them the opportunity to *"do nothing"* and be alone with their own thoughts or find inspiration for self-reflection.

The environment as a whole consists of various natural sensory stimuli: scents, sights, textures, sounds, and tastes, all of which lead to bodily experiences. Such experiences are important for developing greater awareness, as a participant explained it: *"to be here in the garden and at peace—it sharpens your senses"*. Interactions between human and environment are actively incorporated into the awareness exercises. One participant explained how the environments supported her during exercises: *"... It may well be that you have been doing yoga, breathing exercises, relaxation exercises, been in nature, and all these things Nacadia offers... but what a benefit you can get from it, it is a bit more concretized... it's an approach you can use in your own life as well ..."*. In general, it appears that the natural environment renders the exercises more easily accessible to participants. The fact that the environment is made up of a large amount of living natural material appears to result in a feeling of meaningfulness and belonging on the part of participants: *"I feel that I have helped to take responsibility for the maintenance of the garden. It's a responsibility that I like to have. I put some heart and a lot of thought and gained enormously back"*

3.2.3. Operations—Focus on the Performed Use and Activities (Figure 2C)

Identifying the Types of Operations

Operations comprise all use of the therapy garden, and activities carried out within the therapy garden, that involve interaction with the landscape design and the landscape features. These include the nature-based activities which comprise the NBT programme, as well as the gardener's maintenance activities. The operations are managed, and in some cases led, by the staff and conducted by the participants. A list of participants' operations was compiled on the basis of the NBT programme, interviews with staff and behaviour mapping. Operations fall into several broad categories: awareness exercises, garden activities, individual conversational therapy, and 'own time', with some operations being more closely linked to distinctive spaces than others. For instance, the awareness exercises are guided by the therapists at specific locations; a garden activity such as "cleaning the pond" will obviously be linked to the location of the pond (Figure 8d). Awareness exercises are conducted in groups and led by the therapists, either on the benches situated around the bonfire (Figure 8b) or on the circle of cut grass in the meadow (Figure 8f). Garden activities consist of a range of relevant horticultural activities which are proposed by the gardener on a day-to-day basis, taking current seasonal and weather conditions into account, including e.g. chopping wood, cleaning the stream, and picking herbs.

Figure 9 illustrates how garden activities and individual conversational therapy are distributed across the garden based on observations from August 2013 to March 2015. Garden activities are the most widely-distributed activities due to the broad spectrum of activities linked to specific locations. Individual conversational therapy takes place at spot-spaces, typically at locations where there are seating facilities (chairs or benches).

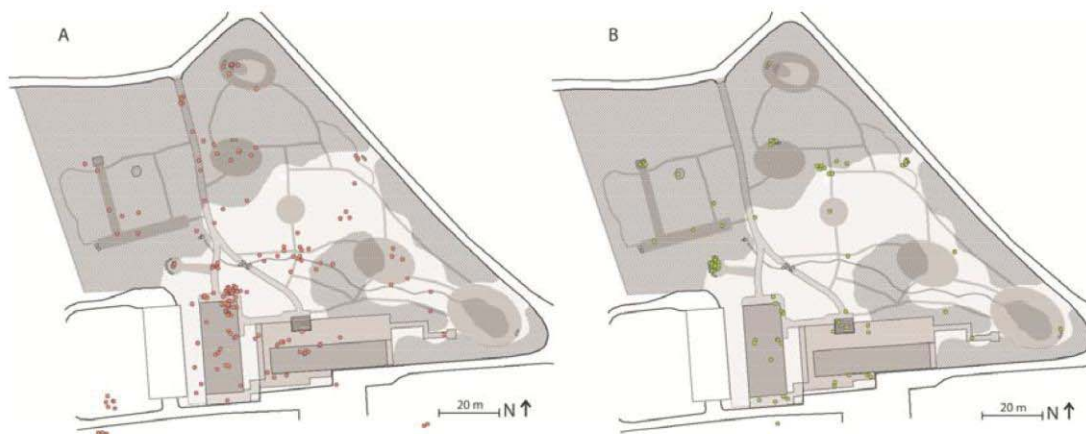


Figure 9. (A) Distribution of garden activities as observed from August 2013 to March 2015; (B) Distribution of individual conversational therapy as observed from August 2013 to March 2015.

Identifying Participants' use of the Garden

The 'own time' operation differs from other operations by offering a higher level of personal choice. It gives the participants the opportunity to do whatever they feel like doing on a particular day in a location of their own choosing, e.g. continuing a garden activity, resting on one's back in the grass looking at the sky or going for a short walk while engaging in reflection. 'Own time' operations are distributed across distinctive spaces and spot-spaces with or without seating facilities (Figure 10). Typically, the spaces selected by participants for 'own time' operations offer a high level of sensory experience, such as scenery, scents, or the sound of rippling water. Participants often mention seeking spaces with features that evoke positive memories or reflections, e.g. a tree which reminds them of a holiday experience, a view which inspires them to think about themselves in a bigger context, or positive childhood memories.

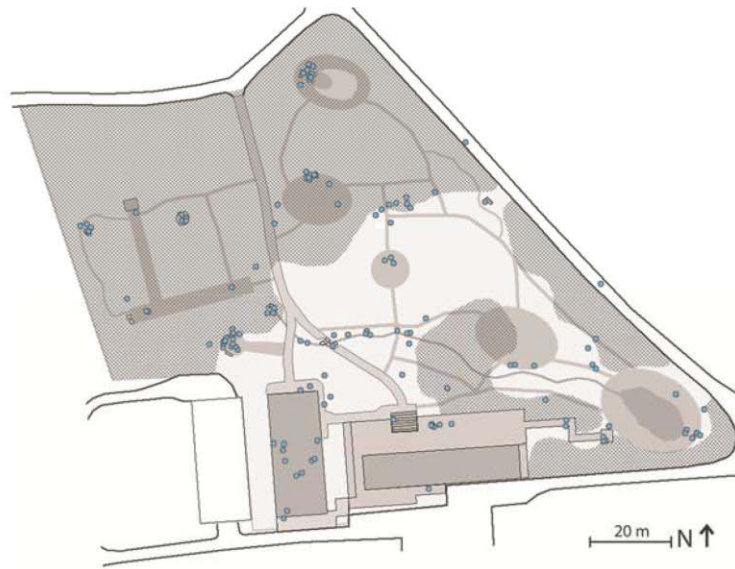


Figure 10. Distribution of ‘own time’ operations as observed from August 2013 to March 2015.

3.2.4. Experiences of the Operations—Focus on the Effect of the Operations on the Participants (Figure 2D)

Participants’ Experiences of the Operations in Nacadia®

The participants’ descriptions of their experiences of the operations have been compiled into a list and placed in a ‘dual-pole spectrum’ with a generally from low challenges to high challenges (Figure 11).



Figure 11. Polarization of the participants’ narratives about activities carried out in Nacadia®.

The polarization of operations was experienced positively. The participants describe several occasions when they found the operations to be too difficult or too challenging. However, they then had the option of stopping and choosing another activity more suited to their current capabilities. Participation in the operations was voluntary and “there was no pressure to perform”. Further, the range of activities and the varying degree of challenge that they represented gave the participants the opportunity to select activities they considered meaningful: “You can see that we do the work, not because we have to, but because we want to do something good for the garden. You get co-responsibility and you feel like it is also your garden. It is a nice feeling”.

Identifying How Participants Benefited from the Operations

Participants benefited in various ways from the various operations. For example, a walk in the garden, which comprises a spontaneous operation, was used by one participant as a tool to achieve calm: “I went on this walk to get the restlessness out of my system and it helped. I enjoyed the walk—when I stopped and listened to the stream – it made me calm in the body”. Further, many participants recounted that during the garden activities they became more aware of negative habitual thought patterns, e.g. their habitual approach to working tasks: “At first I was very energetic and I put a lot of effort into

removing everything so that it would look nice – then I caught myself in it - and I slowed my pace and guided my movements and enjoyed ONLY sweeping branches and cones away”. Several participants deliberately made use of operations to explore themselves in order to identify alternative and more beneficial approaches to everyday tasks by applying these approaches to selected garden activities. The operations are thus seen by many participants as an opportunity to establish new habits and to improve their memory of the operations they have experienced as beneficial.

The activities are helpful tools to support the participants in approaching the mental challenge of changing their negative thought patterns. It appears as if the various operations render the NBT more concrete by making it possible for the participants to select suitable spaces and activities for practicing more constructive thought patterns. It appears that attempting different operations provided the participants with a better understanding of their symptoms, and that the therapeutic tools applied are better grounded when applied in the context of operations: “It is probably easier for me to learn through ‘learning by doing’”, as one participant concludes.

3.2.5. Health and Well-Being Outcomes—Focus on How the Therapy Garden Functions as a Supportive Base for the NBT (Figure 2E)

General Health Outcome Measures

EQ-VAS illustrates a significant improvement in the participants’ general health over the course of the 10-week NBT. A paired-sample t-test was conducted to compare the participants’ self-reported VAS rating at the beginning and the end of the treatment. There was a significant difference in the self-reported VAS rating before ($M = 4.99$, $SD = 1.99$) compared with after the NBTN ($M = 6.49$, $SD = 1.28$); $t(32) = 4.00$, $p < 0.001$ ***. Square root transformation of VAS rating data was used to enable parametric statistical testing. The bars in Figure 12 represent 95% confidence limits around the mean.

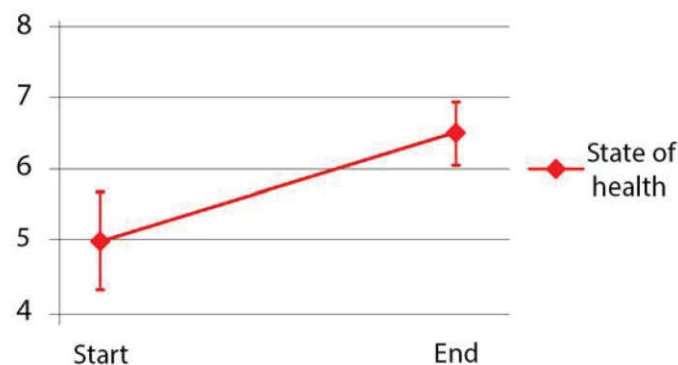


Figure 12. The development in the participants’ general health based on EQ-VAS from start to end of NBTN ($n = 33$).

Identifying the Participants’ Experiences of Health Outcomes

The finding from EQ-VAS is corroborated by narratives from semi-structured interviews and logbooks. Very early on in the NBTN programme, several participants expressed experiencing a positive effect on their well-being both mentally: “I can already feel that I am more relaxed. I have got more energy. I am much more peaceful in the head when I’m here”, and physically: “I felt better and better during the course of the day. I calmed down and had fewer palpitations”.

Based on the quotations, the participants’ explanations of how they experienced positive effects on their health and well-being can be summarized as follows: “more calm”, “not so angry”, “Greater susceptibility [to the therapy, eds.]”, “Greater spirit”, “More energy”, “Improved memory”, “Fewer cognitive problems”, “Ability to accept”. While one of the participants did not experience improved health outcomes, he stated that he had acquired some tools which he could apply to his daily life.

The participants were of the opinion that the interplay between human, environment and operation supported the process of developing a greater awareness of themselves, their health situation and the surrounding world, as the following three citations illustrate: *"I think we are perhaps much more aware of our physical presence and how you actually feel in your body and what it is that you are actually (sensing ed.)"; "this depression has subsided and I can get out of bed more easily in the morning. My emotional register has become slightly more nuanced again. Previously it was stress and depression"; "I have implemented some of these things I've learned up here in my life ... I have come more to terms with the idea of getting back to work; what it entails and what it definitely should not entail"*.

3.3. Successes and Failures

The above findings concerning the design make it possible to summarize the project's successes and failures in relation to the aims and objectives of Nacadia®.

3.3.1. Successes in Relation to the Aims and Objectives of Nacadia®

- To be closely related to the nature-based therapy programme
The design of Nacadia® relates to the NBTN programme by offering various distinctive spaces for hosting all parts of the programme (awareness exercises, individual conversational therapy, garden activities, 'own time'). The overall environment of Nacadia® is considered a safe and protective framework for the therapeutic operations.
- To match the participants' treatment process by both supporting and challenging them
The participants experienced Nacadia® as a safe environment that offered them freedom to explore and challenge themselves in line with their current needs and capabilities. For example, some felt that the spot-space 'by the beehives' was safe, while others considered it to be a bit dangerous. One participant viewed 'the pond-room' with awe, while another found it dark and scary. However, both participants came to terms with their fear of the spaces over the course of the NBTN.
- To provide meaningful activities ranging from physical activity to mentally restorative activity, and from concrete to symbolic activity, all year around
From the broad spectrum of nature-based activities offered at Nacadia® the participants selected and engaged in the activities more or less consciously in accordance with their current physical and mental capabilities in order to explore and test themselves and identify therapeutic tools to support their rehabilitation processes. This was possible during all four seasons of the year. Nacadia® was used for physical activities (e.g. chopping wood) and for symbolic experiences evoking associations (with e.g. religious buildings) and inspiration for reflection (e.g. by triggering positive childhood memories).
- To actively and positively contribute to the participants' treatment and wellbeing
Health outcomes measured by EQ-VAS indicate a significant increase in participants' general health. The participants recounted having positive experiences such as improved memory, less cognitive problems, feeling more relaxed and increased energy. The participants had positive experiences of being able to independently discover how the operations and experiences of the garden could be used therapeutically in terms of learning how to change negative habits and thought patterns and to practice new habits.

Additional Successes—Escapes and Alternatives

Many participants expressed on multiple occasions that they had experienced a need to escape if they encountered any type of obstacle at a space or during an activity, and that this need for escape was successfully met by the garden. Many participants also shared how they sometimes experienced the need to move away from other participants to find more solitude: *"I needed time alone and walked away from the others"*. However, the opposite was also expressed: *"I wanted company and to do physical work. Therefore, I went with L and O"*. Both needs were met in Nacadia®.

3.3.2. Failures

Some design failures were identified, most of which were addressed during the course of the study. Most significant among these were the problems relating to exposure.

Exposure

The fact that visitors to the Arboretum could see into the garden was the most frequently mentioned negative experience on the part of the participants. In the original design, the problem of exposure was to be resolved by the creation of broad buffer zones of vegetation alongside the surrounding roads in the form of evergreen bushes and climbers on the fence surrounding the garden. This was intended to reduce the feeling of being exposed to the outside. However, the evergreens and climbers that were planted were very small and weak, and consequently they did not fulfil their intended function. During the spatial landscape analysis and behaviour mapping carried out in the data collection phase it was noted that the exposure problem had been resolved. The designer and staff had become aware of the problem and resolved it by planting larger and denser evergreen bushes, and by placing piles of wood strategically along the length of the fence (Figure 7).

Drastic Changes in Maintenance

Maintenance activities sometimes had a sudden and significant impact on the spatial structure of the garden. In August 2014, the grass in 'the meadow' was approximately 80 cm tall, which meant that participants could lie down and find shelter on the circle of cut grass, or spontaneously create spot-spaces in the tall grass such that they felt enclosed and hidden. During one observation, the tall grass had recently been harvested, leaving the 'circle' fully exposed and thereby removing the possibility of creating small, spontaneous spot-spaces in the tall grass. However, this was not cited as a problem, since the participants simply found other spaces to which to retreat. Nevertheless, since many of the participants expressed having a certain attachment to specific spaces, the impact of the maintenance procedures should be taken into consideration and form an element of planning alongside the NBTN programme.

Unpleasant Sounds

Sounds generated by installations in the garden were experienced negatively. There was a "really creepy sound" from the wind in the canvas over the bonfire site, and a "very disturbing" sound from the wind shaking the metal name-tags on the trees and shrubs.

Seasonal Variations

In the winter, the foliage on trees and shrubs was less dense, which resulted in the spaces being less well-defined. However, this was not expressed as a significant problem in the interviews, although one participant did comment on it.

Weather Conditions

Weather conditions, such as rain and cold, were mentioned a few times as limiting the operations. However, the garden offered alternative operations and appropriate clothing was made available for the participants to use.

The Personal Attitude of the Staff to the Garden

When introducing the participants to the garden, it appears to be important that the staff avoid investing their presentations with emotional value judgments, as this may affect the participants' experiences and perceptions of the garden, and thereby the potential benefit they derive from the environment. For example, one participant did not like a particular space in Nacadia® because she associated it with negative connotations originating in the staff's personal attitude to the distinctive

space in question: *“I do not like the room. It seems sad, so I never choose it ... dark, closed, sad ... when we got the introduction tour, X told us that many feel like they are walking into a church ... so it kind of became labelled”*.

4. Discussion

4.1. Results

A number of successes and failures have been identified in relation to the original aims and objectives of Nacadia®. The original aim and objectives of Nacadia® appear to have been fulfilled. The participants experienced the setting as a safe and protective frame for the operations. This experience gave the participants a feeling of being free to engage, explore and even challenge themselves. Several distinctive spaces have been identified which are suitable for all the operations which comprise the NBT programme (‘awareness exercises’, ‘individual therapeutic conversations’, ‘garden activities’ and ‘own time’) which made it possible for the participants to find meaningful spaces and activities throughout the NBTN programme and in all four seasons of the year. The participants experienced improved memory, fewer cognitive problems, greater energy levels, and a significant improvement in self-assessed general health over the course of the NBTN programme.

Natural environments can promote health by allowing individuals to recuperate from mental fatigue [35]. According to the Attention Restoration Theory (ART) proposed by Kaplan and Kaplan [36] it is important to restore ‘directed attention’, while natural environments are considered good places in which to practice ‘effortless attention’, thereby providing a break from directed attention [36]. In relation to the positive health impact of natural environments, some recent studies have attempted to identify and describe important spatial features of natural spaces with the goal of supporting psychological restoration [37,38]. These studies conclude that such spaces should be: enclosed at the sides and back as well as incorporating a canopy roof, while at the same time being open and providing a view. Furthermore, the plants in the space should have varied textures and shapes, and comfortable seating should be provided, as well as diverse sensory experiences [37,38]. The participants’ descriptions of the spatial conditions of the distinctive spaces in Nacadia of which they had the most positive experiences confirm these findings. These results can be related to Prospect-Refuge Theory [39]. From an evolutionary perspective, Appleton [39] proposed that people instinctively seek places in nature that have served a fundamental role in human survival in the earlier times [39]. This theory states that enclosed spatial conditions (refuge) with an outlook (prospect) are experienced by humans as safe.

However, the findings from the current study stress that it is important that a therapy garden does not merely function as a safe room for psychological restoration. As is confirmed by the participants’ experiences of the environment, a prerequisite for an effective therapy garden design is that it constitutes an overall protective and safe environment that hosts a variety of distinctive spaces that can facilitate different operations and natural experiences of varying character, presenting varying challenges. The design will thus relate closely to the various operations of an NBT programme: it will engage a broad spectrum of individuals with various backgrounds, preferences and capabilities and it will match individual participants’ treatment processes by both supporting and challenging them over the course of the treatment. Nacadia® constitutes such a protective and safe overall environment, for instance by being visually shielded and blocking out the ‘real world’. This leads participants to experience the overall environment as “fascinating” and makes them feel that they are “in another world”. Such experiences accord with ART [36,40], which states that a restorative environment should include the following four experiences: ‘Fascination’ (does not require the expenditure of mental effort and involves stimuli and processes of exploration); ‘Being away’ (the feeling, either psychological or physical, of being distant from daily routines and demands, where directed attention capacity is utilised); ‘Extent’ (the capacity of an environment to provide scope for exploration and a sense of coherence); ‘Compatibility’ (the correlation between what a person wants to do, what activities the environment supports and what the person is expected to do in the environment) [40]. The participants’ sense of fascination and

being away in another world promotes calmness and encourages them to explore and find 'compatibility' and 'extent' in accordance with their individual current needs and capabilities.

With respect to ART, the NBTN programme provides 'fascination' and 'being away' by providing the experience of being in an overall protective and safe environment distanced from day-to-day worries. The NBTN programme facilitates a spectrum of both concrete and symbolic opportunities, which is of crucial importance for the participants to find 'extent' and 'compatibility', which thereby provide a sense of meaning and support their treatment process and positive development.

On a number of occasions the participants shared stories of how, over the course of the treatment process, Nacadia® gave them opportunities to find spaces and operations that match their current capabilities, e.g. to get support to help them cope with their fears. For this reason it is important that the garden features various opportunities for the participants to select different spaces (environments) and operations and that the participants are made fully aware that it is possible and fully acceptable to seek to escape the space and engage in other activities more suited to their current needs and capabilities.

4.2. DPOE—A Key Element of the EBHDL Model

The EBHDL model (Figure 1) was originally developed with the aim of strengthening the design process of therapy gardens in order to fulfil the design intentions of such gardens with respect to positive health outcomes. The first part of the model has been developed, applied and adjusted over a period of years, while part 4 has yet to be fully developed, and when planning the present study it was difficult to locate a satisfactory model of a POE to apply to the therapy garden. A need for such a POE was thus identified.

The literature describes three different types of POE: Indicative, Investigative, and Diagnostic, with the latter being the most comprehensive type [3,16,41]. Guinther et al. [16] conclude that no DPOE model fits all interventions, and that the methods applied must be tailored to the specific aims and objectives of the design in question [16]. Three different versions of DPOE, proposed by Guinther, Hopper, and Marcus and Sachs, respectively, have been previously described. However, since these did not cover the full examination of a therapy garden, it was necessary to develop version new model inspired by the aforementioned work. Previous research on Nacadia® [16,42,43] highlighted the importance of using mixed method triangulation in order to fully understand the impact of the garden environment and the NBT on the participants. Consequently, the current DPOE places an enhanced focus on the participants' own experiences of, opinions of and reflections on the environment, the operations and the health outcomes. In contrast to the other DPOEs, there is less focus is on the staff's use of and experiences of the environment. The staff's role in managing the NBTN programme and guiding certain operations is examined via interviews.

Some key findings of the current study would have been difficult or impossible to discover without the enhanced focus on participants' own experiences, their opinions of and reflections on their interactions with the environment and activities. These findings are: that the participants experienced the environment as safe and protective; that the participants felt free to explore and challenge themselves; that the participants found meaningful spaces and activities throughout all seasons of the year; that the participants increasingly experienced improved memory, fewer cognitive problems, and increased energy levels. Further, the fact that the DPOE was conducted over a long period of time, and included beginning- and end measures, made it possible to trace developments in and changes to the environment, and most importantly how the participants experienced benefits over time from participation in various operations, through the various seasons of the year, and in the varying physical conditions that the changing seasons brought with them.

The current DPOE model is considered suitable for evaluation of care environments that aim to motivate users to feel safe, and to have a positive impact on users' wellbeing. In particular it is considered appropriate for care settings to implement natural environment and nature-based activities in which synergistic interaction between users, environments and operations are considered key success factors. Use of the current DPOE model may contribute to providing a rich

understanding of interactions between users and environments and may thereby provide a deeper understanding of how to reconsider and adjust potential design failures in order to transform them into successes in relation to the specific user group, and in particular with respect to care settings.

In order to render the DPOE model user-friendly, it is presented as a generic and step-wise model, which means that it can be applied in a range of therapy gardens. The generic DPOE model can be tailored to suit the aim and objectives of the therapy garden, the therapy programme and patient groups. This is of relevance to all steps of the DPOE model, although the methods for measuring health outcomes in particular can vary depending on specific patient groups and intended health outcomes.

According to the EBHDL model, consideration should be given to the DPOE from the very beginning of the project. Clearly stating aims and objectives as early as the programming phase facilitates the DPOE process and may help to strengthen the results. The costs of carrying out the DPOE and any potential design modifications should be taken into account in the full budget for the therapy garden project.

The internal operational impacts of the DPOE process in Nacadia® have been on the design as well as on the NBT programme. Adjustments to the design have been made in Nacadia®, e.g.: the woodpiles were built to resolve the problem of exposure and to enhance the participants' feeling of safety. The various findings regarding the environment, the activities, and the participants' interactions with these aspects are currently and will continuously be used for developing NBT programmes for future projects.

Furthermore the operational impact has an external dimension: the experiences and knowledge acquired from the DPOE have been used in the EBHDL process of the 'Møllebæk' therapy garden in Kolding municipality.

In general a well-implemented DPOE may be said to have a continuing and dynamic operational impact in that the data, findings, and knowledge acquired can be used for modifications to the design and in developing the NBT programme, thus enabling continuous alignment with the most up-to-date internal and external evidence in order to meet the needs of a specific user group in the most optimal manner.

4.3. Methods

Drawing on a triangulation approach, mixed methods are employed in the current DPOE as recommended by Guinther et al. [16], Marcus & Sachs [3], Stigsdotter et al. [44], and Taylor and Francis [45] for DPOEs and in health science studies. The data from the various methods was corroborated during the examination of the core points of examination. Corroborating behaviour mapping, interviews and the spatial landscape analysis provided a comprehensive understanding of the participants' experiences in the garden. Further, a concrete example illustrated the need to corroborate data from the behaviour mapping in order to gain a fuller understanding of this aspect: During the behaviour mapping, certain spaces were observed to be used less frequently than others. However, based upon the interviews, participants actually significantly preferred these same spaces. Participants recounted that there was a collective understanding on the part of the participants that these spaces were for solitary use, rather than social use. The logbook narratives provided further information in this respect; if these preferred spaces were occupied, the participants would go somewhere else. For this reason, the triangulation of methods was considered to yield more nuanced findings.

In general, the participants' graphical mappings from the logbooks are too imprecise to be used quantitatively. The map in the logbooks which the participants were provided with in order to map their routes was small and was misunderstood by some. The logbooks were given to the participants to give them the opportunity to document their daily experiences and thoughts on a voluntary basis. The participants were more inclined to use the logbooks during the first half of the NBT period. Thus it was not possible to use the information from the logbooks to describe or quantify any development in their use or experiences of the garden from the start to the conclusion of the programme. The participants used various types of marking on the maps, which made them difficult

to interpret. In future therapy garden projects, it is recommended that the logbooks include larger and better quality maps and clearer user instructions so that any markings users employ are more uniform. In order to make using the logbooks simpler, it is also recommended that fewer questions in general, and fewer open questions in particular, are included, together with a fixed set of factors to choose from when describing experiences of the garden and operations. Finally, in order to encourage the participants to use the logbooks throughout the entire NBT programme, time could be allocated in the daily programme for this purpose. This would support the DPOE, and would likely also support the participants given that they stated that they found that writing in the logbooks was beneficial for their recovery process.

4.4. Implications for Practitioners

The DPOE is part of the EBHDL model and is considered to be generic and, as such, applicable to other therapy garden projects. By presenting the DPOE as a stepwise model, the ambition is to make it user-friendly and provide the developer and/or therapy garden manager with a tool with which to identify the successes and failures of the design. By definition, a therapy garden should contribute positively to the participants' health and wellbeing. Employing a DPOE that systematically examines the design of the therapy garden will provide knowledge of how the environment and the operations which take place there are experienced and what effect they have on the participants' health. This knowledge is of potential relevance to both landscape architects and therapists.

The current DPOE was developed as part of a research project and is considered to be applicable to other therapy garden projects. In the final textbook of the COST Action E37 Forest, trees and human health [5], the difficulties of comparing the results of different nature-based therapies were raised. By applying the EBHDL model and the DPOE model, it would be possible to transparently document the process and the results. However, the generic DPOE model would benefit from being applied to, and possibly validated by, other therapy gardens. At present collaborative projects are underway with a number of therapy gardens managed by municipalities in Denmark. An extra dimension here, which lends importance to the DPOE, is that the effectiveness of the garden projects can be examined thoroughly so as to provide evidence that can also be used as a basis for municipal healthcare decisions.

4.5. Limitations and Future Research

The present study aims to identify successes and failures in the design of the Nacadia® therapy garden. In accordance with the original aim and objectives of Nacadia®, successes and failures were identified in relation to the potential impact of the environment and the operations on the intended positive health outcomes.

Based on the DPOE it was established which environments and operations were positively experienced, and based on participants own narratives it was established how they experienced support and benefitted from the environment and the operations. The participants self-assessed general health status was found to have improved significantly during the course of the NBTN. This provides strong indications of positive impacts of the environment and the operations on the participants' wellbeing. However, based on the present study it is not possible to establish whether it was the environment, the activities and/or the combination of the two that led to these significant improvements to the participants wellbeing, and thus conclusions as to what extent the environment and the operations have an impact on the measured positive health outcomes must be limited to strong assumptions. It should therefore be emphasized that there may be several other plausible explanations which cannot be excluded, given that the specific causalities have not been the focus of the present study. On the contrary, it was found that the participants had different needs and preferences that changed over the course of the NBTN in step with with their individually fluctuating physical and mental capacities. The same environment and operation were found to have a different impact on the various participants. A specific operation beneficial for one participant may not be beneficial for other participants. During the NBT programme the participants

were encouraged to complete homework assignments to test some of the activities which make up the NBT programme, and where possible to implement some of the tools that they have found to be specifically beneficial for them in their own life situations. This makes it even more difficult, not to say impossible, to exclude other possible causalities from the environment and operations in the NBT setting.

The NBT evaluated in the present study adopts a biopsychosocial and multispectral approach to human health as found in contemporary health science and clinical practice [13,45,46]. The impact of the NBT components (environment and operations) should be considered in the context of the participants' various and changing life situations, as the components of the NBT may not solely be the direct cause of the positive health outcomes. Since all human beings are different (e.g. biologically, social, personality), we all have different preferences and needs. An NBT operation beneficial for one patient may not be beneficial for others. In causality studies of therapy gardens it may be possible to identify a specific causality for one patient, while it may be more difficult to find common specific causalities. In cases of NBT intended for individuals suffering from severe stress, specific causality measures may not be of great significance, and could potentially even result in a limitation of the range of citizens who otherwise would benefit from the NBT. It is considered important that the environment and operations of NBT settings (and other care settings) are able to accommodate a wide range of people, and the present study demonstrates that a diverse group of people have all benefitted and developed individually from the therapeutic tools they have discovered, explored and developed over the course of the NBTN. This accords with the overall salutogenic approach of the NBTN [5], which aims to consolidate what is already healthy within the participants [47] by guiding and supporting them to discover and explore the potential health benefits within themselves, the environment and the activities.

There may be the risk that if a therapeutic setting is based on common specific causalities it will exclude some individuals, because this could potentially limit the spectrum in which the individual clients are allowed to explore and develop. This could be a concern for settings intended for patients suffering from stress-related illnesses, given that the 'stress diagnosis' is based on multidimensional stress-related symptoms [48]. However, for settings intended for patient groups with more distinctive symptoms and pronounced needs, the findings of causality studies would be of great value.

Given that the current study does not provide knowledge of the specific causalities of the measured positive health outcomes, in-depth studies of the possible impact of the various specific NBT components on positive health outcomes is considered a relevant next step in order to provide more certain knowledge of specific causalities. The present study is a part of a major randomized clinical trial, the Nacardia® Effect Study (NEST), which aims to study causality. Over the course of the NEST a vast amount of data has been collected, and as the project continues all elements of the NEST will be utilised in an attempt to provide sound assumptions and knowledge of specific causalities in relation to the environment, activities and positive health outcomes for citizens suffering from stress-related illnesses.

5. Conclusions

The aim of this study was to apply a DPOE to examine the effect of the design of Nacardia® on patients' health outcomes in order to identify successes and failures. The findings of the DPOE suggest that the design of Nacardia® has fulfilled its original aim and objectives. The design of Nacardia® relates to the therapy programme by offering various distinctive spaces that can host all elements of the NBT programme. The participants who suffer from stress-related illnesses consider the therapy garden Nacardia® to be a safe and protective setting for the NBT operations. From the broad spectrum of nature-based operations offered at Nacardia® the participants were allowed to select meaningful operations suited to their current physical and mental capabilities. The Euro Quality of Life Visual Analogue Scale (EQ-VAS) measurements indicated a significant improvement in health outcomes. Some design failures were identified, most of which were resolved during the course of the study. The proposed DPOE model appears to be efficient, while at the same time being

a work in progress which would benefit from being validated by other therapy garden projects. The DPOE may become an important tool in guaranteeing the quality of present and future therapy gardens.

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