UNIVERSITY OF COPENHAGEN

Københavns Universitet

Healing gardens at crisis shelters for women and children survivors of domestic violence

Lygum, Victoria Linn

Publication date:
2012

Document version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Lygum, V. L. (2012). *Healing gardens at crisis shelters for women and children survivors of domestic violence*. Forest & Landscape, University of Copenhagen. Forest and landscape research No. 55/2012

Download date: 16. okt.. 2026

FOREST & LANDSCAPE

Healing gardens at crisis shelters for women and children survivors of domestic violence

FOREST & LANDSCAPE RESEARCH 55 / 2012

Victoria Linn Lygum

KØBENHAVNS UNIVERSITET

FOREST & LANDSCAPE

Healing gardens at crisis shelters for women and children survivors of domestic violence

Victoria Linn Lygum

KØBENHAVNS UNIVERSITET

Forest & Landscape Research is issued by Forest & Landscape Denmark which is a national centre for research, education and advisory services within the fields of forest and forest products, landscape architecture and landscape management, urban planning and urban design.

The journal accepts Ph.D. theses, D.Sc. theses, and other major research reports of scientific standard concerning forest, park, landscape, and planning research written in Danish or English.

The content of the journal undergoes a scientific peer-review process.

Forest & Landscape Research is to be considered the continuation of Forskningsserien - The Research Series (ISSN: 1398-3423).

Editorial board:

Niels Elers Koch (editor-in-chief), director, professor, Forest & Landscape Denmark

Frank Søndergaard Jensen (associate editor), senior researcher, Forest & Landscape Denmark

Tilde Tvedt (associate editor), senior consultant, Forest & Landscape Denmark

J. Bo Larsen, professor, Forest & Landscape Denmark

Jørgen Primdahl, professor, Forest & Landscape Denmark

Erik Dahl Kjær, professor, Forest & Landscape Denmark

Title:	Healing gardens at crisis shelters for women and children survivors of domestic violence
Series-title, no.:	Forest & Landscape Research, No. 55-2012
Author:	Victoria Linn Lygum
Citation:	Lygum, V. L. (2012): Healing gardens at crisis shelters for women and children survivors of domestic violence. Forest & Landscape Research. No. 55-2012. Forest & Landscape Denmark, Frederiksberg. 204 pp.
ISBN:	978-87-7903-595-9 (paper) 978-87-7903-596-6 (internet)
ISSN:	1601-6734
Printed by:	Prinfo Aalborg, DK
Number printed:	40
Order:	Single issues are available from Forest & Landscape Denmark - see last page. Also published at www.sl.life.ku.dk
Illustration front page:	Visualization of Danner's Garden (illustration by Schonherr)

NORDEA FONDEN This PhD thesis was funded by Nordea-Fonden

NORDISK MILJØMÆRKNING
541 070
TRYKSAG

ABSTRACT

Domestic violence is a global public health problem that persists in all countries, ethnic groups and social layers. Crisis shelters offer safety, temporary accommodation and support to women and children fleeing domestic violence. Based on theories and research studies indicating a positive relation between nature and health, the overall aim of this PhD project was to explore the potential of outdoor environments at crisis shelters to become a resource supporting the health and well-being of its users, thereby strengthening crisis shelter functions. The aim was also to explore the design prerequisites for this potential in order to develop evidence-based health design guidelines.

The PhD project included four research studies each with their own specific aims. In Study I, the theoretical framework was established and a literature review gave an overview of existing English language literature on design and nature-based activities in relation to green outdoor environments at crisis shelters. The study pointed up themes on design and health benefits but showed research in the field to be sparse.

In Study II, action research resulted in specific evidence-based health design guidelines for the design of the outdoor environment at a crisis shelter called Danner in Copenhagen. The guidelines were applied in the design of Danner's Garden which is to be inaugurated in the summer of 2012.

In Study III, a questionnaire survey aimed at the staff gave an overview of the current status in relation to the extent, characteristics and use of outdoor environments at crisis shelters in Denmark. It also indicated the staff's point of view as to general satisfaction with the outdoor environments and preferences with respect to specific characteristics. The results show that the crisis shelters have an adjacent outdoor environment which is used by residents and staff. Although the degree of general satisfaction is high, the findings indicate that there is a potential to optimize the setting.

Finally in Study IV, a case study provided descriptions of outdoor environments at three Danish crisis shelters. It also gave rise to categories outlining the staff's point of view on needs and preferences as regards outdoor design and activities and gave a nuanced insight into how the outdoor environments are used to support crisis shelter functions. The results were summarized in implications for design.

All four studies contributed to the exploration of the potential of outdoor environments at crisis shelters and to the development of evidence-based health design guidelines. The results of Studies II, III and IV generally support the theoretical framework and the existing evidence presented in Study I. Because the studies primarily explored the staff's point of view about user needs and preferences, the results contribute to the existing evidence insofar as there is more focus on how outdoor environments should be designed in

order for the staff to use them in their work, combining the focus on design and nature-based activities. The evidence-based health design guidelines, which were derived from all four studies, cover the following topics: Security and feeling safe, accessibility, different levels of social involvement, contact with nature and safe play. The guidelines are presented as suggestions for practitioners to consider when working with the design of outdoor environments at crisis shelters and as a starting point for researchers interested in the topic.

RESUMÉ

Vold i nære relationer er et globalt folkesundhedsproblem, der finder sted i alle lande, etniske grupper og sociale lag. Krisecentre tilbyder sikkerhed, et midlertidig botilbud, omsorg og støtte til kvinder og børn, der flygter fra volden. På baggrund af teorier og forskningsstudier, der indikerer en positiv sammenhæng mellem natur og sundhed, var formålet med dette ph.d.-projekt at undersøge potentialet for, at udendørsområder ved krisecentre kan blive en ressource, der understøtter brugernes sundhed og dermed styrker krisecentrets funktion. Formålet var også at undersøge dette potentiales designmæssige forudsætninger og udvikle retningslinier for evidensbaseret sundhedsdesign. Ph.d.-projektet bestod at fire forskningsstudier, som hver havde deres eget specifikke formål.

I Studie I blev det teoretiske grundlag etableret, og et litteraturstudie gav et overblik over eksisterende engelsksproget litteratur omhandlende design og naturbaserede aktiviteter i forhold til grønne udendørsområder ved krisecentre. Studiet førte til identifikationen af temaer vedrørende design og sundhedsfremmende aspekter, men viste også, at forskningen inden for området er begrænset.

Studie II indebar aktionsforskning, som resulterede i specifikke retningslinier for et evidensbaseret sundhedsdesign af udendørsområdet ved krisecenteret i Danner i København. Det nye udendørsområde, som kaldes Danners Have, vil blive indviet i sommeren 2012.

I Studie III gav en spørgeskemaundersøgelse rettet mod personalet et overblik over den aktuelle status i forhold til omfang, kendetegn og brug af udendørsområder ved krisecentre i Danmark. Undersøgelsen viste, at alle krisecentrene har et tilstødende udendørsområde, som bruges af personalet og beboerne. Selvom graden af generel tilfredshed er høj, tyder resultaterne dog på, at der stadig er et potentiale for at optimere udendørsområderne.

I Studie IV førte et casestudie til beskrivelsen af udendørsområderne ved tre danske krisecentre. Studiet førte også til temaer omhandlende personalets syn på brugernes behov og præferencer for design og brug af udendørsområderne og gav et nuanceret indblik i, hvordan de anvendes til at understøtte krisecentrenes funktion. Resultaterne blev desuden sammenfattet i aspekter, der er relevante for design.

Alle fire studier bidrog til undersøgelsen af udendørsområdernes potentiale og til udviklingen af retningslinier for evidensbaseret sundhedsdesign. Resultaterne fra Studie II, III og IV understøtter generelt set det teoretiske grundlag og den eksisterende evidens, der blev præsenteret i Studie I. Idet studierne primært undersøgte personalets syn på brugernes behov og præferencer, kan resultaterne siges at supplere den eksisterende evidens i den forstand, at der i højere grad er fokus på, hvordan udendørsområderne bør de-

signes, så personalet kan bruge dem aktivt i deres arbejde med at hjælpe kvinderne og børnene. Retningslinierne for evidensbaseret sundhedsdesign, som er udviklet på baggrund af alle fire studier, omhandler følgende emner: Sikkerhed og tryghed, tilgængelighed, forskellige niveauer af socialt engagement, kontakt til natur samt sikker leg. Retningslinierne er præsenteret som forslag, der kan tages med i overvejelserne i design af udendørsområder ved krisecentre, og som et udgangspunkt for forskere, der er interesserede i emnet.

PREFACE

When I was studying for my Master of Science degree, one of my teachers once said that working as a landscape architect is similar to working as a detective and that a good landscape project is like a case that has been solved through the search for clues and evidence in a variety of sometimes unexpected places. I liked this comparison and it made me reflect upon where to find the best evidence to base my projects on.

The search for evidence was at the time not something completely new to me. Since starting my studies, I had learned to base design decisions on results from analyses together with different types of information including evidence from research. I had among other things been busy searching for evidence on topics such as root-friendly pavement and salt shielding when working on my bachelor thesis, which was about roadside trees. But it was not until I started working on my master thesis, which concerned the use of scent in healing gardens for patients suffering from stress-related illnesses that I appreciated the inexhaustible sources worth searching for evidence and the vast amount of information relevant to design decisions. It was also at this time that I really became aware of the potential we have as landscape architects to create projects with a strong impact at various levels including making a difference to people's health and well-being.

When hearing about the PhD position at Forest & Landscape, University of Copenhagen, initiated by Ulrika K. Stigsdotter on the development of a healing garden at the Danner crisis shelter, I thought that here was a cutting-edge landscape project with the potential to make a great difference. It was an opportunity to contribute to the fight against domestic violence – a worldwide public health problem. It was just too good a chance to let go, and as a newly minted landscape architect, I applied for the position. Shortly after, on 15 March 2009, I started as a PhD student on a three-year-three-month-long program. This included research work, six months of courses, teaching activities, other knowledge dissemination, plus duty work (not directly related to the PhD project) as well as a two-month stay abroad.

The tight time schedule for the overall renovation of Danner, which the healing garden project was part of, threw me right into data collection from the beginning of my study. During one of my first data collection trips to Danner, I noticed the following quotation by the Norwegian Psychologist and leader of the organization "Alternative to Violence", Marius Råkil, written in large script on a wall in one of the staff offices: "The road to a better life after violence is through realizing that you belong in this world. You can love and be loved. With each new experience of respect and affection, your heart will get stronger, the nightmares fewer and faith in a good life, greater". Studying the extent and consequences of domestic violence was at times

overwhelmingly sad, but the trust in the potential of healing gardens at crisis shelters to help the people affected was a strong motivator. The same applied to the interest evinced by the public which among other things resulted in articles in the weekly newspaper 'Weekendavisen' and the periodical 'Grønt Miljø'. Furthermore, the many collaborators in this PhD project, who all contributed in their own special way, have meant a great deal to me. Among these are, of course, my principal supervisor Ulrika K. Stigsdotter and my co-supervisor Cecil C. Konijnendijk as well as my fellow PhD student, Sus Sola Corazon, who has contributed to a part of the project. Also important for this PhD project was collaboration with the competent and innovative staff from Danner, where Henriette Højberg has been my main contact person. But I have also been in contact with staff members from other Danish crisis shelters, who have taken the trouble of letting me collect data in spite of a hectic and demanding working day. Moreover, I had the chance to work with landscape architects from Schonherr, one of Denmark's most acknowledged landscape architect firms.

During a conference arranged by the American Horticultural Therapy Association in Pasadena, LA, I became acquainted with Linda Preuss and Nancy Cipes – two fiery souls in charge of a horticultural program at shelters in Santa Monica, also in LA, and whose involvement in the PhD project was very generous. Another area of collaboration of great importance was with Professor Stephen Verderber, who let me participate in the Architecture + Health program at Clemson University in the spring of 2011. Architecture + Health includes both a Master of Science program and a PhD program and is the most structured and established program of its type in the Unites States. During my stay, while focusing on my literature study, I also succeeded in being included in the program's research environment. What also attracted me to Clemson was Stephen Verderber's architectural research on crisis shelters conducted two decades ago but still part of the current best evidence, as very little has been done on the topic since. He gave me access to a hard copy of a comprehensive report including design guidelines for crisis shelters, which I helped him scan because the digital version was lost in the New Orleans floods under Hurricane Katrina. We also visited a local crisis shelter together. In connection with my stay abroad, I also got to meet Clare Cooper Marcus and to drink tea in her beautiful garden in Berkeley where I told her about my work. It was at this meeting that Clare Cooper Marcus suggested that the Danner's Garden project should be featured in her new book on healing gardens.

Throughout the PhD time period, I have had the opportunity to visit many garden projects relevant to the topic of my PhD. These include the crisis shelter garden in Santa Monica, LA, various children's gardens in both California and South Carolina and a learning garden at Venice High School in LA. I also participated in a tour visiting the different healing garden projects

in Denmark together with members of the research group that I'm part of. The Healing Forest Garden Nacadia for people with stress-related illnesses, a primary research project at Forest & Landscape led by Ulrika, has, of course, also been an important source of inspiration.

I have searched for many clues during these three years and three months of being a PhD student and learned much about conducting research and the topic of healing gardens, domestic violence and crisis shelters. Although far from solving the case, I hope that the results of my PhD can be helpful to other researchers as well as to practitioners interested in the topic and that it can in some way contribute to making a difference for the better.

Victoria Linn Lygum
Copenhagen, June 2012

TABLE OF CONTENTS

ABSTRACT **2**

RESUMÉ **4**

PREFACE **6**

1. INTRODUCTION **13**

1.1. STRUCTURE OF THE PHD THESIS 13
1.2. EVIDENCE-BASED HEALTH DESIGN 13
1.3. NATURE AND HEALTH RELATIONS 14
1.4. HEALING GARDENS 17
1.5. DOMESTIC VIOLENCE AND CRISIS SHELTERS 20
1.6. OUTDOOR ENVIRONMENTS AT CRISIS SHELTERS 22

2. OVERALL AND SPECIFIC AIMS **24**

3. OVERALL RESEARCH STRATEGY AND PROCESS **25**

3.1. LIST OF MANUSCRIPTS 26

4. LITERATURE REVIEW (STUDY I) **27**

4.1. METHODS 27
4.2. SUMMARY OF RESULTS 28

5. ACTION RESEARCH (STUDY II) **30**

5.1. METHODS 30
5.1.1. First phase *31*
5.1.2. Second phase *34*
5.1.3. An ongoing process *35*
5.2. SUMMARY OF RESULTS 36

6. QUESTIONNAIRE SURVEY (STUDY III) **39**

6.1. METHODS 39
6.2. SUMMARY OF RESULTS 40

7. CASE STUDY (STUDY IV) **41**

7.1. METHODS 41
7.2. SUMMARY OF RESULTS 43

8. SYNTHESIS OF RESULTS: EVIDENCE-BASED HEALTH DESIGN GUIDELINES **45**

9. DISCUSSION OF RESULTS **51**

9.1. Results of Studies II, III and IV Related to Existing Evidence 51
9.2. Evidence-Based Health Design Guidelines Related to the Theoretical Framework 52
9.3. Discussion of the Design of Danner's Garden 53

10. DISCUSSION OF METHODS 54

10.1. Literature Review – Study I 54
10.2. Action Research – Study II 55
10.3. Questionnaire Survey – Study III 57
10.4. Case Study – Study IV 57

11. CONCLUSIONS AND RECOMMENDATIONS 58

11.1. Recommendations for Future Research 58
11.2. Recommendations for Practice 60

ACKNOWLEDGEMENTS 63

REFERENCES 65

LIST OF PAPERS 72

1. INTRODUCTION

1.1. STRUCTURE OF THE PHD THESIS

This PhD thesis deals with the evidence-based health design of outdoor environments at crisis shelters for women and children survivors of domestic violence. It consists of an introductory part and appendices including Papers I, II, III and IV, author biographies, a site illustration as well as several data collection tools. The papers each derive from their own study namely Studies I, II, III and IV. Although Study II resulted in a manuscript for a book section and not a manuscript for a journal article like the other studies, the book section is referred to as Paper II for simplicity's sake.

The introductory part introduces, describes and discusses the studies and links them together. The first chapter of the introductory part focuses on the academic area of evidence-based health design within landscape architecture, which is then related to theories and research studies concerning the relation between nature and health. After this, the public health problem of domestic violence is introduced and the crisis shelter setting is presented with a focus on the outdoor environment. In this first chapter of the introductory part, the key terms and concepts are defined, the theoretical framework is established and the preceding research presented. All in all, this leads to the statement of the overall and specific aims of the PhD thesis in the second chapter and a description of the overall research strategy and process in the third chapter. In chapter four to seven, the methods and results of the four studies are dealt with in a chapter each. The evidence-based health design guidelines deriving from all four studies are presented in chapter eight. In the ninth chapter, the results of Studies II, III and IV are related to the existing evidence and the evidence-based health design guidelines are discussed in the light of the theoretical framework. Furthermore the chapter includes a discussion of the design of Danner's Garden. In chapter ten, the methods of each study are discussed, and finally, in chapter 11, conclusions are drawn and recommendations given for both future research and practice.

1.2. EVIDENCE-BASED HEALTH DESIGN

The PhD thesis is positioned within the academic area of landscape architecture. Although it can be said that design decisions are often based on general concepts and aesthetic considerations rather than on facts, some would argue that landscape architecture is on the verge of becoming a more scholarly profession, which implies an increased use of evidence to plan, design, and manage the landscape (Brown & Corry, 2011). Some areas of landscape architecture already have strong evidence available for practitioners such as soil drainage, transplanting of trees and material engineering, whereas other

areas are practically unexplored. In order to increase the use of evidence in such areas, actions are required from both practitioners and researchers to generate more evidence upon which to base decisions. In this regard, researchers within the field of landscape architecture can play a key role in producing scholarly information and communicating it to practitioners in a way that can be readily applied (Brown & Corry, 2011). Kirk Hamilton, associate director of the Center for Health Systems & Design and associate professor of architecture at Texas A&M, has provided the following definition for the use of evidence in design: "Evidence-based design (EBD) is a process for the conscientious, explicit, and judicious use of current best evidence from research and practice in making critical decisions, together with an informed client, about the design of each individual and unique project" (Hamilton & Watkins, 2009, p. 9). Although this definition pertains to architecture, it can just as well be applied to landscape architecture.

Health Design is an area within landscape architecture that is attracting increasing attention where evidence from other fields of knowledge is used in the design process. Health Design is addressing the human component of the landscape based on the idea that design can be used to improve health and well-being. In this PhD thesis, the term 'evidence-based health design' (EBHD) is used to describe EBD with a focus on improving health outcomes (Stigsdotter, Møller, Corazon, & Lygum, 2012). A key part of the PhD project consisted in participating as a researcher in EBHD by contributing to the production of scholarly information and communicating evidence to landscape architects as well as to other practitioners.

Working within EBHD calls for interdisciplinary collaboration, as it requires the use of evidence beyond the academic area of landscape architecture. Although the landscape architectural perspective was predominant, the PhD project involved collaboration with academics from other disciplines including PhD Sus Sola Corazon from the field of educational psychology, Professor Stephen Verderber from the fields of architecture, environmental psychology and public health as well as Head of Danner Research and Documentation Center, Henriette Højberg, from the field of Sociology.

1.3. NATURE AND HEALTH RELATIONS

A central topic when working with EBHD within landscape architecture is the relation between nature and human health. The World Health Organization (WHO) defines '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). In this PhD thesis, health is often used together with 'well-being' to underline this broad definition. Furthermore, the term 'healing', also used in this PhD thesis, refers to the beneficial processes that support overall well-being (Cooper Marcus & Barnes, 1999). 'Healing' as well as

'therapeutic' and 'supportive' are used to describe those characteristics that support this process.

The idea that nature can support human health and well-being has existed for thousands of years. The Persian paradise-garden, whose origins may be traced back to 2500 BC, was seen as an oasis in an otherwise hostile environment that radiated eternal and everlasting beauty, sustenance and pleasure (Cooper Marcus & Barnes, 1999). Historically, man has likewise made the connection between contact with nature and the treatment of the ill in healthcare settings, although the importance accorded to nature has varied over the centuries. One example of such a setting is provided by the monastic cloister gardens of the Middle Ages that offered shelter, sun and shade to visitors such as traveling pilgrims. Another example is the pavilion-style hospitals of the 18th and 19th centuries that offered spaces for gardens as a consequence of the increased focus on hygiene and fresh air as part of the emergence of medical science (Cooper Marcus & Barnes, 1999; Gerlach-Spriggs, Kaufman, & Warner, 1998). Although there was a decline in the importance accorded to nature in the 20th century, which can be related to the emergence of the acute-care hospitals and the increased focus on efficiency and technological advancements (Cooper Marcus & Barnes, 1999), awareness of this factor did appear in other areas. In the late 20th century, researchers from various academic areas such as environmental psychology and landscape architecture started focusing on the relation between nature and health. Their work has entailed the development of theories aiming to explain and elaborate on this complex relationship.

The theories included in this PhD thesis were chosen because they touch upon basic human needs and how we relate to our surroundings. Here, the Prospect-Refuge Theory (Appleton, 1975), the Psycho-Evolutionary Theory (Ulrich et al., 1991) and the Attention Restoration Theory (Kaplan, 1995) are central and often used within the research topic. The Scope of Meaning – Scope of Action Theory (Grahn, Tenngart, Stigsdotter & Bengtsson, 2010) is more recent and is included because it focuses specifically on people in crisis. Together with the other theories presented later in this chapter, these theories constitute the main part of the theoretical framework of this PhD thesis to the extent that they provide a background and motivation for the research as well as a framework for discussing the results.

The Prospect-Refuge Theory (Appleton, 1975) focuses on our preferences for certain landscape characteristics. It suggests that there is a connection between the experience of aesthetic satisfaction when looking at a landscape and its apparent potential to provide the necessities for survival, that is to say the potential of a place to satisfy our biological needs such as the desire to eat, drink, sleep, seek shelter and escape danger. The theory claims that the ability to see without being seen is an intermediate step in the satisfaction of many of these needs. Therefore, environments that allow for this

ability are more likely to be immediate sources of aesthetic satisfaction. In the concept of the Prospect-Refuge Theory, *prospect* stands for an unhindered opportunity to see, and *refuge* implies an opportunity to hide. A landscape which affords a good prospect and a good refuge is aesthetically more satisfying than a landscape which affords neither. Strength in one can, however, compensate for weakness in the other (Appleton, 1975).

The Psycho-Evolutionary Theory (Ulrich et al., 1991) builds on some of the same assumptions as the Prospect-Refuge Theory regarding human predisposition to responding in different ways to the environment and centers on stress reduction. It takes as its starting-point our broad range of emotional responses such as fear, interest, anger and sadness, which are central to the psychological aspect of stress and restoration. The basic assumption of the theory is that our emotional responses are immediate and unconsciously triggered and have a major influence on our attention and behavior (Ulrich et al., 1991). When confronted with a natural setting, our response depends on the characteristics of the setting and our psychological and physiological state. Our response can range from stress and avoidance behavior to restoration and approach behavior. In natural settings containing risks or threats, we tend to have stress responses. In unthreatening natural settings, we have restorative responses. Stress and avoidance behavior will among other things cause negatively-toned emotional states and energy consumption, whereas restoration and approach behavior will cause a more positive emotional state and a decreased level of physiological arousal (Ulrich et al., 1991). The Psycho-Evolutionary Theory claims that we have an adaptive need for restoration from stress. Throughout human evolution the capacity for restorative responses to certain unthreatening natural settings has been a great advantage and made it possible to restore energy and exploit the resources of our surroundings. This has led to the development of a biological preparedness for restorative responses to unthreatening natural settings. Ulrich states that we still might have this capacity in relation to unthreatening natural settings, but that we are unable to use it in the same way in most urban or built settings (Ulrich et al., 1991). The Psycho-Evolutionary Theory can be seen in connection with the biophilia hypothesis, which assumes that we have a biologically-based, inherent need to affiliate with life and lifelike processes (Kellert & Wilson, 1993).

From a cognitive perspective, the Attention Restoration Theory (Kaplan, 1995) claims that directed attention plays an important role in human information processing. It is used when doing something that is not attracting attention by itself. Directed attention requires an effort and when used for a long time without the possibility of rest can lead to directed attention fatigue. This manifests itself in mental exhaustion and can cause ineffectiveness and human error (Kaplan, 1995) as well as higher levels of irritability and discomfort (Kaplan, 1987). To recover from directed attention fatigue, the theo-

ry claims you need to use an alternative attention called *fascination*. Fascination requires no effort and allows the directed attention scope for restoration. The theory claims that there are many different types of fascination and sources from where you can get it (Kaplan, 1995). One kind of fascination is 'soft' fascination, which, for example, can be found in certain natural settings such as a sunset or the movement of leaves in a breeze. It has a special advantage in terms of allowing reflection which further enhances the benefit of recovering from directed attention fatigue (Kaplan, 1995). Besides fascination, the theory suggests that an environment needs three additional components in order to be restorative. The first is *being away* which implies that you free yourself from the activity that requires directed attention. This can be done by being in or looking at another environment or just looking at the old environment in a new way. The second component is *extent*, which signifies that the environment must constitute a whole other world so rich in experiences that it engages the mind. The third component is *compatibility* which indicates that the environment must be consistent with one's purpose and inclinations, that is to say an environment where it is easy to perform your preferred activities (Kaplan, 1995). According to the theory, natural settings such as the seaside, a forest or a garden are particularly likely to live up to the four components of a restorative environment (Kaplan, 1995).

The Scope of Meaning – Scope of Action Theory (Grahn et al., 2010) states that our senses, emotions and cognition affect how we relate to the external environment and our ability to communicate with the surrounding world. As a whole, these aspects can be described as our 'scope of meaning'. Under normal circumstances, people can cope with many kinds of environments, but when in crisis, where people are highly affected by stress and have reduced body awareness and attention, the same environments can be experienced as threatening. The state of crisis changes how people relate to the environment, which in turn changes their ability to communicate with their surroundings and what they can do; their 'scope of action'. In order for people in crisis to restore and build themselves up again, they tend to seek secure and stable environments. The theory claims that some environments appear more permanent than others and that people in crisis seem to be drawn to and in need of non-human environments, where the simple objects of nature can be an essential resource (Grahn et al., 2010).

1.4. HEALING GARDENS

Associated with these theories, research studies on the relation between nature and health have among other things focused on health-care settings. An example is Roger Ulrich's landmark study published in Science in 1984 which indicated that a window view of nature can improve post-surgical outcomes of hospital patients (e.g. shorter hospital stays, milder medication re-

quired) (Ulrich, 1984). Another example is Stephen Verderber's survey research suggesting that bedridden hospital patients prefer having a bedside window view of nature (Verderber, 1986). Besides the positive side of viewing nature, research has also addressed the benefits of being in touch with nature at health-care settings. As an example, post-occupancy studies on the use of hospital gardens showed that nearly all users including patients, staff and visitors alike reported therapeutic benefits (Cooper Marcus & Barnes, 1995). A study conducted at a children's hospital garden showed that the garden was perceived as a place of restoration and healing and that it had a positive effect on user satisfaction (Whitehouse et al., 2001). Furthermore, a study carried out at a pediatric cancer center indicated that emotional distress and pain for all groups were lower when in the gardens than when indoors (Sherman, Varni, Ulrich, & Malcarne, 2005).

In relation to these research studies on health-care settings, the practice-oriented Theory of Supportive Gardens (Ulrich, 1999) claims that the quality of the stress-reducing effect is determined by the extent that the garden fosters certain restorative and coping resources: *actual and perceived control* includes scope for temporary escape and access to privacy. *Social support* refers to the garden's capacity to increase social and emotional support for its users. *Movement and exercise* include the possibility for mild exercise and physical rehabilitation. Finally, *natural distractions* refer to users' experience of plants and wildlife (Ulrich, 1999). Furthermore, a sense of security is seen as a prerequisite for these four restorative and coping resources (Ulrich, 1999).

Research on the relation between nature and health has led to the overarching term 'healing gardens' to denote gardens (including 'therapeutic' and 'restorative' gardens) designed for specific user groups so as to facilitate people-plant interactions through which users may develop well-being (Messer Diehl, 2007). Some healing gardens are for use without guidance, while others include therapy programs facilitated by staff (Messer Diehl, 2007).

To describe the variety of both active and more passive activities that can take place in a healing garden in general, the term 'nature-based activity' (NBA) is used in this PhD thesis. It is inspired by terms such as 'nature-based therapy' or 'nature-assisted therapy', which are increasingly used when focusing on therapy in natural settings (Annerstedt & Währborg, 2011; Corazon, Stigsdotter, Jensen, & Nilsson, 2010; Stigsdotter et al., 2011). NBA is a broader term and includes activities that can happen both on the user's own initiative and as a part of a therapy program such as 'horticultural therapy,' which implies the use of horticultural activities (Messer Diehl, 2007; Stigsdotter, et al., 2011).

As regards healing gardens with therapy programs, research studies have focused on various user groups. For example, patients suffering from exhaustion syndrome have recovered through therapy that combines the use of

restorative natural areas with horticultural therapy and traditional occupational therapy, physiotherapy and psychotherapy (Adevi & Lieberg, 2012; Grahn et al., 2010). Other studies have developed and described nature settings and horticultural therapy programs at a rehabilitation clinic for patients with brain damage (Söderback, Söderström, & Schälander, 2004) and in a healing forest garden for patients with stress-related illness (Corazon et al., 2010). Furthermore, rehabilitation programs in a therapeutic garden for women with stress-related illness have been explored and described (Eriksson, Westerberg, & Jonsson, 2011).

In this PhD project, which has a landscape architectural approach, NBAs were primarily included to the degree to which they result in implications for design. Because the activities and the setting can be seen as two interrelated aspects of healing gardens, it was, however, considered relevant to gain an idea of how NBAs can influence healing processes. As a consequence, some central theories from the field of occupational therapy and psychology were included in the theoretical framework, primarily the theory of sensory integration (Ayres, 2008) and the flow experience theory (Csikszentmihalyi, 2008) inasmuch as they both make a clear connection between the physical setting and activity.

From the field of occupational therapy, the theory of sensory integration (Ayres, 2008) is based on the premise that people acquire information about the physical conditions of their body and about the surrounding environment through their senses. Each moment, sensory information enters the brain from every place in the body. Sensory integration is the process of organizing different types of information from the environment and the body, which makes it possible for the brain to produce useful body responses, perceptions, emotions and thoughts (Ayres, 2008). It is this process that is the underlying basis for academic learning and social behavior. Although children are born with a basic capacity for sensory integration, they must develop it by interacting with the surrounding environment. Play leads to a lot of sensory integration and children who learn to organize their play and develop skills through play are more likely to be successful when facing challenges throughout their life. Children naturally seek sensations that help them develop their sensory integration, which is why they love to play (Ayres, 2008). The interaction with the environment is a critical factor in their development, and in environments with many stimuli children respond more often and in a variety of ways. For children with sensory integrative problems a playful and nonthreatening environment in which the children feel driven to play is especially important (Ayres, 2008). Related to NBAs in healing gardens, the theory of sensory integration can explain the importance of non-threatening environments with many stimuli especially in relation to children but also for adults, since sensory integration can be seen as important throughout life.

In general, to be active can be seen as a fundamental human need (Kielhofner, 2006), but we are not equally motivated to carry out all kinds of activities. Our abilities, the importance and meaning of the activity and the pleasure or satisfaction it gives influence our motivation and preferences for different activities (Kielhofner, 2006). From a psychological perspective, the flow theory addresses the relation between our capacity and the challenges we face when carrying out an activity (Csikszentmihalyi, 2008). The optimal experience, which can be described as the experience of flow, happens when there is balance between your capacity and the challenges of your activity. Other prerequisites include clear goals, rules and physical boundaries with respect to the activity as well as feedback on how you are doing. When in flow, you are able to concentrate so intensely that self-consciousness disappears and there is no attention left to think about anything else or to worry about problems. In such a situation, you are likely to feel pleasure, enjoyment, increased self-confidence and even moments of happiness (Csikszentmihalyi, 2008).

This PhD thesis focuses on outdoor environments at crisis shelters for women and children survivors of domestic violence and their potential for becoming healing gardens on the basis of the theoretical framework described in the above. In the following section, the public health problem of domestic violence is addressed, the consequences for the affected women and children are elaborated upon and the crisis shelter setting is presented with a focus on the outdoor environment.

1.5. DOMESTIC VIOLENCE AND CRISIS SHELTERS

Based on the recommendation made by the United Nations (UN) for legislation on violence against women, domestic violence can be defined as any form of physical, sexual, psychological or economic violence involving individuals who are or have been in an intimate relationship, individuals with family relationships to one another, and members of the same household (UN, 2010).

Domestic violence is a global problem that persists in all countries, ethnic groups and social layers (The Body Shop/UNICEF, 2006). In Denmark with its 5.5 million inhabitants, an estimated 28 000 women are exposed to violence by their partner or ex-partner (Helweg-Larsen & Frederiksen, 2007) and 22 000 children grow up in homes with violence (The Body Shop/UNICEF, 2006). Until the 1970s, domestic violence had mostly been seen as a private matter inside the family but with the rise of the Women's Movement it became a critical issue to be addressed in public (Koch-Nielsen & Caceres, 2005). Furthermore, in 1991 Denmark ratified the UN Convention on the Rights of the Child, which explicitly focuses on the protection of children against violence by parents or other persons responsible for their

care. However, it was not until 1997 that corporal punishment or any other kind of offensive treatment against children was entirely banned (based on § 2 (2) of the Danish Act on Parental custody of children and visiting rights).

Today, it is estimated that intimate partner violence costs Danish society at least 280 million Danish Kroner (48.3 million USD) each year. This amount includes health service and legal system expenses, the cost of stays at crisis shelters as well as loss of production (Helweg-Larsen, Kruse, Sørensen, & Brønnum-Hansen, 2010). Every year, approx. 2 000 women and 2 000 children flee to a crisis shelter (Helweg-Larsen & Frederiksen, 2007). In this PhD thesis a crisis shelter (CS) is defined as a place which offers temporary accommodation to women who have been exposed to domestic violence. The women may be accompanied by children and they receive care and support during their stay (based on § 109 of the Danish Consolidation Act on Social Services). This definition does not include network groups, transitional housing and shelters welcoming other groups such as drug and alcohol abusers.

When seeking help at a CS the women and children are in a state of crisis and can be affected by numerous health consequences. For women, the most prevalent mental health consequences of domestic violence are depression and post-traumatic stress disorder (Campbell, 2002; Coid et al., 2003). They often have feelings of low self-esteem and hopelessness and can suffer from emotional distress, anxiety, insomnia, eating disorders, social dysfunction and suicidal tendencies (Campbell, 2002). The physical health consequences can include injury (Plichta, 2004, Guth & Pachter, 2000), chronic pain such as headaches and back pain (Plichta, 2004, Campbell, 2002; Diaz-Olavarrieta, Campbell, Garcia de la Cadena, Paz, & Villa, 1999) as well as disability (Plichta, 2004).

Domestic violence not only affects the women involved, it may also damage the health and well-being of children in the family. This can partly be explained by the health consequences that the mothers may suffer and the negative effects of violence on their capacity for parenting (WHO, 2010). Witnessing inter-parental violence can have numerous negative health outcomes for children in itself (Kitzmann, Gaylord, Holt, & Kenny, 2003). Furthermore, children who grow up in homes with domestic violence are also more likely to be victims of child abuse (Holt, Buckley, & Whelan, 2008; McGuigan & Pratt, 2001).

In general, a wide range of children's developmental outcomes can be compromised by exposure to domestic violence (Wolfe, Crooks, Lee, McIntyre-Smith, & Jaffe, 2003). Children may have increased emotional problems, such as depression and anxiety, low levels of social competence and poor academic functioning (Fantuzzo & Mohr, 1999; Campbell & Lewandowski, 1997). Studies also indicate behavioral problems such as aggressiveness, hyperactivity and clinging behaviors as well as physical symptoms

including headaches and disturbed sleeping (Campbell & Lewandowski, 1997). Moreover, studies reveal that children who are exposed to domestic violence have an increased risk of becoming either victims or perpetrators of violence as adults (The Body Shop/UNICEF, 2006).

CSs offer protection from perpetrators of violence, help the women and children cope with their crisis and support them in starting a new life without violence. The support for the women involves counseling and individual or group discussions including conversations with psychologists. More practical support such as help with hospitalization and legal assistance is also offered (Barlach & Stenager, 2009). The children typically participate in social activities, childcare, homework assistance and individual or group discussions and are also offered psychological help (Børjesson, 2008). As an example of help offered, the Danish CS, Danner, adopts an overall approach which is both sympathetic and orientated towards problem-solving and change (Danner, 2011). Here, narrative therapy is used as a method where there is focus on building up the feeling of self based on a positive, personal narrative concentrating on resources, capacities and values (Danner, 2011; Holmgren, 2009). The duration of stays at CSs can vary from 24 hours to over one year (Barlach & Stenager, 2010) which underlines that the help, which the CS is able to offer, to a high degree depends on the specific situation of the women and children.

1.6. OUTDOOR ENVIRONMENTS AT CRISIS SHELTERS

Living at a CS can be a challenge in itself. The residents live in temporary, unfamiliar housing conditions often in close proximity to strangers with shared facilities such as kitchens and bathrooms. As a whole, this can make the CS a potentially stressful setting capable of contributing negatively to the crisis situation the women and children already find themselves in. The outdoor environment can be seen as an essential part of the CS in terms of giving respite from the indoor environment, additional space and the benefits of being outside where there are opportunities for contact with nature.

To cover the great variety of outdoor settings at CSs such as gardens, courtyards and roof gardens the terms ‘green outdoor environment’ (used in Paper I) or ‘outdoor environment’ (used in Papers III and IV) are used. In this introductory part of the PhD thesis, the term ‘outdoor environment’ (OE) is used. OEs can either be designed or spontaneously developed and have different amounts of vegetation, it being understood that ‘green outdoor environment’ necessarily includes some amount of vegetation. The term ‘garden’ used in Paper II accords with the terminology of the book with the working title: ‘The Case for Healing Gardens’, edited by Cooper Marcus and Sachs with Barnes and Hazen.

The theoretical framework suggests that an OE at a CS in the form of a healing garden may support health and well-being. The potential health benefits include better stress coping (Ulrich et al., 1991) improved capacities for directed attention (Kaplan 1995), heightened body awareness (Ayres, 2008), strengthened feelings of self, improved social competence (Grahn et al., 2010) and increased self-confidence (Csikszentmihalyi, 2008). These health benefits can all be seen as highly relevant in relation to the health consequences of domestic violence presented above. However, the theoretical framework also points towards some overall characteristics of design and activities that can be seen as prerequisites for achieving the potential health benefits. The question is how to design and plan for NBAs in OEs at CSs in order for them to be healing gardens.

In this respect, several studies indicate results concerning design and NBAs in OEs at CSs. An important contribution is Refuerzo and Verderber's three-year-long study of CSs. Their work mainly had an architectural perspective but did, however, also generate guidelines for the design of OEs. In short, these guidelines address screening, surveillance and reinforcement of the interior by providing a protected, landscaped OE that allows for both private and social use. The OE should be a controllable environment that includes children's play areas and good indoor/outdoor connections (Verderber, 2001; Refuerzo & Verderber, 1993, 1990, 1989, 1988). Addressing NBAs at CSs, one study shows that horticultural therapy increased self-esteem and decreased depression of the women involved (Lee, Kim, & Suh, 2008). Another study describes a pilot program exploring the idea that gardens and healthy food can enrich the lives of residents and staff at CSs. The study suggests that gardens at CSs have a potential on many different levels including relieving stress, supporting social relations, increasing food security and beautifying CS spaces (Stuart, 2005). Yet another project resulted in a description of the design and implementation of horticultural therapy with children at a CS (Keeley & Leigh, 1999). Finally, one study discussed a program consisting of gardening activities for women and children led by master gardeners. This work suggests that master gardeners and gardening activities at CSs can play an important role in helping the residents mitigate their psychological trauma and develop a restored sense of dignity (Pierce & Seals, 2006; Seals & Pierce, 2007).

One of the studies mentioned above was conducted in a Korean context and the rest were carried out in the USA. Most of them focus on NBAs and only one has an architectural perspective. The studies with a focus on NBAs suggest health benefits but deal with design issues to a very limited degree. Furthermore, the study with a focus on design, gives design guidelines but from an everyday use perspective. Overall, it can be said that OEs at CSs are an intriguing research topic that lacks sufficient breadth and depth, and that one important gap, which has yet to be filled, is studying the relationship be-

tween design, NBAs and health benefits. This leads to the overall and specific aims of the present PhD thesis.

2. OVERALL AND SPECIFIC AIMS

All in all, the theoretical framework and the research studies presented above suggest that an OE has the potential to be a resource supporting the health and well-being of its users, thereby strengthening CS functions. It indicates that healing gardens at CSs can be an optimized setting for everyday activities and provide opportunities for incorporating the therapeutic aspects of nature in the staff's toolbox for helping the women and children.

The overall aim of this PhD project was to explore this potential and its design prerequisites in order to develop EBHD guidelines for OEs at CSs. The PhD project included four research studies each with its own specific aim as described below. The research questions related to the specific aims of Studies I, III and IV appear in detail in the papers.

Study I aimed to review literature concerning landscape architectural design and NBAs in relation to green OEs at CSs in order to gain an overview of extent, content and quality as well as to relate the literature to the theoretical framework. Furthermore, the study aimed to find evidence that supports or contradicts assertions that landscape architectural design and NBAs can play an important part in supporting the health of the residents. As a part of this analysis, the aim was to identify the residents' design needs and preferences as well as to identify health benefits (**Paper I**).

Study II was based on action research aimed to develop EBHD guidelines for the OE at the Danish CS, Danner, in order for it to offer experience and activities that support the health and well-being of its users and thereby strengthen CS functions (**Paper II**).

Study III, which was based on a questionnaire survey, aimed to better understand the potential of the OEs at CSs in Denmark and to what degree this is already fulfilled. Furthermore, this study aimed to provide an overview of the current status of the OEs in relation to extent, characteristics and use. The aim was also to get the staff's point of view as to general satisfaction with the OEs as well as preferences for specific characteristics (**Paper III**).

Study IV, which was based on a case study, aimed to find implications for design of OEs at CSs by exploring how OEs could be designed not only so that everyday use is enhanced but also so that staff could use the OEs actively in their work. As part of this study, the aim was to explore the appearance of OEs and the physical traces of use in them as well as the staff's perspective on user needs and preferences with regard to outdoor design and activities (**Paper IV**).

3. OVERALL RESEARCH STRATEGY AND PROCESS

The field of EBD with a focus on improving health outcomes (here referred to as EBHD) is still relatively young and can be seen in relation to Evidence-Based Practice (EBP) used in many academic areas including the field of medicine (Viet, 2009). Although evidence is the central theme in both EBHD and EBP within medicine, there are significant differences in how evidence is defined and categorized. This is due to the different nature of the two academic areas and their scope when conducting research. Unlike medicine, which tends to focus on quantitative studies, both quantitative and qualitative research can greatly benefit designers (Viets, 2009). Since EBHD deals with measures such as clinical outcomes as well as environment-behavior interactions, the approach uses both types of methods (Viets-Schmitz & Anderson, 2011). Quantitative and qualitative studies have different goals and therefore cannot substitute for each other. As an example, a qualitative study can explore a series of complex interrelations impossible to generate in a numerical analysis (Viets, 2009). Qualitative methods can be especially useful in EBHD in situations where there are few or no research precedents (Viets, 2009). In this PhD project, the literature review revealed that little precedent research had been conducted on OEs at CSs regarding design and activities.

As a consequence of this and the participation in the EBHD of Danner's Garden, the studies carried out as a part of this PhD project mainly included qualitative methods. The exploration of the potential of OEs at CSs and its design prerequisites did, however, also call for a more quantitative approach, which made it possible to gain an overview of the current status of OEs at CSs in Denmark.

The **literature review (Study I)** was initiated at the beginning of the PhD project. At the same time, there was a focus on the development of Danner's Garden through EBHD and the **action research (Study II)** conducted as a part of this. The **questionnaire survey (Study III)** and the **case** study (Study IV) were planned together, and the results of the questionnaire survey were used as a basis for the case selection.

	Year 1	**Year 2**	**Year 3**	
I				
II				
III				
VI				

Table 1 General time line of research studies. The more focus on the specific study, the darker the shade.

In the following, Studies I, II, III and IV are described. Certain aspects concerning the research process, the methods and the results, considered relevant in order to understand the choices made and how the overall aims of this PhD project were achieved, are elaborated upon, while others are described in more detail in the papers. When it comes to the research process and method of the action research in Study II, these are described in full in Chapter 5, since, for editorial reasons, they are not included in Paper II.

3.1. LIST OF MANUSCRIPTS

Paper I: Lygum, V. L., Stigsdotter, U. K., & Verderber, S. (2012). Green Outdoor Environments at Crisis Shelters for Women and Children Survivors of Domestic Violence: A Review. Manuscript submitted for publication in *Journal of Architectural and Planning Research.*

Paper II: Lygum, V. L., & Stigsdotter, U. K. (accepted for publication). Gardens at Crisis Shelters for Women and Children Survivors of Domestic Violence. in C. Cooper Marcus & N. Sachs with M. Barnes & T. Hazen (Eds.), *The case for healing gardens*. New York: John Wiley & Sons.

Paper III: Lygum, V. L., Stigsdotter, U. K., Konijnendijk, C. C., & Højberg, H. (2012). Outdoor Environments at Crisis Shelters in Denmark. Manuscript submitted for publication in *Journal of Therapeutic Horticulture.*

Paper IV: Lygum, V. L., Stigsdotter, U. K., Konijnendijk, C. C., & Højberg, H. (2012). User Needs and Preferences with respect to Outdoor Design and Activities at Danish Crisis Shelters. Manuscript to be submitted to *International Journal of Architectural Research*

4. LITERATURE REVIEW (STUDY I)

4.1. METHODS

Conducting a review of related literature can be seen as important in terms of being able to show the underlying assumptions behind the general research questions as well as to present the related research and the scholarly traditions surrounding and supporting the study. It can also identify gaps in previous research and refine the research questions by positioning them in larger traditions of inquiry (Marshall & Rossman, 2006). In an academic area with few published review articles, conducting a review can be seen as relevant to the progress of the research field (Webster & Watson, 2002). No review articles were found on the specific topic of this PhD thesis. As a consequence, the literature review was carried out to get an overview of the extent, overall content and quality of relevant literature on the design of green OEs and NBAs at CSs. Within these sources, the goal was to examine the existing evidence for design and health benefits. To maintain a landscape architectural perspective, issues on the organization and practice of NBAs were not examined. The review contributed to progress achieved in the research field by placing the literature within a theoretical framework and uncovered those areas where further research is needed.

For the methods used to find and assemble the literature a systematic approach and procedure were adopted. The search and selection of literature are thoroughly described in Paper I. In short, several key words were used in relation to the target groups, the setting and the focus on NBAs and design. The search was conducted in a number of databases to cover the interdisciplinary topic. Back-referencing, citation tracking and searches on authors and specific terms were also performed. Only English-language sources were included. The selected literature was classified in terms of peer-reviewed or gray literature, type of study and setting, as well as inclusion of design and health issues. The diverse character of the literature called for a separate analysis of the literature concerning design and NBAs respectively. The strengths and weaknesses of the empirical studies were assessed examining the objectives/research questions, methods, site, population of study and type of results. Limitations pointed out by the authors were also taken into account in the assessment. The analysis of content in relation to design and health benefits was concept-centric (Webster & Watson, 2002).

Due to the diverse character of the literature, a qualitative analysis was considered appropriate. It focused on similarities in content which led to the identification of central issues regarding design and health benefits addressed in the literature. The results of this analysis are presented in the form of themes with a limited quantification. When presenting results from a qual-

itative analysis, a limited amount of quantification of the data can give the reader a greater idea of the prevalence of the issues (Bryman, 2008).

4.2. SUMMARY OF RESULTS

The systematic search and selection revealed 23 sources, 19 of which have a focus on design and four on NBAs. The sources with a focus on design consist of 15 design descriptions, three empirical studies and one description of research-based guidelines. Only one of these sources includes health issues. The literature which focuses on NBAs consists of four empirical studies, all of which include health issues and, to a limited degree, design. In total, only eight of the sources are published in peer-reviewed journals, and the few research studies are of varying quality. Overall, the literature review shows that the research on design and health benefits lacks sufficient breadth and scope. Furthermore, the studies only focus to a limited degree on the relationship between design and health benefits and there is a general lack of focus on linking design and NBAs.

The sources with a focus on design yielded the following themes regarding needs and preferences with respect to the design of green OEs at CSs: *Security from intruders*, *A sense of safety*, *Space for different needs, Indoor/outdoor connections* and *Qualities of plantings*. The findings did not reveal any actual health benefits but focused on the relation between degree of satisfaction with the environment, actual use, and health status of the user. The sources focusing on NBAs yielded *Safety* and *Accessibility* as being relevant for the design of the green OE. All of the sources which focused on NBAs indicated that green OEs can promote the health of their users, though only two of them presented actual research results. This yielded the following themes regarding health benefits: *Self-esteem*, *Mood and stress*, and *Social relations*.

Because of the limited amount of research on design and health benefits, the connections between the theoretical framework and the themes were only applicable on a general level.

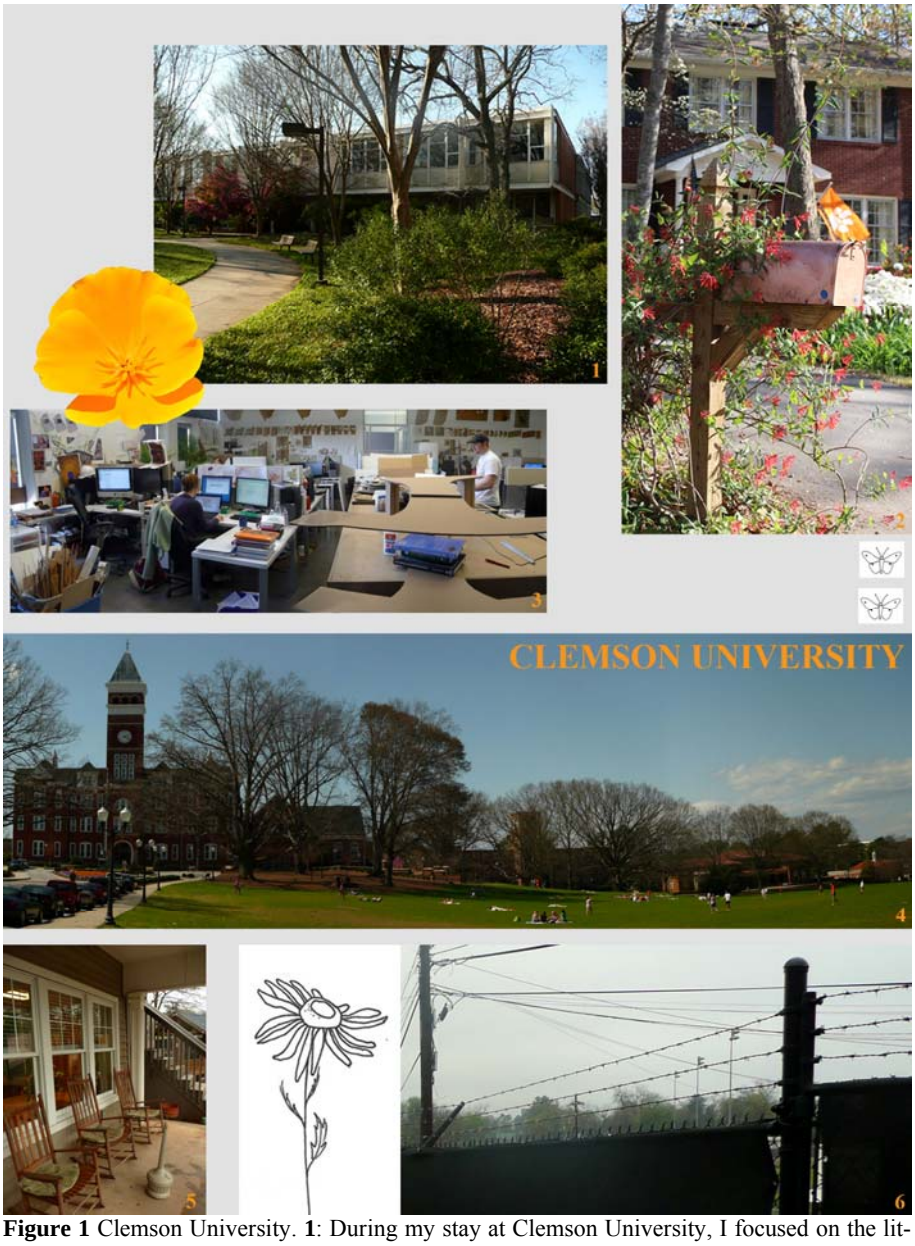


Figure 1 Clemson University. **1**: During my stay at Clemson University, I focused on the literature review. Lee Hall is home to the Architecture + Health program and the Architecture Library. It was also where I had my office which I shared with other PhD students; **2**: The tiger paw logo is the trademark of the university and can be seen everywhere in Clemson; **3**: The master student studio part of the Architecture + Health program; **4**: Bowman Field is a central location for outdoor activities for students; **5-6**: Crisis shelter in South Carolina; **5**: Rocking chairs on the porch; **6:** Harsh security measures

5. ACTION RESEARCH (STUDY II)

5.1. METHODS

The methods used in Study II are described in full because a thorough method description is not included in Paper II. Furthermore, a little background information and a general description of the EBHD process is provided hereafter to better understand the methods chosen.

'Danner' is a private humanitarian organization that runs a CS for women and children survivors of domestic violence. Danner also includes a research center documenting and generating knowledge about violence. Danner, which is situated in Copenhagen, houses 35 employees, 250 volunteers and has room for 17 women and their children. The employees represent many different fields of knowledge including social science, psychology and pedagogy (Danner, 2011). From 2010 to 2012, the building of Danner was renovated and the OE was redesigned into a healing garden, called Danner's Garden. For Danner, the goal was to develop new and improved methods in helping women and children at CSs. Danner wanted to collaborate with researchers from the Center for Forest and Landscape, University of Copenhagen, in the development of Danner's Garden. By participating in this process, the PhD project had a practice-oriented approach from the beginning.

Collaboration among professionals with complementary expertise can be seen as important in effective evidence-based projects (Hamilton & Watkins, 2009). Danner's Garden was developed through EBHD in collaboration between staff from Danner, landscape architects from the Schonherr firm, and the interdisciplinary Health Design research team from the University of Copenhagen. The research team consisted of Associate Professor Ulrika K. Stigsdotter and me from the field of landscape architecture and PhD student Sus Sola Corazon from the field of educational psychology. The role of the research team was to facilitate the EBHD process and to inform design decisions by collecting, interpreting and communicating information from existing sources. However, the design process was also a research study in its own right.

The approach in the study can be described as action research. Action research is an approach that addresses research issues in partnership with local people, where collaboration, mutual education and action for change define its characteristics. It is an approach that recognizes contextual factors within the research environment and where the research outcome may be in the form of programs or policies (Gibson, 2004). Although there is no single type of action research, it generally involves researchers and members of a social setting collaborating in the identification of a problem and in the development of a solution to the problem (Bryman, 2008). In the development

of Danner's Garden, the research team became part of the field of study and it was during data collection and analysis that the challenges of developing the design appeared. It was also through data collection and analysis that the solutions emerged. The study was planned with the assistance of my key informant at Danner, Henriette Højberg. According to the time schedule of the overall renovation, the landscape architects from Schonherr had to present the main characteristics of the design of Danner's Garden in September 2009. This deadline had decisive implications for the planning of the study. Viewed from within the context of the total time period of the PhD project (March 2009 – June 2012), it necessitated a focus on developing EBHD guidelines early on in the project.

The study consisted of two phases. The first phase had a primary focus on the design of Danner's Garden, and the second phase had a primary focus on NBAs. Although the phases had different primary foci, both design and activities were touched upon in both phases, as these two aspects of a healing garden can be seen as interdependent.

5.1.1. First phase

The first phase included a presentation, individual interviews, landscape analyses, direct observation, a workshop and a questionnaire survey at Danner. To begin with, I gave a presentation to the employees and the volunteers respectively to inform them about the project and introduce the concept of healing gardens. Then, to gain knowledge about Danner as an organization and its different functions, I conducted six individual interviews with staff members. The interviews were unstructured and the interviewees were selected by Henriette Højberg to represent the different functions at the CS. The focus in the interviews was on the process that the women and children go through during their stay, how the staff work and in what surroundings. In the interview with the caretaker, the focus was different and to a higher degree concerned use and maintenance of the garden. The interviews were also used to gather references of relevant existing sources giving access to internal documents and contributing to the general literature study. An important document in this regard was a user analysis carried out by the firm 'Signal Architects' during planning of the overall renovation project.

In order to gain an understanding of the visual elements of the garden and its surroundings, a landscape analysis based on the theory of mental maps (Lynch, 1960) was carried out. This analysis takes as its starting point the fact that, in order to navigate successfully in an environment, we develop a mental image composed of visual elements. According to this theory, people are likely to have similar images of a given environment. The component elements of the image can be classified into five types that have a general application: *paths* (channels along which the observer moves), *edges* (bounda-

ries or linear breaks), *districts* (entities having a common character), *nodes* (junctions or concentrations) and *landmarks* (points of reference). These elements can be adjusted to different scales and can be used as symbols when analyzing the composition of an environment (Lynch, 1960).

Furthermore, a landscape analysis of the 'perceived sensory dimensions' (PSDs) (Grahn & Stigsdotter, 2010) was conducted to identify the main qualities of the garden. The PSDs are based on the premise that people perceive natural environments in terms of certain dimensions and that their preference for these dimensions is related to their state of health. Through research, eight PSDs have been identified and can be described in the following way: *Serene* (undisturbed, calm, retreat, safe), *Space* (spacious, free, connectedness, not crossed by paths), *Nature* (on nature's own terms, wild, vigorous), *Rich in Species* (wealth of plants and animals), *Refuge* (enclosed, safe, play, watch other people being active), *Culture* (traces of human culture), *Prospect* (open, level area, overview, for space-consuming activities) *and Social* (facilities for social activities, entertainment) (Grahn & Stigsdotter, 2010). The PSDs are based on a questionnaire survey giving answers about preferences with respect to qualities in the urban green space from 953 randomly selected respondents from Swedish cities. Although the PSDs are based on research concerning urban green space they are viewed as usable in garden settings as well (Stigsdotter & Grahn, 2002; Stigsdotter & Grahn, 2003; Stigsdotter et al., 2012).

Whenever I had field visits at Danner including those occasions where other data was collected, direct observations were conducted. Observations of this kind can be described as casual data collection (Yin, 2009). The observations focused not only on the actual use of the garden but also on indications of use such as the location of garden furniture or toys in the garden. To record each observation, notes were made and photos taken of the indications of use. Direct observation was used to provide additional information about the garden.

A central part of the first phase was a workshop with eight staff members most of whom had participated in the individual interviews. Together with my supervisor, I facilitated the workshop. In order for the garden to become a success, it was considered important that the staff took ownership of the project and were motivated by seeing the potential of the garden as a means of improving their practice. For this reason, the methods used were based on the principles of facilitating the discussions rather than leading them. The workshop had a primary focus on the design of the garden and started with a brainstorm over positive and negative aspects about the existing garden. Afterwards, these aspects were related to a site illustration of the garden. The second part of the workshop was about the staff's wishes for the new garden and a discussion on how the garden could become a more integrated part of

Danner's functions with the focus on how it could serve as a setting for its activities.

Finally, the first phase also included a small questionnaire survey including seven out of the 13 women who stayed at the shelter at the time (see appendix). The women answered the questionnaire in the garden where some had brought their children. A staff member and I were there to answer questions about the questionnaire. A further three completed questionnaires were picked up the next morning. The questionnaire consisted of four parts:

1) Background questions (gender, age, country of birth, duration of stay in Denmark, level of education, principal occupation, duration of stay at Danner, children and their gender and age, self-estimated state of health and level of stress) (answers not included in the data analysis).
2) A few open-ended questions, where the women were asked how they used the garden, what they thought was positive and negative about it and what could make them use the garden more.
3) A set of closed questions related to the PSDs aimed at indicating preferences with respect to garden settings (answers not included in the data analysis). In this part of the questionnaire the eight PSDs appeared through a number of closed statements adjusted to a garden setting. For each statement, the respondent had to indicate their awareness, if any, of the presence of a particular element in the garden (five-point scale from 'not at all' to 'entirely') and their personal idea of its significance within the setting of an ideal garden (five-point scale from 'nothing' to 'a lot'). The statements were based on a questionnaire developed by Grahn and colleagues at the Swedish University of Agricultural Sciences. I adjusted and translated the questions from Swedish to Danish.
4) Finally, the women were asked to draw/describe a garden that they would like to be in. The five children attending the session were also asked to make drawings.

The Danish Data Protection Agency was notified about the collection of personal data from the women staying at Danner. The data collection was approved and the directives issued by the agency were followed.

The data collected in the first phase consisted of documents, field notes, notes from individual interviews, plans, photos and transcripts of recordings from the workshop with the staff. Furthermore, the answers to the open-ended questions and the drawings/descriptions from the questionnaire directed at the women were included. The thematic analysis began soon after the data collection started. In a thematic analysis key themes are extracted from the data, with the analytic procedure falling into several phases including immersion in the data, generating themes and coding the data (Bryman, 2008, Marshall & Rossman, 2006). Documents, field notes, plans and photos

were read through and looked at and I started to get immersed in the data. At the same time, the notes from the individual interviews were analyzed. In fact, after each interview the notes were analyzed to become more focused in the next interview. After the interviews, the workshop with the staff was conducted. The recordings were listened to and transcribed. The collected data including the data from the questionnaire survey with the residents was read through and looked at and notes were written down. Different themes started to appear which were revised during the analysis. The data was coded according to the themes and in the end the themes were linked to the findings from the literature study and were further developed and refined. The result of the first part of the Danner project was a set of preliminary guidelines presented in a report and a schematic overview which I was responsible for communicating to the landscape architects from Schonherr in the course of a series of meetings.

To sum up, the first phase of the study yielded useful findings on the topic, and the set of preliminary guidelines was scheduled for re-examination in the course of the PhD project through further research. It also provided some experience on how to carry out the research. In relation to this, the first phase can be seen as a pilot study for the entire PhD project, since what I learned from it had implications for the planning of the following studies. Generally speaking, a pilot study can help refine the data collection plans with respect to both the content of the data and the procedures to be followed (Yin, 2009).

5.1.2. Second phase

The second phase of the study consisted of a course of presentations and a workshop with the selected group of staff members from the first phase. To begin with, Sus and I each gave a presentation for the staff members in order to inform them about the progress of the design process and give further information on healing gardens and discuss the concept. In this phase, Sus presented theories and examples concerning NBAs that could be relevant for Danner's Garden. Her presentation was based on the development of a nature-based therapy program for people with stress-related illnesses, which was the topic of her PhD project (Corazon, Schilhab, & Stigsdotter, 2011; Corazon et al., 2010).

As an example of best practice, a presentation was given by Nancy Cipes and Linda Preuss. They are volunteers at 'Sojourn Services for Battered Women and Children' in Santa Monica, California, USA, and are in charge of a horticultural program at two local shelters. These horticultural programs can be seen in connection with 'Project Grow', a California-based pilot program conducted from 1999 to 2000 at nine CSs that explored the idea that gardens and healthy food can enrich the lives of the users (Stuart, 2005).

During the presentation, Nancy and Linda explained the background to and overall ideas behind the project. They also gave examples of NBAs they had the best experience with and stressed the importance of funding and the use of available resources in the community. Moreover, the staff got the opportunity to try out examples of horticultural activities themselves and there was time set aside for a discussion between practitioners. The goal with these presentations was to inspire the staff at Danner in relation to their own garden and the use made of it.

After the presentation, I facilitated a second workshop with the staff which had a primary focus on the NBAs in the garden. The facilitation of the workshop was assisted by Sus, and the goal was to further refine the ideas from the former workshops as well as to generate new ideas in order to initiate the development of NBAs. The workshop started with a brainstorm in small groups on how Danner's garden should be used. Afterwards, the ideas were presented and similar ideas were clustered. The different clusters where then given titles, and each title was transferred to a large sheet of paper where the ideas were further developed and related to the preliminary design of Danner's Garden.

The results from the workshop led to further development of the guidelines which resulted in several changes to the design of Danner's Garden, among which the addition of the children's program house was the most important**.** Furthermore, the results from the workshop together with information from the presentations were gathered in an 'ideas catalogue' which serves as a working document for the staff at Danner in their work with the NBAs.

5.1.3. An ongoing process

The collaboration between Danner, Schonherr and the research team continued throughout the PhD time period. Following phases one and two, the design of Danner's Garden was the subject of consultations with recognized experts including Professor Stephen Verderber and Professor Emerita Clare Cooper Marcus. Stephen Verderber is conducting research within the area of architecture and health and has among other things focused on CSs. Clare Cooper Marcus is a leading scholar within the area of healing gardens. Their comments added to further refinement of the guidelines which were passed on to Danner and the landscape architects from Schonherr.

In relation to the use of the garden, the selected staff members intend to take a course in mindfulness at the Healing Forest Garden Nacadia, which is based on a research project concerning nature-based therapy for people with stress-related illnesses. Their goal is to develop the NBAs further.

Danner's Garden is to be inaugurated in the summer of 2012. The EBHD of Danner's Garden is an ongoing process, and the NBAs are to be refined as

the garden is used. After initial implementation and a testing phase, the plan is that both the design and the NBAs in general will be evaluated in collaboration with a research team in line with the EBHD process. Some thoughts on the evaluation of Danner's Garden are presented in Chapter 10 concerning implications for future research.

5.2. SUMMARY OF RESULTS

The results of the action research which was conducted as a part of the EBHD of Danner's Garden were practice-oriented in the sense that they were applied in the design process. Concurrently with the action research, the design guidelines were interpreted by Schonherr which resulted in their design of Danner's Garden. Schonherr's design and how it facilitates the different uses is thoroughly described in Paper II. Furthermore, a site illustration can be found in the appendices. The results of the action research concerning the more overall design philosophy of Danner's Garden are presented hereafter.

First of all, Danner's Garden is designed to be a resource supporting the overall functions of the CS, which include providing safe accommodation, counseling and therapy. The expected healing process of the women and children staying at Danner revolve around feelings of safety, recollection, grief and reconnection to an everyday life without violence. In relation to this, the intended health outcomes of Danner's Garden are better stress coping, heightened body awareness, strengthened feelings of self, and improved social competence.

The garden is to be an optimized space for the CS functions by supporting everyday activities such as relaxation, play and eating outside as well as staff-facilitated meetings, counseling sessions and a therapy program for both women and children. The therapy program is seen as a part of the general therapy approach of Danner. The distinguishing feature of the therapy program in the garden lies, however, in the fact that the potential benefits of contact with nature are to be used actively, and therefore the design focuses on making nature accessible in the therapy. This is seen in relation to physical exercise where the sensory qualities of nature can add other dimensions to the experiences of movement, horticultural activities that are meaningful and correspond to the residents' capacities as well as narrative therapy where metaphors such as growth, care and coherence can be used to ease the handling of sensitive topics.

To accommodate NBAs in general, the overall design intentions revolve around creating a safe and secure environment that is accessible and supports positive distractions, encourages physical exercise and facilitates both outgoing and inwards involvement.

Figure 2 Danner's Garden. **1**: The Countess Danner; **2**: In connection to the presentations part of the second phase the staff tried out horticultural activities while developing their ideas; **3**: Example of one of the eleven sheets of paper with ideas to how Danner's Garden could be used. The title is 'Body' and it's about different types of physical exercise and meditation with a focus on improving body awareness; **4-5**: Drawings a woman and a girl made to illustrate their ideas of a garden that they would like to be in. The drawings are from the questionnaire survey with the residents at Danner; **6**: After Linda and Nancy's presentation everybody got to sew their own lavender eye pillow during the discussion; **7**: Danner's garden in the summer of 2009; **8**: "…You should want to go outside because it is so boring inside…" (girl staying at Danner)

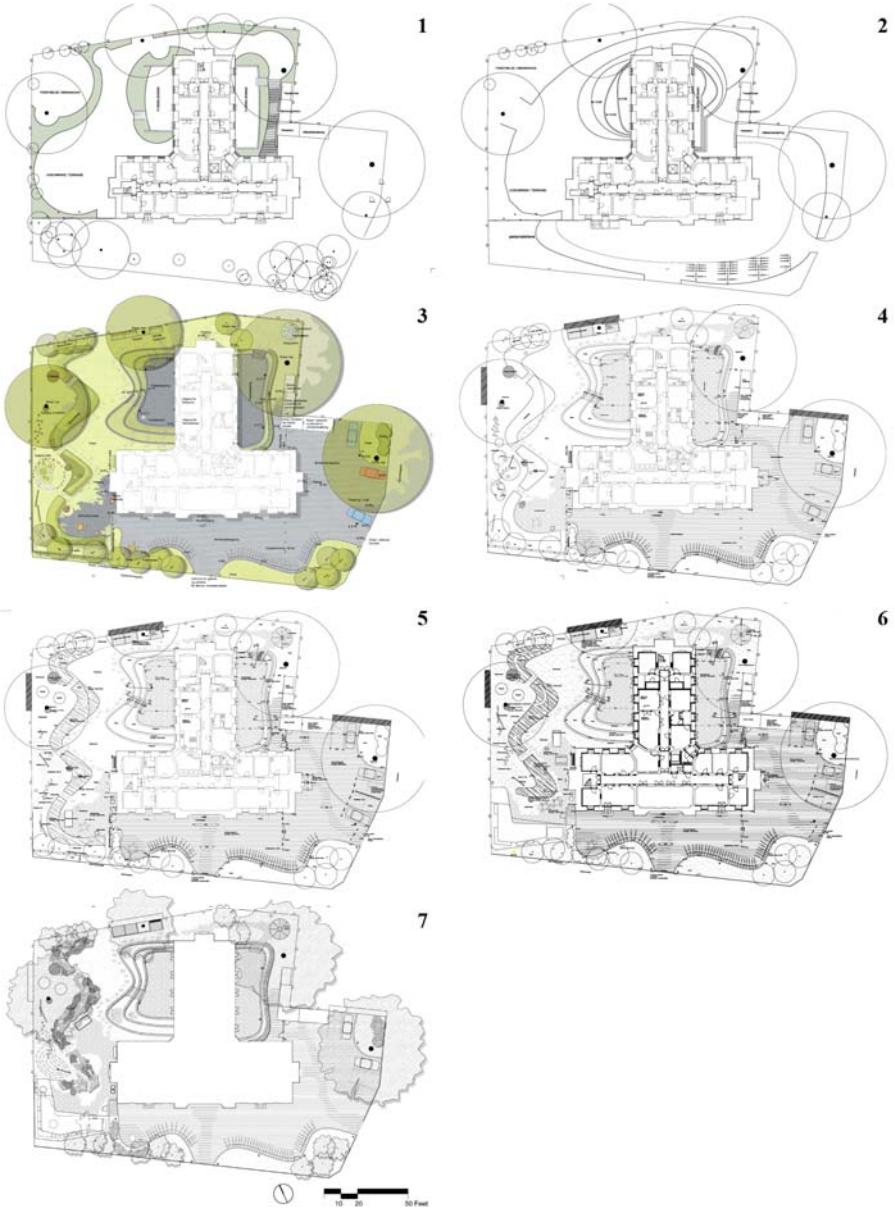


Figure 3 Site illustrations by Schonherr showing how the design of Danner's Garden evolved from 2009 to 2012. **1**: March 2009; **2**: May 2009; **3**: September 2009; **4**: Mach 2010; **5**: April 2010; **6**: June 2011; **7**: January 2012

6. QUESTIONNAIRE SURVEY (STUDY III)

6.1. METHODS

The results of the literature review (Study I) and the action research in relation to Danner's Garden (Study II) showed that there are certain needs and preferences regarding the design of OEs at CSs. Furthermore, the literature review indicated several health benefits of NBAs. This made it interesting to gain an overview of the current status of OEs at the Danish CSs, to better understand their potential and to what degree this is already fulfilled in practice. Therefore, a more quantitative approach was chosen in the form of a questionnaire survey aimed at CS staff (see appendix) sent out by the Danish National Organization of Shelters for Battered Women and their Children (LOKK). The choice of aiming the questionnaire at the staff was based on the pilot study in Study II indicating that staff are likely to have an overview of the CS functions, an understanding of the situation that the women and children find themselves in and a good amount of experience, having met many different types of residents. The same reasoning was valid in the planning of the case study (Study IV).

The topics of the self-completion questionnaire were based on the literature review (Study I) as well as the action research (Study II). It consisted of both open-ended and closed questions. The open-ended questions were useful for exploring this new area and allowed for unusual responses (Bryman, 2008). The relatively small number of respondents made the coding of the answers manageable. Closed questions were used when possible to ease both completion of the questionnaire for the respondent and its analysis.

The aim was to gain an overview of the current status of the OEs in relation to their extent, characteristics (type, size, demarcation and screening) and use, but also to obtain the staff's point of view as to general satisfaction with the OEs as well as preferences with respect to specific characteristics. The questionnaire consisted mainly of 'informant factual questions'. These types of questions are essentially about those characteristics of an entity of which the respondent has certain knowledge. However, such questions may also be concerned with behavior (Bryman, 2008). With these types of questions, the respondents were mainly asked about characteristics and use of the OEs. The questionnaire also included 'questions about attitudes' (Bryman, 2008), and here the respondents were asked to score their satisfaction with the OE in general and to note aspects that evoked the most satisfaction or dissatisfaction. The intention with these questions was to find out how the respondents evaluated their OEs in general as well as some specific aspects of them. Here, the goal was to get an indication of what aspects are seen as important from their point of view as professional CS staff. Furthermore,

looking at the answers in comparison with the characteristics and use made it possible to get an idea of to what degree the potential of the OEs, which is indicated in the literature review (Study I), is being fulfilled.

The scope of the study, the data collection process and the content of the questionnaire are described in greater detail in Paper III. Responses were analyzed one or two variables at a time. Responses to open-ended questions were grouped into categories. Furthermore, data analysis included systematic classification of the OEs into different types based on the CS building and context.

6.2. SUMMARY OF RESULTS

Out of the 38 Danish crisis shelters, 31 responded to the questionnaire survey. The results show that all of the crisis shelters in the study have an adjacent OE that is used by residents and staff.

The majority of the respondents were either 'very satisfied' or 'satisfied' with their OE. The aspects of the OEs evoking most satisfaction or dissatisfaction evolve around the different needs of the users such as play, physical activity and seating opportunities. They also concern spaciousness and the qualities of the out-of-doors and nature as well as an OE that is safe, snug and secluded from its surroundings. Aspects regarding maintenance were also mentioned.

Answers regarding type, size, demarcation and level of screening-off from surroundings gave an overview of these characteristics of OEs at the Danish CSs, which is presented in detail in Paper III. Analyses of the relationship between the degree of general satisfaction and these characteristics suggest the following preferences: back/front/surrounding garden is favored compared to courtyards, larger OEs ($\geq 501 m^2$) are preferred to smaller ones, a combination of solid (e.g. walls, fences) and soft (e.g. hedges, shrubs) boundaries is preferred to solid boundaries only, and the more screened an OE is the better. Moreover, the findings indicate that the OE should be closed to public use.

Activities such as 'playing', 'smoking', 'just sitting down', 'drinking tea/coffee' and 'hanging clothes to dry' are frequent in most OEs, whereas activities such as 'doing homework', doing relaxation exercises', 'taking a walk', and 'having meetings' never take place in slightly less than half of the OEs. The more active activities are engaged in by children and staff, whereas the more sedentary activities are performed by all users. Several activities are organized by the staff on a regular or occasional basis in most of the OEs, including 'playing', drinking tea/coffee', 'eating', 'gardening', 'looking after children', 'having conversations', 'celebrating events' and 'having meetings'. The widest range of activities occurs during the summertime followed by spring, autumn and then winter.

7. CASE STUDY (STUDY IV)

7.1. METHODS

The questionnaire survey (Study III) gave an overview of the current status of OEs at the Danish CSs. However, it only allowed for overall indications, which called for a more in-depth case study in order to find further implications for design. This was done with a qualitative approach by exploring the appearance and physical traces of use of OEs as well as the staff's perspective on user needs and preferences with regard to outdoor design and activities.

The case study included three cases, which were selected on the basis of the results from the questionnaire survey in Study III. It was important to obtain as much and as varied information as possible without compromising the depth of the study. As a consequence, an information-oriented selection was chosen with a relatively small sample of cases each with their different qualities. On the basis of expectations about their information content, the study focused on 'especially good' cases (Flyvbjerg, 2004, p. 426).

The case selection is thoroughly described in Paper IV. In short, I selected six CSs out of the 31 CSs covered in the questionnaire survey. The selection was based on information from the survey, CS homepages and aerial photos. After a visit at the six cases including an unstructured interview with a staff member and an overall assessment of the OE to clarify results from the questionnaire survey, the final three cases that were the best in terms of rich and varied information content were chosen.

To begin with, the study of the three cases each included an unstructured individual interview with the shelter leader to gather further information on the CSs as organizations and to organize future data collection. Furthermore, several types of landscape analyses were conducted to gain a greater understanding of the physical environments within which the CSs are placed. This included analyses based on the theory on mental maps (Lynch, 1960) and the PSDs (Grahn & Stigsdotter, 2010). A 'therapeutic garden audit for acute-care hospital' (C. Cooper Marcus, personal communication, October 4, 2010) was also used as a checklist in combination with findings from the literature review (Study I) and action research (Study II) described above. The 'therapeutic garden audit for acute-care hospital' lists all the elements and qualities desirable in a healing garden at an acute- care hospital. The list is based on current research, observation of gardens and common-sense design. Each element or quality is given a score and the tool can be used to evaluate a garden roughly, make suggestions for improvement and compare different gardens. Since the tool is for acute-care hospitals, the use made of it in this study was limited to directing attention towards design details in the OEs. Moreover, an observation of physical traces (Zeisel, 2006) was conducted to

obtain indications of use. Physical traces include both traces that are unconsciously left behind and conscious changes that people have made to their surroundings. The advantages of this method include the fact that it does not influence the behavior that caused the traces and that it is easy and fast compared to observing actual use. Furthermore, physical traces can provide rich impressions from which it is easy to generate hypotheses about the possible causes for the traces. These hypotheses can then be further explored through other methods such as interviews (Zeisel, 2006). In this study the physical traces looked for included traces that were the by-product of use (e.g. erosion and leftovers) or non-use and traces which could indicate certain adaptations for use (e.g. garden furniture placed in a certain way). The traces were recorded by photos as well as annotations on site illustrations. As a whole, these landscape analyses generated knowledge used as a basis for carrying out the group interviews described below.

In the last part of the case study, semi-structured group interviews of approximately an hour and a half were conducted with three to four staff members selected by the leaders at each CS (see appendix). The 'seven stages of an interview inquiry' by Kvale and Brinkmann (2009) assisted the planning. These include finding the themes of inquiry, planning the design of the inquiry, conducting the interviews, transcribing the recordings and organizing other types of data, analyzing the data and verifying the results in terms of validity and generalization.

The overall goal of the interviews was to identify the staff's experience of the needs and preferences of the women and children concerning outdoor design and activities as well as the staff's own needs and preferences. Questions revolved around: use, positive and negative aspects, significance for the different users, and participants' idea of an ideal OE. A site illustration of the OE as well as paper and pens were provided to the groups to support the discussions. Furthermore, the interviews included a small exercise at the end where participants were asked to prioritize different types of experience in OEs according to users' preferences at CSs based on the eight PSDs (see appendix X).

The recordings from the three group interviews were transcribed and analyzed. The analysis took as its starting point a 'thematic content analysis', which is a method adapted from 'grounded theory' approach and from works on content analysis (Burnard, 1991). Results from the initial part of the research, such as notes from the individual interviews and findings from the landscape analyses, supported the analysis. The data from both parts were gathered in NVivo 8 (computer-assisted qualitative data analysis software) to facilitate the analysis.

In the analysis, the themes addressed in the interviews concerning needs and preferences with respect to outdoor design and activities were systematically registered. Moreover, the themes and interviews were linked together

under a category system. The process of developing this system included several stages of reading through the transcripts, assigning headings to relevant aspects, grouping headings into categories and rereading transcripts to adjust the system. Further details on the analysis as well as measures taken to reinforce validity are presented in Paper IV.

7.2. SUMMARY OF RESULTS

First, the three cases are presented in terms of number of residents, context and building type, type and size of OE, overall layout and content of OE, security measures and most significant PSD in the OE. These descriptions are presented in detail in Paper IV.

Second, the findings include the following five categories regarding user needs and preferences with respect to outdoor design and activities: *Protection against perpetrators of violence and supporting residents in feeling safe* – this is about possible causes for the residents feeling unsafe and how this is dealt with by the staff and taken into consideration in the OE. *Accessibility in the design, straightforward activities and staff guidance* - this is about initiatives taken by the staff to get residents to go outside and the design aspects which make it easier for residents to use the OEs. *Being outside and the positive distractions of nature* - this is about the experiences that the OEs can provide and how they benefit staff, women and children. *Space for all* - this is about the differences in users' needs and preferences. *Room to play and relieve children's feelings* - this is about how the OE makes it possible for children to express themselves in different ways than when they are indoors. This last category also concerns how conflicts can occur between children, and examples are given as to how this is handled by the staff and allowed for in the design.

Third, results concerning preferences with respect to outdoor experiences (PSDs) show that *Refuge*, *Social* and *Serene* were seen as the most important dimensions.

Finally, the findings are summarized in implications for design which are presented in detail in Paper IV.

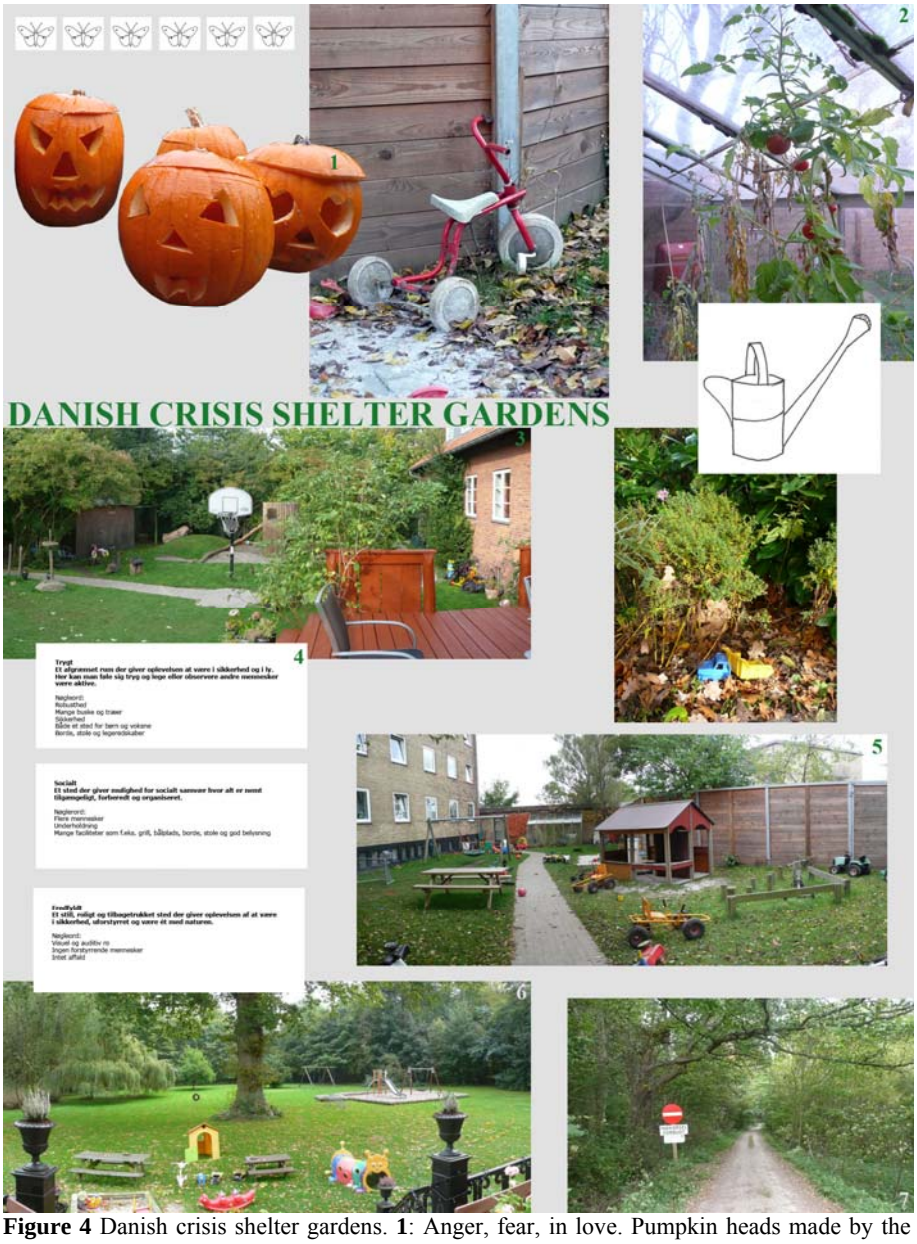


Figure 4 Danish crisis shelter gardens. **1**: Anger, fear, in love. Pumpkin heads made by the residents at Case 1; **2**: Tomatoes in the greenhouse at case 2 which a group of women had planted and taken care of during the summer; **3**: Case 1; **4**: The PDSs Refuge, Social and Serene were ranked the highest at all three cases. During the interviews, the eight PSDs were presented with a name, a short description and some keywords just like these three examples; **5**: Case 2; **6**: Case 3; **7**: The road leading to case 3 which is well hidden in a forest

8. SYNTHESIS OF RESULTS: EVIDENCE-BASED HEALTH DESIGN GUIDELINES

In this chapter, the EBHD guidelines for OEs at CSs derived from all four studies are presented. When reading the guidelines, it is important to keep in mind that there are no easy, ready-made answers to complex problems. Because no two design projects are the same, the purpose of EBD (here referred to as EBHD) is not to increase standardization but to improve individual, specific and unique design decisions (Hamilton & Watkins, 2009). Furthermore, the uniqueness of each project and the fact that new research is published constantly make it undesirable to aim for static design concepts (Hamilton & Watkins, 2009). Here, the EBHD guidelines are presented as suggestions for practitioners to consider when working with the design of OEs at CSs and as a starting point for researchers interested in the topic. The guidelines derive from all four research studies in this PhD project, in the sense that an examination of similarities in content of precedent literature led to identification of the main issues addressed (Study I), which were then related to the results from the action research (Study II), the questionnaire survey (Study III) and the case study (Study IV). As to the results of the studies, their transferability was considered and context-specific aspects were left out. The guidelines can therefore be seen as a synthesis of the current best evidence from research and practice. It is important to mention that the EBHD guidelines only include the essentials and that both existing literature as well as the Papers II, III and IV offer further details and elaborations of certain aspects.

Below, the guidelines are presented with references. All literature that supports a certain topic in a guideline in some kind of way has been added as a reference. For the sake of clarity, the references to preceding studies are indicated by numbers which refer to the list of references presented below the guidelines. References to Studies II, III and IV are simply referred to as II, III and IV. To indicate the credibility of the evidence, references to peer-reviewed literature are entered in bold. The guidelines presented below are more comprehensive than those in Paper II which have been adjusted to an overall list of guidelines valid for several types of health-care settings presented elsewhere in the book, of which the paper forms a part. The guidelines that are not part of Paper II are the following: B1, B3, B5, B7, C5, D1, D2.

A. SECURITY AND FEELING SAFE

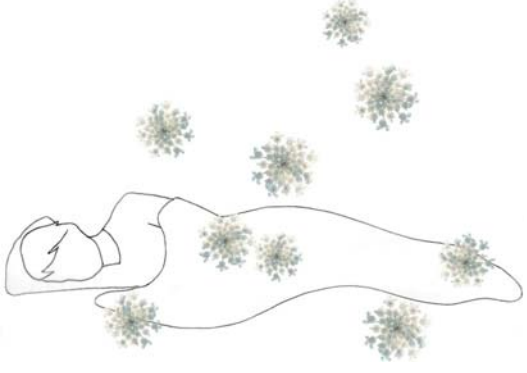
Security against intrusion is a fundamental aspect to be addressed when designing the OE at a CS, because there is a risk that the perpetrators of violence will seek out residents. For the women and children, feeling safe is an essential aspect of the support they need in order to improve their situation.

A1. The parts of the OE that are visible to the public should be in harmony with the strategy of the CS building by helping, for example, to create an anonymous CS that blends in with its surroundings [II, 8, **11**, **14**, 15, 17, 18].

A2. In the immediate CS environs, security may be optimized by providing sightlines [8, **14**] and lighting [III, 17] and by avoiding potential hiding places for perpetrators [5, **14**, 17].

A3. The OE should be enclosed [III, IV, II, 1, 2, 3, 4, 6, 7, 8, 9, 10, **11**, **14**, 15, 16, 17, 18, 19, **20**]. All entrances to the OE from public areas should be locked, and video surveillance might be necessary [II, **14**]. Views from public areas into the OE should be minimized [II, III, IV, 2, **11**, **13**, **14**, 16].

A4 It should be easy to gain an overview of the OE [II, IV, 3, 5, 6, 8, 9, **11**, **12**, 17, 19, **20**]. This can ensure staff surveillance and visual contact between mothers and children, which can support them in feeling safe. Good upkeep (e.g. by having a shed to store unused items) and lighting can support these aspects [IV].



B. ACCESSIBILITY

The numerous health consequences that the women may experience, such as emotional distress, anxiety and chronic pain, can hinder their own and thereby also their children's use of the OE. It is therefore important that the OE is as accessible as possible, both in its design and in the activities it offers.

B1. Views of the OE from the CS building through large windows [II, 1, 3, 5, 8, **11**, **14**, 17, 19] as well as easy access from shared spaces such as a dining area or an indoor space for the children [II, 1, 3, 6, 7, 8, **11**, **14**, 16, 17, 19] are important aspects in enhancing the connection between the indoors and the outdoors.

B2. A transition area, such as a covered porch or a terrace, can constitute a safe place to start using the OE and encourage residents' use of the rest of it [II, IV, 5, **11**, 19].

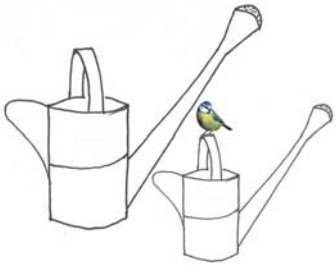
B3. Pleasant lighting can enhance the residents' feeling of safety and make the OE accessible when it is dark [II, IV].

B4. In general, design that supports activities, which are straightforward and in accordance with the capacities of the women and children, can enhance their feeling of safety and use of the OE [IV, **20**, 23]. The OE could, for instance, include elements familiar to residents from kindergarten, after-school activities or their own gardens [IV].

B5. Covered areas or small garden buildings can constitute safe environments and make activities possible, even in adverse weather conditions [II, **14**].

B6. Residents' use of the OE depends to a high degree on staff initiative. Elements such as watering cans, bird feeders and barbecues can be used as starting points for outdoor activities and might help the staff in taking the initiative [II, IV]. Furthermore, plans for how the OE is to be used for CS functions ranging from everyday activities to therapy programs may vary from CS to CS [II, IV]. It is important to allow for these plans in the design [II].

B7. Women with disabilities constitute one particular group that is more vulnerable to violence. Violence can also cause various types of disability. It is therefore suggested that both the CS building and OE be universally designed to ensure accessibility to women and children of all abilities [2, 23].



C. DIFFERENT LEVELS OF SOCIAL INVOLVEMENT

One of the consequences of violence is that both women and children may suffer from social dysfunction. Establishing social relations with the staff and other residents can be seen as a prerequisite for the support the women and children receive at the CS. An OE that accommodates different levels of social involvement can take the residents' varying needs for social and private activities into account and thereby support their social competence.

C1. The OE can constitute an informal environment in which it is easier to initiate contact and establish relations. Seating along pathways can allow intermittent interaction **14**. Seating areas for smaller and larger groups can accommodate social CS activities such as communal eating, meetings and group counseling II, III, IV, 2, 6, 10, **11**, **14**, 15. Movable and flexible garden furniture may provide for more freedom of choice **14**.

C2. Semi-enclosed spaces, from where it is possible to watch social activities from a distance, can help residents not to feel entirely cut off from social life, yet without having to participate actively themselves II, IV.

C3. Secluded spaces can make private activities such as conversational therapy possible and provide a calm refuge for relaxation II, IV, 2, 10, **11**, **13**, **14**, 15.

C4. Visual contact between different types of seating areas and the play area makes activities such as counseling and meetings possible, while allowing the adults to keep an eye on the children playing nearby II, IV.

C5. In order for the staff to take breaks from their work in the OE, a screened staff area not used by the residents is needed II, IV.

D. CONTACT WITH NATURE

While staying at the CS, activities such as going to work or school can be disrupted, and the danger from the perpetrator of violence can force some residents to stay on CS property. This makes the OE an important place (sometimes the only place) where residents can gain respite from the indoor environment and benefit from contact with nature.

D1. An OE with a variety of nature experiences in both softscape and hardscape, and which provides an attractive habitat for wildlife, can offer positive distractions and give the residents some distance from their crisis situation [II, IV, 2, **13**, **20**].

D2. Soothing as well as challenging sensory experiences, such as different types of surfaces and a varying terrain, can support health processes on the sensory level [II].

D3. Enhancing a pleasant homelike image as opposed to an institutional one can support the residents' feeling of safety [IV, 7, 8, **14**, 15, 19]. Landscaping can soften and beautify the appearance of security measures such as fences, gates and cameras, and function as a visual buffer covering stark surroundings [II, 2, **11**, **13**, **14**, 16, 19].

E. SAFE PLAY

Women and children at a CS are in a state of crisis. At the same time, they are living in close proximity to strangers, in temporary housing. This can result in a tense and distressed indoor atmosphere. The OE affords the children greater scope for play, expressing themselves and abreacting, than indoors. Furthermore, having the children outside can help to create a calmer indoor environment.

E1. The OE should include a flexible play area that offers challenges for children of various ages with play equipment that can be used in different ways according to the children's abilities and preferences [II, III, IV, 1, 3, 4, 5, 6, 7, 8, 9, 10, **11**, **12**, **14**, 15, 16, 17, 18, 19]. For teenagers, semi-enclosed areas can constitute spaces to "hang out" [II, 10].

E2. The play area should encourage the children to use their limbs in different ways and should support physical exercise [II, III, IV].

E3. Spaces for quiet play where the children can withdraw from active play once in a while are also important [II, IV].

E4. Some children may be unclear about the boundaries between what they can and cannot do. Conflicts can occur when the children's aggression becomes directed towards elements in the OE or each other. This can be taken into account by having robust play elements that discourage dangerous activities such as jumping from on high, or creating excessive speed or force, as in the case of a merry-go-round [II, IV, **14**]. Furthermore, objects that could be used as weapons should be avoided [II, IV].

E5. Contact with domestic animals may benefit the children on many levels but should be subject to staff supervision [II, IV].

E6. Designing for good visual contact between adults and children in the placement and layout of the play area is essential for staff in charge of child care and mother/child contact. Seating near the play area can ease surveillance [II, IV, 3, 5, 6, 8, 9, **11**, **12**, 17, 19, **20**].

E7. The emotional distress, depression and anxiety that the mothers may experience can cause them to be less attentive towards their children. Child safety should be incorporated into all aspects of the OE [II, IV, 3, 10, **11**, **14**, 16, **20**, **21**] including the avoidance of toxic plants [**20**, **21**] and unsafe gardening tools [**21**]. If water features are part of the OE, the children's access to these should be controllable by adults [II].

([1]Arcidi, 1992; [2]Brown, 2005; [3]Children's play, 2002; [4]Greer, 1986; [5]Grote, 1992; [6]Kapusta, 1999; [7]MacDougall, 1999; [8]Mary Vogel Heffernan, 1986; [9]Peters, 1989; [10]Popkin, 1987; [11]Refuerzo & Verderber, 1993; [12]Refuerzo & Verderber, 1990; [13]Refuerzo & Verderber, 1989; [14]Refuerzo & Verderber, 1988; [15]Robertson House, 1995; [16]Robinson, Shippee, Schlimgen, & Solow, 1982; [17]Sprague, 1991; [18]ULI Awards, 1998; [19]Verderber, 2001; [20]Keeley & Leigh, 1999; [21]Lee, Kim, & Suh, 2008; [22]Seals & Pierce, 2007; [23]Stuart, 2005). For further details on the above literature see Paper I, Table 2.

9. DISCUSSION OF RESULTS

The EBHD guidelines presented above derive from all four research studies part of this PhD project and sum up the aspects relevant to design. The specific results of Studies I, III and IV are discussed separately in the respective papers. In the following section, the results of Studies II, III and IV are related to the existing evidence identified in the literature review (Study I). Moreover, the EBHD guidelines will be discussed in relation to the theoretical framework. Finally, the applied results of the action research in the EBHD of Danner's Garden are discussed.

9.1. RESULTS OF STUDIES II, III AND IV RELATED TO EXISTING EVIDENCE

None of the results from the action research (Study II), questionnaire survey (Study III) and case study (Study IV) are found to contradict each other. On the contrary, to the extent that the results of the three studies touched upon similar topics, they were either found to support or elaborate certain aspects further. As a consequence, this section focuses on relating the results of these studies to existing evidence presented in the literature review (Study I).

As is apparent from the references to the guidelines, most of them are both supported by existing evidence as well as by results from Studies II, III and IV, which makes the evidence stronger. These guidelines concern security measures (including safe enclosure and screening), overview, indoor/outdoor connections, accessible activities, opportunities for both social and private activities, making use of the qualities of nature, creating a home-like image and safe play area.

None of the results of this PhD project contradict the existing evidence. Because the research studies of this PhD project primarily explored the staff's view of user needs and preferences with respect to outdoor design and activities, the guidelines do, however, differ from existing results insofar as there is much more focus on how OEs should be designed in order for the staff to use the OEs actively in their work, combining the focus on design and NBAs. Examples of this include: the need for lighting and good facilities for keeping the garden orderly (both of which can ease staff surveillance);

elements which can easily be used as starting points for activities with the residents; seating areas with visual contact to the play area which can make activities such as meetings and counseling possible while adults can keep an eye on the children playing nearby; a secluded staff area; opportunities for physical exercise (as a means to control children's energy levels) and; staff-facilitated contact with domestic animals.

Other new aspects in relation to existing results include pleasant lighting and familiar elements to enhance accessibility, seating from where it is possible to watch social activities from a distance, opportunity for quiet play, avoiding objects that might be used as weapons and controlled access to water features.

9.2. EVIDENCE-BASED HEALTH DESIGN GUIDELINES RELATED TO THE THEORETICAL FRAMEWORK

Several parallels can be made between the *Security and feeling safe* guideline and the theoretical framework. This guideline describes the need for an enclosed OE screened off from its surroundings and in which it is easy to gain an overview. In the other guidelines, a safe transition area between the inside and outside, lighting, and a homelike image are also aspects which address the residents' feeling of safety. The Prospect-Refuge Theory (Appleton, 1975) claims that landscapes which afford good scope for both prospect and refuge are preferred to landscapes which afford neither. The need to see without being seen can be regarded as especially relevant in relation to OEs at CSs, because the women and children may be and feel that they are in danger from the perpetrator of violence. Furthermore, the theory of supportive gardens (Ulrich, 1999) states that a *sense of security* is seen as a prerequisite for a garden to be supportive at other levels. In the theory of sensory integration, a non-threatening environment is also mentioned as an important condition in order for children to play freely (Ayres, 2008).

The *Accessibility* guideline deals with the need for a design and activities corresponding to users' capacities**.** This can be related to *compatibility,* one of the four components of a restorative environment in the Attention Restoration Theory (Kaplan, 1995) and which indicates the need for it to be easy to do those activities you like to do. Moreover, the flow theory (Csikszentmihalyi, 2008) claims that the challenges of an activity should correspond to a person's capacity in order to provide a feeling of well-being and self-confidence. In the guideline *Accessibility* there is first and foremost focus on making the garden accessible for the women and children who are in crisis and who can have difficulties in taking the initiative for activities on their own. The flow theory does, however, also state that an activity which is not challenging enough compared to one's capacities becomes boring (Csikszentmihalyi, 2008).

In the Theory of Supportive Gardens (Ulrich, 1999), *social support* as well as *actual and perceived control* are two of the four restorative and coping resources in the garden. This can be seen in relation to the *Different levels of social involvement* guideline which indicates the need for both social and private activities. The Scope of Meaning – Scope of Action Theory (Grahn et al., 2010) claims that people in crisis seem to be in need of non-human environments in order to restore and build themselves up again. This can underline the need for more private activities in the OEs. The results of this PhD thesis do, however, also suggest that social relations between mother and child, resident and staff and among residents seem to be important supportive aspects at CSs. The residents need others to mirror themselves in as well as social support to realize that a life without violence is possible.

Many parallels can be drawn between the theoretical framework and the *Contact with nature* guideline which is about the need for experiences of nature. The Attention Restoration Theory (Kaplan, 1995) claims that natural settings are particularly likely to live up to the four components of a restorative environment. Furthermore, in the Theory of Supportive Gardens, *natural distraction* is one of the four restorative and coping resources referring to the user's experience of plants and wildlife (Ulrich, 1999). The theory of sensory integration (Ayres, 2008) states that interaction with the environment is a critical factor in children's development, and in environments with many stimuli, children respond more often and in more different ways. This underlines the need for OEs in which nature offers many sensory qualities.

The *Safe play* guideline deals with a safe playing environment which allows for physical activity and can be seen in relation to the theory of sensory integration (Ayres, 2008). The theory states that children need a playful and non-threatening environment in which they feel driven to play in order to develop their sensory integration. This guideline is also connected to the Theory of Supportive Gardens (Ulrich, 1999) where movement and exercise is one of the restorative and coping resources.

The fact that these connections can be made between the EBHD guidelines and the theoretical framework and that none of the guidelines directly contradicts another support the highlighted aspects of the theories and indicates that there is the potential to design OEs at CSs that support the health and well-being of their users.

9.3. DISCUSSION OF THE DESIGN OF DANNER'S GARDEN

The results of the action research conducted as part of the EBHD of Danner's Garden were applied in the design process. Bearing in mind the challenges related to keeping to the deadlines of the overall Danner renovation project and the fact that participating in EBHD was a new way of working for the different collaborators, there is solid coherence between the final

EBHD guidelines presented as a result of this PhD project and the design of Danner's Garden. However, the following challenges and inconsistencies should be mentioned.

The guideline about overview and surveillance gained much more importance throughout the PhD time period than first assigned in the preliminary guidelines for Danner's Garden. The same applied to the guideline about encouraging physical activity in the play area. A guideline which was not part of the preliminary guidelines and therefore communicated later to the landscape architects concerned the area for teenagers.

Related to these latecomers and to the way the landscape architects interpreted the guidelines, some of them do not appear as clearly in the design of Danner's Garden as others. One of them concerns the level of screening-off from the surroundings which was a major challenge in the urban setting of Danner. Another concerns the play area. As recommended in the guidelines, the play area was designed to be safe for the children. One particular aspect that can be questioned is whether it is attractive enough and allows for sufficient physical activity. Another concern is whether the garden allows for adequate overview and surveillance and, as part of this, whether there is enough lighting in the garden. Furthermore, the staff area was given a low priority in the design, and it can be questioned whether the area will be used by staff at all.

10. DISCUSSION OF METHODS

In the following section, the methods used in Studies I, II, III and IV are discussed.

The methods of action research and the EBHD process in Study II are discussed in further detail since this discussion is not included in Paper II.

10.1. LITERATURE REVIEW – STUDY I

In the literature review, both literature concerning design and NBA in relation to green OEs at CSs was included. However, the main issues addressed were only related to design and health benefits, leaving out issues on organization and practice of NBAs. This was done to maintain a landscape architectural perspective. The decision to have this perspective, which applied to all four research studies part of this PhD project, has been a balancing act, where NBAs were primarily included to the degree to which they result in implications for design.

Furthermore, it is important to be aware that EBHD should exercise caution with untested sources of information such as anecdotal evidence and non-peer-reviewed case studies. On the other hand, these sources may be informative in situations where there is no other clear evidence (Viets, 2009). The literature review dealt with a topic with very little peer-reviewed re-

search literature, and therefore gray literature in the form of descriptions of design (architectural reviews) and non-peer-reviewed studies were included. This type of gray literature runs a much higher risk of inaccuracy or bias than well-conducted research studies (Viets, 2009) and therefore the academic status of the literature included in the review were made clear in the presentation of the findings.

10.2. ACTION RESEARCH – STUDY II

The action research conducted as a part of the EBHD of Danner's Garden required a flexible approach which can be seen as a weakness because of the lack of rigor in the research design (Gibson, 2004). Another weakness can be that the researcher risks having a partisan approach in collaborating with the people being studied (Gibson, 2004). On the other hand, the people being studied are involved in identifying and solving the problem, as opposed to the researcher imposing on them a solution to a predefined problem (Bryman, 2008). Collaboration among professionals with complementary expertise can be seen as important in effective evidence-based projects (Hamilton & Watkins, 2009), and therefore having an action research approach as opposed to a more rigid and distanced study design was seen as appropriate.

As part of the action research a casual kind of direct observation was adopted, although a more formal kind of direct observation of use of the garden could have strengthened the study. The reasons for this are among other things that it would have been very time-consuming, but first and foremost because of the high risk of the observer influencing use of the garden. This can be described as reflexivity where events that are being observed may proceed differently because of the observation (Yin, 2009). The choice of not including the formal kind of direct observation also applied to the case study part of the PhD project (Study IV). Here, an observation of physical traces (Zeisel, 2006) was conducted to obtain indications of use.

The first time I met women and children survivors of domestic violence was in conjunction with the questionnaire survey with the residents at Danner, also part of the action research. The questionnaire was chosen as a data collection method because it gave the participants something concrete to do and made it possible for them to participate in an indirect and casual way. The intention with the questionnaire was to retrieve information from the residents in the open-ended questions about their use and thoughts about the garden. Furthermore, they had the possibility to write and draw their ideas of a better garden. The answers from these questions as well as the drawings gave good additional information pinpointing certain aspects of findings from the other methods adopted. Another intention was to initiate a questionnaire survey related to the first part of the questionnaire on background questions and the third part based on the PSDs. The idea was to continue

giving new residents this part of the questionnaire until Danner had to relocate because of the renovation project. This intention was abandoned for several reasons including language issues: in 2010, 44 per cent of the women living at the Danish CSs were born outside of Denmark (Barlach & Stenager, 2010) and sparsely answered questionnaires.

The first phase of the action research can be seen as a pilot study for the entire PhD project that helped refine the research studies to be followed. The most important lesson was the ability of the staff to give information based on long-term experience with a great variety of user needs and preferences concerning OEs. Furthermore, the staff had the ability to explain and clarify aspects related to the CS functions from a professional perspective. This lesson had implications for the second phase of the action research, the questionnaire survey (Study III) and the case study (Study IV) where the focus was on researching the staff's point view. It could be argued that increased involvement of the residents could have added another dimension to the results of this PhD project in general. The decision not to collect further data directly from the residents was a combination of several things including the fact that they are in a vulnerable situation, my relatively limited experience as an interviewer and insufficient insight as a landscape architect into how to handle people in crisis and analyze the data. Language issues were also an important consideration. The decision not to involve the residents directly was also seen as a way to increase the chances of getting access to the CSs I wanted to study.

Besides conducting action research, I had the primary responsibility for facilitating the EBHD process and informing those concerned of design decisions by collecting, interpreting and communicating information from existing sources. Throughout the process, design guidelines were communicated to the landscape architects from Schonherr in the course of a series of meetings and e-mail communications**.** First, the guidelines were presented in the form of a report of 67 pages richly illustrated with photos and sketches supported by quotations from the interviews, the workshops, the questionnaire survey and existing literature. The guidelines were presented in the form of bullet points. After receiving this report, the landscape architects requested a schematic overview including the most important aspects. One lesson I drew from this was to be less wordy and clearer in communicating guidelines. After the main characteristics of the design of Danner's Garden were made available, the guidelines were not only communicated a little at a time but were much more precise.

An alternative to this model of EBHD which could have eased the design process would have been to involve the landscape architects in the workshops and thereby cut out a middleman. But this would have meant that the role of the research team would have shifted from conducting action research (including interpreting findings from the workshops and the other methods

used) to being only facilitators of the process and communicating information from existing sources. Ideally, Schonherr's deadline to present the main characteristics of the design of Danner's Garden in September 2009 (half a year into the PhD time period) should have been nearer to the end of the PhD project. This would have left time both for action research for developing the ideas behind Danner's Garden together with the staff and for workshops with the landscape architects also focusing on the layout, which could have led to a more coordinated result. This approach would, however, have necessitated a shift in the division of the roles determined before I became part of the overall Danner renovation project.

10.3. QUESTIONNAIRE SURVEY – STUDY III

The most important discussion point in relation to the methodology of the questionnaire survey is the fact that only one staff member per CS was asked to answer the questionnaire. A criticism of using 'informant factual questions' is that it relies on the respondents' memories and on their possibly distorted view concerning their own and others' behavior (Bryman, 2008). However, the fact that most of the CSs included in the study are small organizations (Barlach & Stanager, 2009) makes it probable that the respondents have a reasonable overview of the relevant aspects. Furthermore, posing 'informant factual questions' as well as 'questions about attitudes' to staff provides information on what they think about the OE and its importance to the CS functions, which can reveal the current practice. Paper III contains a more detailed discussion of the questions in the questionnaire.

10.4. CASE STUDY – STUDY IV

The questionnaire survey (Study III) and the case study (Study IV) were planned as one study. Writing up the results from this overall study was begun in one paper but ended up in two separate papers: Paper III dealing with the questionnaire survey and Paper IV dealing with the case study. As a consequence, the questionnaire attracted more attention than originally intended and the plan to describe the three cases in a national context other than in relation to the case selection receded in to the background. Three additional discussion points are presented in Paper IV concerning the somewhat limited repetitive interplay between data collection and analysis, only using staff as participants in the interviews and not doing separate PSD exercises focusing on the different user groups at the CSs.

11. CONCLUSIONS AND RECOMMENDATIONS

The overall aim of this PhD project was to explore the potential of OEs at CSs to be a resource supporting health and well-being of their users and thereby strengthen CS functions. The aim was also to explore the design prerequisites for this potential in order to develop EBHD guidelines for OEs at CSs.

All four studies contributed to the exploration of the potential of OEs at CSs and to the development of EBHD guidelines. Whereas the first and the third study gave an overview of existing English language literature and the current state of OEs at CSs in Denmark respectively, the second and the fourth study went into the matter in more depth. Here, the results may be applied to other contexts to the extent that the descriptions of the cases are taken into consideration with a reasoned judgment about transferability (Guba & Lincoln, 1982). The EBHD guidelines derived from all four studies are presented as suggestions for practitioners to consider when working with the design of OEs at CSs and as a starting point for researchers interested in the topic. When using the EBHD guidelines, it is important to be aware of the strength of the evidence and that they are developed primarily in an American and Danish context.

11.1. RECOMMENDATIONS FOR FUTURE RESEARCH

Kirk Hamilton suggests several levels of rigor to differentiate ways of working with evidence in practice (Hamilton & Watkins, 2009). On the lowest level, relevant research may be critically interpreted. On the second level, design hypotheses may be made and measurements performed. On the third level, results may be reported in an unbiased way, and on the fourth level, these results may be published in peer-reviewed journals (Hamilton & Watkins, 2009). The goal in the EBHD of Danner's Garden is to reach level four, where both the design of Danner's Garden and the NBAs are to be evaluated in collaboration with a research team after initial implementation and a testing phase, and also to have the results published in both research and practice-oriented sources.

The goal of the evaluation would be to find out whether the design and the associated NBAs are therapeutic and support CS functions. The evaluation should study whether the different design intentions (of, for example, supporting accessibility, encouraging physical exercise and facilitating both outgoing and inwards involvement) effectively support everyday use and the staff-facilitated NBAs, including the therapy program. Here, it will be interesting to discover whether the EBHD guidelines that Danner's Garden reflect are supported or weakened and whether the therapy program in the garden proves to be effective compared to other similar approaches where con-

tact with nature is not used actively in the therapy. Post-occupancy evaluations (Cooper Marcus & Barnes, 1999; Hamilton & Watkins, 2009) including triangulation techniques (Yin, 2009) with both qualitative and quantitative methods such as interviews, participant observations and questionnaire surveys could be used in studying relations between design, use and preferences from different angles. A post-occupancy evaluation can both determine whether the design intentions were achieved and serve as an evaluation of the design which can be translated into suggestions for changes or be used to develop general guidelines for the type of setting (Cooper Marcus & Barnes, 1999).

When evaluating the therapy program, quasi-experimental studies (Bryman, 2008; Cooper Marcus & Barnes, 1999) could be used where participants may choose to be part either of an intervention group which could follow a therapy program in the garden or of a control group which could follow a similar program but where there is no active use of contact with nature in the therapy. Outcomes of the therapy program in the garden compared to the control group could be measured in relation to the physical and psychological health status of the users where physiological measures and self-reporting could be used (Cooper Marcus & Barnes, 1999). Another more indirect way of comparing results would be to look at duration of stays at the CS, the number of women moving back to the perpetrator of violence and in the long run, returns to or new beginnings on the labor market. Statistics on several of such aspects are already conducted by LOKK.

On a smaller scale, to further develop the design of Danner's Garden and the NBAs, specific smaller changes can be made to the setting or the practice and evaluated.

In general, there should be a focus on choosing appropriate methods to collect data directly from the women and children so that the research does not add negatively to the crisis situation they find themselves in. One option could be to have the primary contact persons of the women and children, whom they feel confident with, do the interviews. In addition, data could be collected from women and children having had the experience of living at the CS and who have come further in the healing process and find themselves in a more stable situation. If these studies show positive results in Danner's Garden, it could cause other CSs to implement healing gardens which would make similar studies possible in other settings and could reinforce research on the topic leading to the strengthening of EBHD guidelines for OEs at CSs.

Based on existing as well as future evidence, it could be an idea to develop a tool such as the 'therapeutic garden audit for acute-care hospital' developed by Clare Cooper Marcus and Marni Barnes. This tool could be used to reveal the strengths and weaknesses of an OE and to make suggestions for improvement. In order for it to be used by both researchers and practitioners,

it should be user-friendly**.** The challenge in developing such a tool is to find a balance between abstract concepts and simple listings of content. Abstract concepts can to a higher degree encompass contextual differences between OEs but they can also be difficult to understand. Listings of content might be easier to understand but risk being oversimplified. Furthermore, a challenge in developing such a tool is taking into account the importance of the interplay between elements and qualities in the OE which can have a great influence on the way an OE is experienced and used. When evaluating an OE at a CS, I think that it is important not only to be aware of what an ideal OE implies but also to understand why the different aspects are important, because it can leave more room for unique context-specific solutions.

11.2. RECOMMENDATIONS FOR PRACTICE

LOKK has defined a set of very general quality standards for OEs at Danish CSs that include a demarcated screened environment with good facilities for safe play. The results from this PhD project, which had a practice-oriented approach from the beginning, can be used in fine-tuning and elaborating these quality standards. Furthermore, Danner's Garden can function as an inspiration project for other CSs wanting to optimize their OEs and develop their practice. Paper II (to be published as a section in the book 'The Case for Healing Gardens') aimed at both researchers and practitioners, is written with a view to supporting them in working with EBHD of OEs at CSs. When looking at the EBHD guidelines, taking account of all of them in a design project can been seen as challenging. Examples of such challenges include finding a balance where both security measures and the appearance of the OE are adjusted to residents' needs. Another challenge is how to create overview, which is important for surveillance and the feeling of safety, while having an interesting OE that allows for different types of activities at the same time. Here, the need for secluded areas for privacy can be seen as especially conflicting. Moreover, there is a challenge in designing play areas that are not dangerous but which the children still find interesting and challenging.

A way to help practitioners make the decision on what to include and what to leave out in a design project would be to prioritize the guidelines. However, it can be questioned whether the guidelines should be prioritized by the strength of evidence that support them or by an assessment where experts indicate those guidelines that can be seen as prerequisites for the others. If the volume of evidence grows bigger in the future; it may become more evident which guidelines are required and which are recommended, but then again it could be debatable to what degree guidelines with strong evidence are the result of strong specific research interests on certain aspects of the topic. Furthermore, it can be argued that prioritizing the guidelines in a

design, depends to a large extent on the specific setting, the detailed intentions of the project and the available budget. In spite of these challenges, working with EBHD at OEs at CSs can be seen as crucial, because the need and preferences of the users are so particular and far from obvious. In one of the interviews at Danner, a staff member told me that you should be careful about thinking good thoughts on the behalf of others. The women and children at CS find themselves in such an extreme situation that it can be difficult, if not to say impossible, to put oneself in their shoes and here, even the best intentions based on what you might think is good for them, won't be enough. By working with EBHD, which includes basing design decisions on current best evidence as well as evaluating the results, each new design project can add to the scope for designing OEs at CSs that first of all do no harm and second support the health and well-being of their users and thereby strengthen CS functions.

All over the world CSs perform an important task in helping women and children to start a new life without violence. This PhD project has shown that, although the design prerequisites are challenging, the potential for turning their OEs into healing gardens is real.

Figure 5 Inspiring gardens. **1**: Children's Garden in San Francisco Botanical Garden; **2**: Peace Garden Room for Children in Brookgreen Gardens, South Carolina; **3-8**: Photos and illustration of the garden at the crisis shelter part of Sojourn Services for Battered Women and Children in Santa Monica; **3**: Site illustration of the garden; **4**: Every woman that has been part of the horticultural program at Sojourn receives a Prairie Grass pin; **5**: Collecting seeds in the garden and putting them in to small bags are activities part of the horticultural program at Sojourn. The seed bags are sold at auctions as a way to get funding; **6**: The garden is full of plants from which it is possible to harvest fruits, flowers or leaves which can be used in cooking, craftwork or remedies. For example, lavender flowers are used in eye pillows and citrus fruits are used in lemonades and sorbet; **7**: A much loved activity among the children is watering the garden; **8**: During my visit at the garden a boy proudly showed me a larva that he had dug up; **9**: A learning garden at Venice High School in LA; **10**: Clare's garden in Berkeley

ACKNOWLEDGEMENTS

I would like to thank the following people for contributing to this PhD project:

Marianne Bigum from Nordea-fonden for funding this PhD project - your genuine interest in the project has been a great motivation.

Principal supervisor and co-author of all my manuscripts, Ulrika K. Stigsdotter – your competent commenting, high level of energy and good mood has been essential in this PhD project. You are a great source of inspiration to me.

Supplementary supervisor and co-author of Paper III and IV, Cecil C. Konijnendijk – your skills as a researcher and not least as an editor have helped me a great deal. Furthermore, your sense of humor has been much appreciated.

Fellow PhD student Sus Sola Corazon for her collaboration in a part of my studies and being a great colleague.

Other fellow PhD students – you have been there to help and support me and we have had many good discussions. But most importantly we have had lots of fun.

Other colleagues at Forest & Landscape for contributing to a pleasant workplace.

Main contact person at Danner and co-author of Paper III and IV, Henriette Højberg – you have given me good advice and supported me with your positive outlook and cheerfulness.

Main contact person at Clemson University and co-author of Paper I, Stephen Verderber. It has been of great importance for me to be your student and a part of the Architecture + Health Program during my stay abroad.

Clare Cooper Marcus and Naomi Sachs editors of the book section (Paper II). It has been an honor to work with you.

Tine Langsted Krogstrup, Arense Kjærulff-Schmidt and Jonas Lambert Johansen from the Schonherr firm for a fruitful collaboration.

Linda Preuss and Nancy Cipes – your contribution has been important for the PhD project and your friendship means a lot to me.

Staff members at crisis shelters in both Denmark and the USA for giving me attention during a hectic working day.

LOKK for sharing information and sending out the questionnaire survey.

Librarians from the Faculty of Life Science Library, Copenhagen University and Gunnin Architecture Library, Clemson University for their competent help.

The people involved in the PhD courses that I have taken, including Morten Pedersen who gave me useful comments on data analysis of the questionnaire survey.

Martin Thiebaut, Stuart Wright and Saskia Gooding for proofreading the different parts of the thesis.

My family and friends for giving me moral support all the way through my PhD.

Last but not least Jonas - you have helped me read through and structure long and winding text passages. But most importantly you have kept me on track with your ability to make me feel better – thank you from the bottom of my heart.

REFERENCES

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

Annerstedt, M., & Währborg, P. (2011). Nature-assisted therapy: Systematic review of controlled and observational studies. *Scandinavian Journal of Public Health, 39*(4), 371 – 388.

Appleton, J. (1975). *The Experience of Landscape.* New York: Wiley.

Arcidi, P. (1992). Housing for women: Safely linked, Amandla Crossing, Edison, New Jersey. *Progressive Architecture, 73*(8), 64 – 65.

Ayres, J. A. (2008). *Sensory Integration and the Child*. Los Angeles, CA: Western Psychological Services.

Barlach, L., & Stenager, K. (2010). *LOKK årsstatistik 2010 – Kvinder og børn på krisecentre*. Odense: Servicestyrelsen. Accessed August 7, 2012 at: http://www.lokk.dk/_files/Dokumenter/rapporterogpublikationer/statistikker/lokkrsstatistikkenendeligudgave2011.pdf (in Danish).

Barlach, L., & Stenager, K. (2009). *LOKK årsstatistik 2009 – Kvinder og børn på krisecenter*. Odense: Servicestyrelsen. Accessed August 7, 2012 at: http://www.lokk.dk/_files/Dokumenter/rapporterogpublikationer/statistikker/lokkrsstatistik2009.pdf (in Danish).

Brown, J. R. (2005). A healing refuge for homeless women – Estelle's Garden in Boston offers women a respite from the street. *Landscape Architecture, 95*(11), 22, 24, 26, 28 – 30.

Brown, R. D., & Corry, R. C. (2011). Evidence-based landscape architecture: The maturing of a profession. *Landscape and Urban Planning, 100,* 327 – 329.

Bryman, A. (2008). *Social Research Methods*, New York: Oxford University Press.

Burnard, P. (1991). A method of analysing interview transcripts in qualitative research. *Nurse Education Today, 11*, 461 – 466.

Børjesson, E. (2008). *LOKK børnestatistik, 2008 – Børn på krisecenter.* Odense: Ser-vicestyrelsen. Accessed August 7, 2012 at: http://www.lokk.dk/_files/Dokumenter/rapporterogpublikationer/statistikker/boernestatistik2008.pdf (in Danish).

Campbell, J. C. (2002). Health consequences of intimate partner violence. *The Lancet, 359,* 1331 – 1336.

Campbell, J. C., & Lewandowski, L. A. (1997). Mental and Physical Health Effects of Intimate Partner Violence on Women and Children. *Psychiatric Clinics of North America. 20*(2), 353 – 374.

Children's play spaces at Cuanlee Refuge, Cork. **(**2002). *Irish architect,* (182), 41 – 42.

Coid, J., Petruckevitch, A., Chung, W. S., Richardson, J., Moorey, S., & Feder, G. (2003). Abusive experiences and psychiatric morbidity in women primary care attenders. *British Journal of Psychiatry,* (183), 332 – 339.

Cooper Marcus, C. & Barnes, M. (Eds) (1999). *Healing Gardens: Therapeutic benefits and design recommendations.* New York: John Wiley & Sons.

Cooper Marcus, C., & Barnes, M. (1995). *Gardens in Healthcare Facilities: Uses, Therapeutic Benefits, and Design Recommendations.* Concord, CA: The Center for Health Design.

Corazon, S. S., Schilhab, T. S. S., & Stigsdotter, U. K. (2011). Developing the therapeutic potential of embodied cognition and metaphors in nature-based therapy: lessons from theory to practice. *Journal of Adventure Education & Outdoor Learning, 11*(2), 161 – 171.

Corazon, S. S., Stigsdotter, U. K., Jensen, A. G. C., & Nilsson, K. (2010). Development of the Nature-Based Therapy Concept for Patients with Stress Related Illness at the Danish Healing Forest Garden Nacadia. *Journal of Therapeutic Horticulture, XX,* 35 – 50.

Csikszentmihalyi, M. (2008). *Flow.* New York: Harper Perennial Modern Classics.

Danner (2011). *Sådan arbejder vi – metoder og praksis i Danners krisecenter*. København: Danner. (in Danish).

Diaz-Olavarrieta, C., Campbell, J., Garcia de la Cadena, C., Paz, F., & Villa, A. R. (1999). Domestic Violence against Patients with Chronic Neurologic Disorders. *Arch Neurol, 56,* 681 – 685.

Eriksson, T., Westerberg, Y. & Jonsson, H. (2011). Experiences of women with stress-related ill health in a therapeutic gardening program. *Canadian Journal of Occupational Therapy, 78,* 274 – 282.

Fantuzzo, J.W., & Mohr, W. K. (1999). Prevalence and Effects of Child Exposure to Domestic Violence. *The Future of Children – Domestic Violence and Children 9*(3), 21 – 32.

Flyvbjerg, B. (2004). Five Misunderstandings About Case-Study Research. In C. Seale, G. Gobo, J. F. Gubrium, and D. Silverman (Eds.), *Qualitative Research Practice* (pp. 420 – 434). London and Thousand Oaks, CA: Sage.

Gerlach-Spriggs, N., Kaufman, R. E., & Warner, S. B. (1998). *Restorative gardens – the healing landscapes.* New Haven and London: Yale University Press.

Gibson, N. (2004). Action research. In M. S. Lewis-Beck, A. Bryman, & T. F. Liao (Eds.), *The sage encyclopedia of social science research methods 3* (pp. 4 – 6). Thousand Oaks, California: Sage.

Grahn, P., & Stigsdotter, U. K. (2010). The relation between perceived sensory dimensions of urban green space and stress restoration. *Landscape and Urban Planning, 94*, 264 – 275.

Grahn, P., Tenngart, C. I., Stigsdotter, U., & Bengtsson, I. (2010). Using affordances as a health promoting tool in a therapeutic garden: the development of horticultural therapy in Alnarp, Sweden. In: C. Ward Thompsom, P. Aspinall, S. Bell (Eds.), *Innovative Approaches to Researching Landscape and Health, Open Space: People Space 2* (pp. 120 – 159). Abingdon: Routledge.

Greer, N. R. (1988). *The Search for Shelter.* Washington, DC: The American Institute of Architects.

Grote, J. (1992). Matrix: A Radical Approach to Architecture. *The Journal of Architectural and Planning Research, 9*(2), 158 – 168.

Guba, E. & Lincoln, Y. (1982). Epistemological and methodological bases of naturalistic inquiry. *Educational Technology Research and Development, 30*(4), 233 – 252.

Guth, A. A., & Pachter, H. L. (2000). Domestic violence and the Trauma Surgeon. *The American Journal of Surgery, 179,* 134 – 140.

Hamilton, D. K., & Watkins, D. H. (2009). *Evidence-based design for multiple building types.* Hoboken, New Jersey: John Wiley & Sons, Inc.

Helweg-Larsen, K., & Frederiksen, M. L. (2007). *Mænds Vold mod Kvinder – Omfang, karakter og indsats mod vold, 2007.* Statens Institut for Folkesundhed, Syddansk Universitet og Minister for Ligestilling. Accessed August 7, 2012 at: http://www.si-folkesundhed.dk/upload/m%C3%A6nds_vold_mod_kvinder.pdf (in Danish).

Helweg-Larsen, K., Kruse, M., Sørensen, J., & Brønnum-Hansen, H. (2010). *Voldens pris - Samfundsmæssige omkostninger ved vold mod kvinder.* København: Statens Institut for Folkesundhed, Syddansk Universitet/ Rockwoll Fondens Forskningsenhed. Accessed August 7, 2012 at: http://www.si-folkesundhed.dk/upload/voldens_pris_2010_web.pdf (in Danish).

Holmgren, A. (2009). *Terapi fortællinger – narrativ terapi i praksis*. Denmark: Dansk psykologisk forlag. (in Danish).

Holt. S., Buckley, H., & Whelan, S. (2008). The impact of exposure to domestic violence on children and young people. *Child Abuse & Neglect, 32*, 797 – 810.

Kaplan, S. (1995). The restorative benefits of nature: towards an integrative framework. *Journal of Environmental Psychology*, (15), 169 – 182.

Kaplan, S. (1987). Mental fatigue and the designed environment. In J. Harvey & D. Henning (Eds.), *Public environments* (pp. 55 – 60). Washington, DC: Environmental Design Research Association.
Kapusta, B. (1999). Domestic sanctum: Robertson House Women's Shelter, Toronto. *The Canadian Architect, 44*(3), 16 – 19.
Keeley, J., & Leigh, A. S. (1999). Design and Implementation of Horticultural Therapy with Children Affected by Homelessness and Domestic Violence. *Journal of Therapeutic Horticulture, 10*, 34 – 39.
Kellert, S. R., & Wilson, E. O. (Eds.) (1993). *The Biophilia Hypothesis.* Washington, DC: Island Press/Shearwater Books.
Kielhofner, G. (2006). Moho – modellen for menneskelig aktivitet. Copenhagen: Fadl's Forlag. (in Danish).
Kitzmann, K. M., Gaylord, N. K., Holt, A. R. & Kenny, E. D. (2003). Child witnesses to domestic violence: a meta-analytic review. *Journal of Consultative Clinical Psychology, 71*(2), 339 – 352.
Koch-Nielsen, I., & Caceres, L. (2005). *Shelters in Denmark for Battered Women – Welfare systems and policies, Working Paper.* Copenhagen: The Danish National Institute of Social Research. Accessed August 7, 2012 at: http://www.sfi.dk/resultater-4726.aspx?Action=1&NewsId=252&PID=9422 (in Danish).
Kvale, S. & Brinkman, S. (2009). *InterView – Introduktion til et håndværk.* København: Hans Reitzels Forlag (in Danish).
Lee, S., Kim, M. S., & Suh, J. K. (2008). Effects of Horticultural Therapy of Self-Esteem and Depression of Battered Women at a Shelter in Korea. In E. Matsuo, P. D. Relf & M. Burchett (Eds.), *VIIIth International People-plant Symposium Proceedings. Acta Horticulturae (ISHS), 790,* (pp.139 – 142). Accessed August 7, 2012 at: http://www.actahort.org/books/790/790_19.htm
Lynch, K. (1960). *The Image of the City*. Cambridge: The MIT Press
MacDougall, J. (1999). Creating a home (Robertson House, Toronto). *Canadian interiors, 36*(1), 26 – 27.
Marshall, C., & Rossman, G. B. (2006). *Designing qualitative research.*Thousand Oaks, California: Sage Publications, Inc.
Mary Vogel-Heffernan on designing battered women's shelters. (1986). *Women & Environment, 8*(2), 7.
McGuigan, W. M., & Pratt, C. C. (2001). The Predictive impact of domestic violence on three types of child maltreatment. *Child Abuse & Neglect, 25*, 869 – 883.
Messer Diehl, E. R. (Ed.). (2007). *Definitions and Positions.* American Horticultural Therapy Association. Accessed August 7, 2012 at: http://www.ahta.org/documents/Final_HT_Position_Paper_updated_409.pdf

Peters, P. (1989). Star of Hope mission Women's and Family Shelter. *Cite: the architecture and design review of Houston*, 6.

Pierce, C. A., & Seals, L. M. (2006). The Importance of Community Gardening for Homeless Women: A Pilot Study. *Journal of therapeutic horticulture. 17*, 20 – 26.

Plichta, S. B. (2004). Intimate Partner Violence and Physical Health Consequences: Policy and Practice Implications. *Journal of Interpersonal Violence, 19,* 1296 – 1323.

Popkin, L. (1987). In a children's garden. *Cite: a publication of the Rice Design Alliance*, 8.

Refuerzo, B. J., & Verderber, S. (1993). In support of a New Life: A Shelter for Victims of Domestic Violence. *Journal of Architectural & Planning Research, 10*(1), 40 – 58.

Refuerzo, B. J., & Verderber, S. (1990). Dimensions of Person-Environment Transaction in Shelters for Victims of Domestic Violence. *Journal of Architectural & Planning Research, 7*, 33 – 52.

Refuerzo, B. J., & Verderber, S. (1989). Effects of Personal Status and Patterns of Use on Residential Satisfaction for Victims of Domestic Violence. *Environment and Behavior, 21*(4), 413 – 434.

Refuerzo, B. J., & Verderber, S. (1988). Creating a safe refuge: The functions of nature in the design of shelters for battered women and their children. In D. Lawrence, R. Habe, A. Hacker, & D. Sherrod (Eds.). *Paths for Co-Existence (EDRA 19 Proceedings)* (pp. 63 – 69). Washington, DC: Environmental Design Research Association.

Robertson House Crisis Care Center: Sherbourne Street, Toronto; Taylor Hariri Pontarini Architects. (1995). *The Canadian Architect, 40*(12), 20 – 21.

Robinson, J., Shippee, W., Schlimgen, J., & Solow, R. (1982). *Women's Advocates shelter: An Evaluation*. University of Minnesota, Minneapolis: Center for Urban and regional Affaires and school of architecture and landscape architecture.

Seals, L. M., & Pierce, C. A. (2007). Extension Master Gardeners: Helping the Homeless to Heal. *Journal of Extension, 45*(3). Accessed August 7, 2012 at: http://www.joe.org/joe/2007june/iw5.shtml

Sherman, S. A., Varni, J. W., Ulrich, R. S., & Malcarne, V. L. (2005). Post-occupancy Evaluation of Healing Gardens in a Pediatric Cancer Center. *Landscape and Urban Planning,* (73), 167 – 187.

Söderback, I., Söderström, M., & Schälander, E. (2004). Horticultural therapy: the 'healing garden' and gardening in rehabilitation measures at Danderyd Hospital Rehabilitation Clinic, Sweden. *Pediatric Rehabilitation, 7*(4), 245 – 260.

Sprague, J. F. (1991). *More than housing – Lifeboats for Women and Chidren.* Stoneham, MA: Butterworth Architecture.

Stigsdotter, U. A., & Grahn, P. (2003). Experiencing a Garden: A Healing Garden for People Suffering from Burnout Diseases. *Journal of Therapeutic Horticulture, XIV,* 38 – 49.
Stigsdotter, U. A., & Grahn, P. (2002). What Makes a Garden a Healing Garden? *Journal of Therapeutic Horticulture,13,* 60 – 69.
Stigsdotter, U. K., Møller, M. S., Corazon, S. S., & Lygum, V. L. (2012). Terapihaven Nacadia: Evidensbaseret sundhedsdesign. *Landskab, 3,* 88 – 91. (in Danish).
Stigsdotter, U. K., Palsdottir, A. M., Burls, A., Chermaz, A., Ferrini, F., & Grahn, P. (2011). Nature-Based Therapeutic Interventions. In K. Nilsson, M. Sangster, C. Gallis, T. Hartig, S. de Vries, S., K. Seeland, & J. Schipperijn (Eds.). *Forests, Trees and Human Health* (pp. 309 – 342). New York, Dordrecht, Heidelberg, London: Springer.
Stuart, S. M. (2005). Lifting Spirits: Creating Gardens in California Domestic Violence Shelters. In P. F. Barlett (Ed.). *Urban Place – Reconnecting with the Natural World* (pp. 61 – 88). Cambridge, MA: The MIT Press.
The Body Shop/UNICEF (2006). Behind Closed Doors. *The Impact of Domestic Violence on Children.* London: The Body Shop International Plc. Accessed August 7, 2012 at: http://www.unicef.org/protection/files/BehindClosedDoors.pdf
The Danish Act on Parental custody of children and visiting rights, Act no. 416 §2(2) (1997).
The Danish Consolidation Act on Social Services, Act no. 904. § 109 (2011).
ULI Awards: a safe house for kids and moms. (1998). *Urban land, 57*(11), 24 – 25.
Ulrich, R. S. (1999). Effects of Gardens on Health Outcomes: Theory and Research. In C. Cooper Marcus & M. Barnes (Eds.), *Healing Gardens: Therapeutic Benefits and Design Recommendations* (pp. 27 – 86). New York: John Wiley & Son.
Ulrich, R. S. (1984). View through a window may influence recovery from surgery. *Science, 24,* 420 – 421.
Ulrich, R. S., Simons, R. F., Losito, B. D., Fiorito, E., Miles, M. A., & Zelson, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology,* (11), 201 – 230.
UN (2010). *Handbook for Legislation on Violence against Women.* New York: UN.
Verderber, S. (2001). Recent trends in the design of shelters for victims of domestic violence. *Loyola Law Review, 47,* 457 – 470.
Verderber, S. (1986). Dimensions of person-window transactions in the hospital environment. *Environment and Behavior, 18,* 450 – 466.

Viets-Schmitz, A., & Anderson, D. C. (2011). Bridging the gap: multidisciplinary collaboration in medicine and architecture. *UTMJ , 88*(3), 129 – 134.

Viets, E. (2009). Lessons from evidence-based medicine: what healthcare designers can learn from the medical field. *Health environments research & design journal, 2*(2), 73 – 87.

Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: writing a literature review. *MIS Quarterly, 26*(2) xiii-xxiii.

Whitehouse, S., Varni, J. W., Seid, M., Cooper Marcus, C., Ensberg, M. J., Jacobs, J. R., & Mehlenbeck, R. S. (2001). Evaluating a Children's Hospital Garden Environment: Utilization and Consumer Satisfaction. *Journal of Environmental Psychology, 21*(3), 301 – 314.

WHO (2010). *Preventing intimate partner and sexual violence against women – Taking action and generating evidence.* Geneva: WHO. Accessed August 7, 2012 at: http://www.who.int/violence_injury_prevention/publications/violence/9789241564007_eng.pdf

WHO (1948). Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19 – 22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (OfAccessed October 16, 2011 at:ficial Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.

Wolfe, D. A., Crooks, C. V., Lee, V., McIntyre-Smith, A., & Jaffe, P. G. (2003). The effects of children's exposure to domestic violence: a metaanalysis and critique. *Clinical Child and Family Psychology Review, 6*(3), 171 – 187.

Yin, R. K. (2009). *Case Study Research – Design and Methods*. Thousand Oaks, California: Sage.

Zeisel, J. (2006). *Inquiry by Design*. New York: W. W. Norton & Company, Inc.

LIST OF ORIGINAL PUBLICATIONS

Paper I: Lygum, V. L., Stigsdotter, U. K., & Verderber, S. (2012). Green Outdoor Environments at Crisis Shelters for Women and Children Survivors of Domestic Violence: A Review. Manuscript submitted for publication in *Journal of Architectural and Planning Research.*

Paper II: Lygum, V. L., & Stigsdotter, U. K. (accepted for publication). Gardens at Crisis Shelters for Women and Children Survivors of Domestic Violence. in C. Cooper Marcus & N. Sachs with M. Barnes & T. Hazen (Eds.), *The case for healing gardens*. New York: John Wiley & Sons.

Paper III: Lygum, V. L., Stigsdotter, U. K., Konijnendijk, C. C., & Højberg, H. (2012). Outdoor Environments at Crisis Shelters in Denmark. Manuscript submitted for publication in *Journal of Therapeutic Horticulture.*

Paper IV: Lygum, V. L., Stigsdotter, U. K., Konijnendijk, C. C., & Højberg, H. (2012). User Needs and Preferences with respect to Outdoor Design and Activities at Danish Crisis Shelters. Manuscript to be submitted.to *International Journal of Architectural Research*

Illustrations of Danner's Garden by Schonherr

The papers are not included in this version of the thesis due to copyright.

Former issues of Forest & Landscape Research

(No. 1 - No. 26 issued in "The Research Series" (Forskningsserien))

No. 1-1993 Stofkredsløb i sitkagran, rødgran og bøgebevoksninger i Danmark.
Lars Bo Pedersen
ISBN 87-89822-14-5. *Out of print*

No. 2-1993 Provenienser af stilkeg (*Quercus robur* L.) og vintereg (*Quercus petraea* (Matthuschka) Liebl.) i Danmark.
Jan Svejgaard Jensen
ISBN 87-89822-16-1. DKK 150.00

No. 3-1993 Growth and Yield Estimation from Successive Forest Inventories. Proceedings from the IUFRO Conference, held in Copenhagen, 14-17 June 1993.
J.K. Vanclay, J.P. Skovsgaard & G.Z. Gertner (ed.)
ISBN 87-89822-19-6. DKK 150.00

No. 4-1993 Vanris på dansk stilkeg (*Quercus robur* L.).
Jan Svejgaard Jensen
ISBN 87-89822-22-6. DKK 100.00

No. 5-1994 The Use of Sludge in Forestry and Agriculture. A Comparison of the Legislation in Different Countries.
Merete Morsing
ISBN 87-89822-24-2. DKK 100.00

No. 6-1994 Marginaljorder og landskabet - marginaliseringsdebatten 10 år efter. Rapport fra et tværfagligt seminar afholdt af Dansk Landskabsøkologisk Forening i samarbejde med Institut for Økonomi, Skov og Landskab, KVL, Fredag den 25. september 1992.
Jesper Brandt & Jørgen Primdahl (ed.)
ISBN 87-89822-28-5. *Out of print*

No. 7-1994 Landskabsøkologiske problemer i kystzonen. Rapport fra et tværfagligt seminar afholdt af Dansk Landskabsøkologisk Forening i samarbejde med Institut for Økonomi, Skov og Landskab, KVL, Fredag den 8. oktober 1993.
Erling Andersen (ed.)
ISBN 87-89822-29-3. DKK 75.00

No. 8-1994 Throughfall and Canopy Interactions in Spruce Forest.
Karin Hansen
ISBN 87-89822-30-7. DKK 150.00

No. 9-1994 Genetisk variation i sitkagran (*Picea sitchensis* (Bong.) Carr.) i højdevækst, stammeform og frosthærdighed - vurderet ud fra danske proveniens-, afkoms- og klonforsøg.
Ulrik Bräuner Nielsen
ISBN 87-89822-35-8. DKK 200.00

No. 10-1994 Density Variations and Demarcation of the Juvenile Wood in Norway Spruce.
Frede Danborg
ISBN 87-89822-36-6. DKK 100.00

No. 11-1995 Genetics and Silviculture of Beech. Proceedings from the 5th Beech Symposium of the IUFRO Project Group P1.10-00,19-24 September 1994, Mogenstrup, Denmark.
Søren F. Madsen (ed.)
ISBN 87-89822-38-2. DKK 200.00

No. 12-1995 Naturbeskyttelse og det almindelige agerland. Rapport fra det 4. landskabsøkologiske seminar afholdt af Dansk Landskabsøkologisk Forening i samarbejde med Institut for Økonomi, Skov og Landskab, KVL, 11. november 1994.
Jesper Brandt & Jørgen Primdahl (ed.)
ISBN 87-89822-43-9. *Out of print*

No. 13-1996 Bøgeforyngelser i Østjylland.
J.P. Skovsgaard & M. Morsing (ed.)
ISBN 87-89822-45-5. DKK 250.00

No. 14-1996 Bynære landbrugsområder i hovedstadsregionen 1994.
Susanne Ogstrup & Jørgen Primdahl
ISBN 87-89822-47-1. *Out of print*

No. 15-1996 Plantevækst i forbindelse med byggeri. Planlægningens og projekteringens indflydelse på vedplanters vækstvilkår i utilsigtet komprimerede jorder.
Thomas Barfoed Randrup
ISBN 87-89822-49-8. DKK 300.00

No. 16-1996 Virkning af slamgødskning på det omgivende miljø og på biomasse-kvantitet og -kvalitet i energiskove af pil.
Keld Hauge Nielsen
ISBN 87-89822-58-7. DKK 150.00

No. 17-1996 Træers forhold til salinitet. En behandling af træers reaktion på salt- og ionstress med vægt på arter fra den tempererede klimazone.
Jens Dragsted
ISBN 87-89822-64-1. DKK 300.00

No. 18-1996 Juvenile Wood in Norway and Sitka Spruce. Anatomy, density, drying properties, visual grading and strength properties.
Frede Danborg
ISBN 87-89822-69-2. *Out of print*

No. 19-1997 Tyndingsfri drift af sitkagran. En analyse af bevoksningsstruktur og vedmasseproduktion i utyndede bevoksninger af sitkagran *(Picea sitchensis* (Bong.) Carr.) i Danmark.
Jens Peter Skovsgaard
ISBN 87-89822-78-1. DKK 300.00

No. 20-1997 Friluftsliv i skovene 1976/77 - 1993/94.
Frank Søndergaard Jensen & Niels Elers Koch
ISBN 87-89822-89-7. DKK 250.00

No. 21-1997 Decline of mires in four Danish state forests during the 19th and 20th century.
Flemming Rune
ISBN 87-89822-94-3. DKK 100.00

No. 22-1997 Fire artikler om nåletræer.
Ellen Juel Christensen (ed.)
ISBN 87-7903-003-3. DKK 125.00

No. 23-1998 Vitalization of mature Norway spruce stands by fertilization and liming.
Morten Ingerslev
ISBN 87-7903-008-4. DKK 250.00

No. 24-1998 Natural forest management among indigenous peoples in Latin America.
Søren Gram
ISBN 87-7903-020-3. DKK 125.00

No. 25-1998 Friluftsliv i det åbne land 1994/95.
Frank Søndergaard Jensen
ISBN 87-7903-021-1. DKK 175.00

No. 26-1999 Forest recreation in Denmark from the 1970s to the 1990s.
Frank Søndergaard Jensen
ISBN 87-7903-058-0. DKK 175.00

No. 27-2000 Offentlige områdeudpegninger i jordbrugslandskabet.
Helle Tegner Anker, Ole Hjort Caspersen, Berit Hasler & Jørgen Primdahl
ISBN 87-7903-068-8. DKK 100.00

No. 28-2000 Anvendelse og betydning af byens parker og grønne områder (Use and importance of urban parks).
Stine Holm
ISBN 87-7903-075-0. DKK 300.00

No. 29-2001 Recirkulering af organisk affald ved kompostering i lokale og større kredsløb.
Ulrik Reeh
ISBN 87-7903-115-3. DKK 150.00

No. 30-2001 Vedvarende græsarealer – landbruget og reguleringen.
Erling Andersen
ISBN 87-7903-135-8. DKK 250.00

No. 31-2002 Landskab, forandring og forvaltning - fem landskabsstudier fra Bjerringbro og Hvorslev
Ole H. Caspersen & Bo Fritzbøger (ed.)
ISBN 87-7903-142-0. DKK 250.00

No. 32-2002 Implementation of Landscape Ecological Methods to GIS-based Procedures for Land Use Analysis and Decision Support in Rural Areas
Ole H. Caspersen
ISBN 87-7903-141-2. DKK 250.00

No. 33-2003 Næringsstofkredsløb i skove - Ionbalanceprojektet
Karin Hansen (ed.)
ISBN 87-7903-156-0. DKK 300.00

No. 34-2003 A study of factors affecting germination, establishment, and competition of the turfgrass species red fescue (*Festuca rubra* L. spp. *litoralis* Vasey), perennial ryegrass (*Lolium perenne* L.), and Kentucky bluegrass (*Poa pratensis* L.)
Søren Ugilt Larsen
ISBN 87-7903-202-8. DKK 250.00

No. 35-2005 Nørholm Hede. En langtidsundersøgelse af hedens vegetationsudvikling og tilgroning
Torben Riis-Nielsen, Inger Kappel Schmidt, Bjarke Frandsen & Trine Binding
ISBN 87-7903-249-4. DKK 300.00

No. 36-2006 Understanding and Communication forest stand structures. Lifting barriers for nature-based forest management
Anders Busse Nielsen
ISBN-10: 87-7903-285-0.
ISBN-13: 978-87-7903-285-0. DKK 250.00

No. 37-2006 Bynære landbrugsområder I hovedstadsregionen 2004. Udvikling i landbrug, landskab og bebyggelse 1984-2004
Jørgen Primdahl, Anne Gravsholt Busck & Casper Lindemann
ISBN-10: 87-7903-299-0.
ISBN-13: 978-87-7903-299-6. DKK 200.00

No. 38-2007 Skovopfattelse blandt danskere og i skovlovgivningen.
Liv Oustrup
ISBN 978-87-7903-308-5. DKK 300.00

No. 39-2008 Transpiration and water budgets of European beech (*Fagus sylvatica* L.) dominated stands in relation to canopy structure
Lise Dalsgaard
ISBN 978-87-7903-350-4. DKK 300.00

No. 40-2008 Partnerskaber i parkforvaltningen: Grøn drift på kontrakt
Andrej Christian Lindholst
ISBN 978-87-7903-378-8. DKK 250.00

No. 41-2008 Status and prospects for urban green structure planning in China – Weihai city as a case study
Li Liu
ISBN 978-87-7903-380-1. DKK 300.00

No. 42-2008 Enzymatic hydrolysis of lignocellulose. Substrate interactions and high solids loadings
Jan Bach Kristensen
ISBN 978-87-7903-393-1. DKK 200.00

No. 43-2009 Marketizing municipal park management organisations in Denmark - A study of policymaking and organisational change in the period 1985-2005
Christine Nuppenau
ISBN 978-87-7903-395-5. DKK 250.00

No. 44-2009 Unges friluftsliv i Danmark i det 21. århundrede – Unges friluftsliv som personligt, socialt og kulturelt identitetsprojekt på friluftslivets felt
Hans Jørgen Fisker
ISBN 978-87-7903-460-0. DKK 300.00

No. 45-2010 Use of urban green space
Jasper Schipperijn
ISBN 978-87-7903-462-4. DKK 250.00

No. 46-2011 Methods for physical characterisation of solid biofuels - a basis for standardisation
Peter Daugbjerg Jensen
ISBN 978-87-7903-518-8. DKK 200.00

No. 47-2012 Root dynamics and below ground carbon input in a changing climate
Marie Frost Arndal
ISBN 978-87-7903-567-6

No. 48-2012 Plant community responses to climate change
Jane Kongstad
ISBN 978-87-7903-575-1

No. 49-2012 Stress, Nature & Therapy
Sus Sola Corazon
ISBN 978-87-7903-577-5

No. 50-2012 Workplace Greenery: Use, preferences, and health benefits of green outdoor environments at workplaces
Lene Lottrup
ISBN 978-87-7903-582-9

No. 51-2012 Green space use and management in Malaysia
Nor Akmar Abdul Aziz
ISBN 978-87-7903-584-3

No. 52-2012 Non-chemical weed control on hard surfaces: An investigation of long-term effects of thermal weed control methods
Anne Merete Rask
ISBN 978-87-7903-588-1

No. 53-2012 PlayLab Cph. Design and use of public playgrounds in urban green spaces
Anne Dahl Refshauge
ISBN 978-87-7903-590-4

No. 54-2012 Urbanisation, urban growth and planning in the Copenhagen Metropolitan Region with reference studies from Europe and the USA
Christian Fertner
ISBN 978-87-7903-593-5

No. 55-2012 Healing gardens at crisis shelters for women and children survivors of domestic violence
Victoria Linn Lygum
ISBN 978-87-7903-595-9

Single issues are available from:

Forest & Landscape Denmark
University of Copenhagen
Rolighedsvej 23
DK-1958 Frederiksberg C
Tel. +45 3533 1500
SL-publikationer@life.ku.dk

FOREST & LANDSCAPE

FOREST & LANDSCAPE RESEARCH 55 / 2012

Healing gardens at crisis shelters for women and children survivors of domestic violence

Forest & Landscape Denmark
University of Copenhagen
Rolighedsvej 23
DK-1958 Frederiksberg C
Tel. +45 3533 1500
sl@life.ku.dk
http://sl.life.ku.dk/english

National centre for research, education and advisory services within the fields of forest and forest products, landscape architecture and landscape management, urban planning and urban design