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ABSTRACT

The present study examines whether participants of a nature-based therapeutic intervention in the therapy garden Nacadia® have changed their nature consumption one year after the intervention compared with one year before the intervention. The study uses exploratory pre- and post-test methods and mixed methods. Quantitative measures (questionnaires) and qualitative measures (interviews) were analysed to illuminate the changes in the informants' nature consumption. A significant change in the frequency of the informants' visits to public green spaces was found. The quantitative data were found to be insufficient with regard to achieving the goals of the current study and were therefore disregarded. The qualitative data showed that the quality of the informants' nature consumption can be organised in the four themes: 1) New approach to green spaces; 2) Awareness of self and environments; 3) New attitudes to everyday tasks; and 4) Maintaining beneficial mind-sets. After the completion of a nature-based therapy intervention, nature consumption motivated informants to remember and maintain the beneficial mind patterns they achieved during the nature-based therapy. As such, nature-based therapy seems to present an accessible health-enhancing tool that is easy to use in everyday life. The current study identifies a need for more comprehensive studies of cause and effect in relation to nature consumption as a post-therapeutic tool.

Keywords: : Absorption, Biopsychosocial, Evidence-based Health Design in Landscape Architecture, ICD-F43.0-9, Mixed Method, Nature-Assisted Therapy, Salutogenesis, Therapy Garden.

1. INTRODUCTION

Over the past twenty years an abundance of evidence supporting the presumption that natural environments can be beneficial to health has been generated (Annerstedt & Währborg, 2011; Bragg & Atkins, 2016; Hartig, Mitchell, de Vries, & Frumkin, 2014; Mitchell & Popham, 2008; Nilsson et al., 2011). Based on state-of-the-art evidence, the University of Copenhagen's Nacadia® therapy garden was designed in accordance with the model for evidence-based health design in landscape architecture (Ulrika K. Stigsdotter, 2014; Ulrika K. Stigsdotter & Randrup, 2008). The garden was opened in 2011.

The Evidence Based Health Design in Landscape Architecture (EBHDL) process is based on a model (Fig. 1) that has been developed and validated by research done by the research group 'Nature, Health & Design' and illustrates a working process based on most current evidence concerning nature-based therapeutic (NBT) interventions (Sidenius et al., 2017a; Stigsdotter, 2014). It has four parts. In part 1 the components: a) Aesthetic and practical conditions; b) The specific target group's needs and attributes; c) Evidence and experiences from relevant research and practical, must be considered in relation to the treatment and expected rehabilitation progression. In part 2, a programme is made to guide the subsequent design. Here, the collected knowledge and evidence are organized, and consensus on aims and objectives for the design and the means to achieve those are made and reported through design criteria. Part 3 is the realization of the design, and part 4 is a diagnostic post-occupancy evaluation to evaluate if the design meets the original aims of the design.

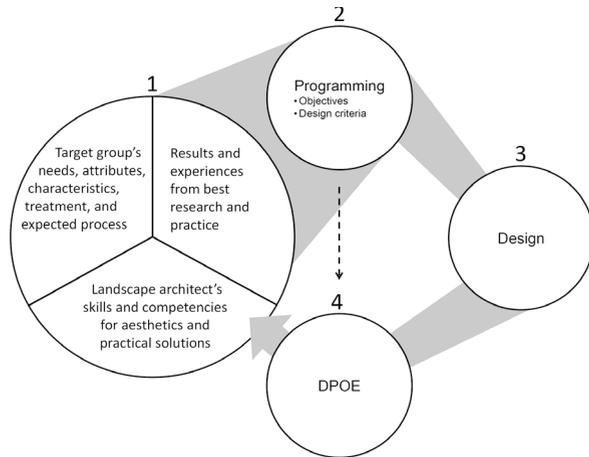


Figure 1 : The model for evidence-based health design in landscape architecture. DPOE: Diagnostic post-occupancy evaluation (Sidenius et al., 2017)

From 2013 to 2018, a randomized clinical study, ‘Nacadia Effect Study’ (NEST) was conducted. A 10-week NBT intervention in Nacadia was explored to shed light on how the patients use Nacadia, what their experiences are and how they develop during the intervention (Sidenius, 2017; Sidenius et al., 2017; Ulrik Sidenius et al., 2017a; Sidenius et al., 2015). Further, NEST measured the long-term efficacy of the intervention based on four health-indicating variables: 1) number of contacts with a general practitioner, 2) sick leave, 3) overall mental well-being, and 4) burnout symptoms during and after the course of NBT (Corazon et al., 2018; Stigsdotter et al., 2018). The NBT included in the NEST project contains five nature-based components: 1) individual conversational therapy, 2) mental and physical awareness exercises, 3) horticultural-based activities, 4) ‘own time’, and 5) homework (Corazon et al. 2018a; Corazon et al. 2010).

The intention of using homework as a part of the NBT programme was to motivate participants to practice different components and means from the NBT within their everyday life, and further to start using green spaces more beneficially for their health and well-being, outside Nacadia. This intention was inspired by findings showing associations between frequency of use of green spaces and mental health (Grahn & Stigsdotter, 2003; Ulrika K. Stigsdotter et al., 2010).

The overall hypothesis of the present study is that NBT has a positive impact on the informants’ ability to find health-beneficial nature experiences. The predictions are that after participating in NBT, the participants will use nature more frequently; have gained new insights into nature consumption (NC); and be able to use NC to improve for their well-being. To examine whether these predictions hold true, the present study focuses on the changes in the informants’ behavioural habits in relation to their use of green spaces prior to and one year after participating in the NBT in Nacadia.

2. MATERIALS AND METHODS

The present study is an exploratory pre-test post-test study that uses mixed methods to identify possible changes in the informants’ (N=43) general NC in their everyday lives from before the NBT to one year after participating in the NBT in Nacadia. To be eligible for participation the participants had to be incapable of working and have the primary diagnosis: psychiatric diagnosis of adjustment disorder and reaction to severe stress (ICD-F43.0, 2–9) (Stigsdotter et al., 2018; World Health Organization, 1992).

Inclusion criteria: Adults aged 20–60 years. Exclusion criteria: Individuals with severe psychiatric morbidity, psychotic disorders, personality disorders, suicidal tendencies and drug or alcohol problems. Potential participants were recruited through medical doctors, social workers, psychologists and advertisements in newspapers. Clinical assessments of potential participants were conducted by one of four clinical psychologists supervised by a psychiatrist. In total 43 persons were found eligible for participation in the 10 weeks NBT programme in Nacadia. One was misdiagnosed, one did not want to receive the intervention, four did not provide baseline data, and five did not provide post-data. The informants were divided in 7 groups of 4-7 participants. The total treatment period of the study was from 05.08.2013 to 27.03.2015.

The study followed the ethical principles of the World Medical Association Declaration of Helsinki, and was approved by the Danish Data Protection Agency (J.no. 2013-54-0344) and the National Committee on Health Research Ethics (P.no. H-1-2013-038). Participants received verbal and written information about the study and signed an informed consent acknowledgement before participating.

2.1 Questionnaires

One of several questionnaires used in the NEST (detailed descriptions of the questionnaires and selected results from NEST can be found in Stigsdotter et al., 2018) was a background questionnaire (n=32) comprising questions regarding demography, educational level, employment status, health, and NC. The questionnaires were handed out to the informants on the first day of the NBT programme, and sent by mail to the participants at the end of NBT (ninth or tenth week), and 3, 6 and 12 months after completion of the NBT.

The present study uses the data from the first day of the NBT and from 12 months post NBT, and uses the part of the background questionnaire in relation to NC. The questionnaire contains measures of NC on two variables: 1) Frequency of visits to public green spaces, e.g. parks, green spaces, harbours, beaches and forests; 2) Frequency of visits to informants' own garden, balcony or common backyard where they live. The purpose of using questionnaires is to be able to conduct a statistical quantification of the possible changes in participants' NC.

2.2 Interviews

Two informants from each group (n=14) participated in semi-structured interviews (Ritchie et al., 2013). Due to ethical considerations, the aim was to use as few informants as possible, yet saturate the material. Participation was voluntary, and with the aim to obtaining rich and varied stories, the therapists in Nacadia aimed to ensure that the voluntary interviewees had sufficient capabilities to participate.

The interviews were conducted with the aim to gain more in-depth knowledge about the possible changes in how the informants use nature from before having participated in NBT programme to after. An interview guide for the semi-structured interviews was developed in relation to the aim of NEST. The questions in relation to NC are: Is there a particular type of environment you prefer in parks, squares and gardens? Are there any particular type of activities you prefer in parks, squares and gardens? Are there any special components you prefer in green spaces? Are there any special places, activities or components that you avoid when you are in parks, squares or gardens?

The interviews were conducted in the first week of the NBT programme, in the fifth week, and at the end of the NBT (ninth or tenth week), and 3, 6 and 12 months after completion of the NBT. The interviews were conducted in Nacadia or via telephone and lasted 25 minutes on average. They were recorded with the informants' consent and were transcribed for the further analyses.

The pre-test data consists of the interviews conducted within the NBT period (first and fifth week), and the post-data consists of the interviews conducted after the NBT. A procedure based on content analysis (Shannon, 2005) was followed during the analysis:

1. The interviews were listened to. The interviewees' style of telling about their experiences, e.g. their tone of voice, may add to an idiographic understanding of the individual informants prior to analysis and making meaning of their stories.
2. All transcripts were read and meaning units of interests in relation to the research focus were marked.
3. Meaning units from all interviews were set in a matrix in accordance with the contents of interest and were clustered in relation to recurrent themes.
4. The developed themes were elaborated based on the meaning units from the informants' stories about their experiences.

3. RESULTS

3.1 Questionnaires

A Wilcoxon Signed Ranks Test of the data from the questionnaire survey shows that there was: 1) A significant difference ($Z=-2.449$, $p<0.05$, $n=32$) in the frequency of visits to public green spaces, indicating an increased use of public green spaces; 2) No significant difference ($Z=-0.24$, $p>0.05$, $n=32$) in the frequency of visits to the informants' own gardens, balconies or common gardens where they live.

3.2 Interviews

The content analysis was conducted with the aim to qualify the possible changes in NC and provide the authors more in-depth knowledge about changes in the informants' NC. The results of the analysis are described below in relation to the content of interest and will be further discussed in the discussion section.

The content analysis of the interviews identified four recurrent themes: 1) New approach to green spaces; 2) Awareness of self and environments; 3) New attitudes to everyday tasks; and 4) Maintaining beneficial mind-sets. The themes represent the quality of how the informants use green spaces a year after having participated in NBT in the Nacadia therapy garden.

New approach to green spaces

The most noticeable recurrent theme and quality of the informants' general NC after NBT is found to be a new approach to green spaces. The informants share various stories that in different ways exemplify how they have found new insight into the potentials of green spaces, and how they have a new attitude toward using green spaces. *"Now I see nature in a whole different way. It's the first time I really notice how beautiful the spring is in Denmark. Trees are budding and are beautiful and colourful. I have never been aware of that before. It's a new way that really makes you happier. Just to be out in nature."* The quote demonstrates how an informant has become aware of new aspects of nature that she has previously not been aware of. This new awareness makes her open up to new possible human-nature interactions. Another informant, who was already aware of various aspects of nature, shares how he has learnt a new approach to how to use nature: *"I have been on many outdoor trips where I have not managed to let go of the work-related thoughts occupying my mind – at least not for long. I was caught up in all sorts of thoughts. I think that I've learned from Nacadia to be present where I am."* Similar to other stories shared by this informant, this story exemplifies an acknowledgement of how NBT has given new insight into seeing and using outdoor environments in a more beneficial way, and has thus given a new approach to something he was already familiar with.

Awareness of self and environments

The new approach was most notably found to be lived as an enhanced consciousness to exploring and experiencing the natural environments in everyday life. An informant explains: *"I have become aware of sensory nature experiences (...) There are really many different ones which I have not previously seen in that way."* Another informant adds: *"I have become more aware of how nature affects the senses (...) I experience it more in my everyday life, for example, when I'm standing by my garden pond."* The informants describe an enhanced awareness of both themselves as individuals and of themselves within the environment. The awareness of themselves seems awakened by their senses, which are roused by natural environmental factors. They describe a consciousness of how the sensory natural experiences may have an impact on them, and how they have developed an understanding of the natural environments as supportive components/factors for their well-being. This leads them to a more conscious awareness of beneficial interactions between themselves and the green environments.

New attitudes to everyday tasks

The exemplified enhanced awareness of self and environment further seems to lead to an enhanced attentiveness within the informants of their own capabilities in different everyday life situations. This can be seen in the

examples shared by several of the informants of how their new approach to NC has been converted into new attitudes to everyday life tasks and situations: *"I've obviously learned that when I begin a project in my garden, I will no longer push myself to feel completely down. I can now say: 'this is good for today, I can continue another day', without feeling bad about it."* There are also examples of how the informants' new approaches to NC have been successfully transferred into useful nature-based means in more complex and challenging environments with a higher presence of potential sociocultural stressors, e.g. working environments: *"My workplace has permitted me to go for a walk every day if I need to. I work close to a lake, so I use that area. There are three different paths I can select depending on what I need, how much time I have, and what the weather is like."* This is a good example of a supportive and collaborative employer, and it demonstrates how it has been possible to transfer NC efficiently into a tool for actively maintaining the beneficial gains from NBT in an everyday context.

Maintaining beneficial mind-sets

Several informants tell how they use green environments more or less deliberately to maintain some of the beneficial mind-sets they have discovered and practiced during NBT. They have become more aware of exploring and discovering nature experiences that they find beneficial for their positive emotions, and they purposefully transfer and implement their new approaches to NC as a self-therapeutic mean. An informant exemplifies how she use natural environments for remembering and maintaining certain beneficial gains from the NBT in her daily life: *"When I'm in nature, I recognize some of the things I did in Nacadia. During the sessions in Nacadia there were a lot of calming nature experiences, which I recall a bit when I go out to do something in my garden, or if I'm moving around in nature. Then the calmness I know from Nacadia will come back to me again."*

The informants experience NC as a means to retaining a more beneficial state of mind, thus an enhancement of their mood and quality of life in general. An informant tells how he used a specific natural element as a way for him to recall and maintain a beneficial mind-set: *"I used the big trees in Nacadia as a way to find peace. Trees can be found everywhere – they might be seen through a window in the train, in the middle of a field or in front of 'Rundetårn', which I pass by every day. It's the trees that somehow hold such a great calmness that I take with me and use."* The quote illustrates how components from NBT are used to maintain beneficial mindsets in the informant's everyday life, thus, how NBT is transmitted from the treatment sessions to everyday life situations.

4. DISCUSSION

4.1 Enhanced Awareness

A recurrent theme of the interviews is an enhanced awareness, both of the informants' selves and of themselves within the environment. The informants' enhanced awareness seems to lead them to a higher state of being absorbed, i.e. as being "an effortless state of being fully involved and engrossed in an activity like viewing or interacting with nature" (Ballew & Omoto, 2018, p. 27), in the natural environments that they use in their everyday lives. This enhanced level of absorption is assumed based on the participants' descriptions of environmental experiences, that can be qualified as essentials of 'absorption': that is, being involved, engaging one's senses, and thus being absorbed in natural features (Ballew & Omoto, 2018). It further aligns with the quality of the psychological factor 'fascination' as elaborated by Kaplan (1995) when he explains the process of health-beneficial human-nature interactions. The process on how individuals benefit emotionally from nature experiences has been hypothesized by Ballew & Omoto (2018). Though their hypothesis is based on measures of individuals in general, their mediation model (p.31) of nature's effect on an individual's positive emotions seems to align well with the core of the qualitative findings of the present study of severely stressed informants, and with previous studies of the same case (Ulrik Sidenius, 2017). The informants' general descriptions of human-nature interactions are found to be of a quality aligning being absorbed, and their descriptions of positive effects of human-nature interactions can be closely related to the paths in the mediation model (Fig. 2).

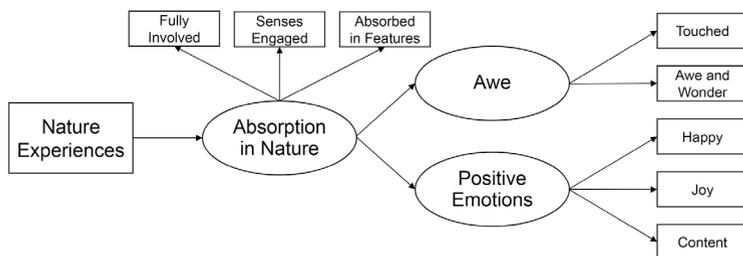


Figure 2: A simplified version of the Empirical Mediation Model of how absorption mediates the effect of nature on awe and positive emotions (Ballew & Omoto, 2018, p.31)

The mediation model hypothesizes the process of positive emotional effect of human-nature interaction on humans, which, according to Ballew and Omoto, (2018), is a process that often occurs during nature experiences. It seems that participating NBT has made the informants more aware of the general

health-beneficial potentials of natural features, and that participating NBT has led them to concrete and tangible experiences of health-beneficial human-nature interaction processes, such as those hypothesized and illustrated by the Empirical Mediation Model. It has led them to consciously seek out and engage in such processes in which natural features are used as health-supporting means.

4.2 Transferring Gains from NBT to Everyday Life

The examples under the theme 'New attitudes to everyday tasks' seem to be attempts to transfer and live such beneficial processes also in less natural environments and in everyday situations. All informants shared stories of how they benefitted differently from NBT, and of how they have implemented different individual means into their lives with regard to training and maintaining those gains. This confirms the importance of motivating 'homework' as part of NBT interventions. Through practicing 'homework', the individual participant is able to try different approaches and means from the NBT programme, and can subsequently implement the one they find to be most beneficial for them into their life. The present study and a study by Corazon et al. (2018) confirm how the informants practised and found such individual beneficial approaches and means (tools) for moving on after NBT.

From a biopsychosocial view (Timothy P. Melchert, 2015), we understand that individuals and different groups of people, e.g. groups of people with a similar diagnosis and/or symptoms, perceive and benefit differently from environments (Bucci, 2007; Grahn, Ivarsson, Stigsdotter, & Bengtsson, 2010; Ottosson & Grahn, 2008). Environmental factors can be numerous, and in the context of the present study, the main environmental factors are based on natural, cultural and social circumstances (Grahn et al., 2010; Palsdottir, 2014). The way in which environmental factors are perceived is subjective. Thus they can impact the individuals in unlimited ways, because perceptions are influenced by the individual's background, for example culture, personality, experiences, and physical and mental resources and capabilities (Grahn et al., 2010; Palsdottir, 2014).

In the present study, the informants share similar stress-related symptoms, and with the aim of developing an understanding of possible differences in this user-group's NC from prior to post participation in NBT in Nacadia, it is found that they develop an enhanced awareness of the beneficial influences of natural environmental factors on their emotions and well-being. The present study exemplifies a number of different health beneficial nature-based means that participants successfully have transferred from NBT into everyday situations. However, due to limited numbers of informants, the present study

alone is insufficient to suggest a general cause-effect pattern, making it difficult to give specific guidelines for which of the presented nature-based means would show most efficiency in the transferring and implementation to everyday context, for the participants.

4.3 Post-therapeutic Progression

In addition to developing a better understanding of the changes in NC from prior to to post NBT, it was possible to find indications of a post-therapeutic progression in relation to how informants developed an increased consciousness of how to apply NC, or essentials of NC, to everyday tasks and of how to benefit from this. Roughly speaking, the progression can be divided into two phases. During the interviews conducted three and six months after completion of the NBT, the participants describe a phase that began approximately three months after NBT during which they experienced a certain level of unhappiness. They describe a lack of motivation to perform and to maintain the beneficial means learned during NBT. However a few months later, another phase seems to begin. During the interviews conducted 12 months post NBT, the informants tend to talk more about how they, through NC, recognise, remember and resume the beneficial means and gains from NBT, and how they actively and successfully implement them in everyday contexts. This demonstrates how NC is used as a means for remembering beneficial therapeutic exercises and mind-sets practised during the NBT, as previously found by Sidenius et al. (2017) and Corazon et al. (2018). Based on the relatively limited extent of interview data from the present study, it is only possible to distinguish and describe two phases. However, the study indicates that after they move on in their everyday lives, participants experience two phases during a period of approximately 12 months after the NBT in which they adapt and find a new grounding within themselves and in their everyday environment with the new insight and approach gained from NBT.

4.4 Nature Consumption as a Post-therapeutic Tool

During that post-therapeutic progression, NC plays an important role for the informants with regard to remembering, resuming and maintaining beneficial means and gains from NBT. A good example is a participant's description of how he uses trees in an urban context to transfer means from the NBT context to his daily circumstances. Based on the four themes described above and considered within the therapeutic framework, an important conclusive aspect of NC after NBT is NC applied as a tool. In line with this, several participants describe episodes of applying NC as a tool, and describe their achievements from NBT as such: *"I'm getting used to the various tools that I've learned. And they work."* It is found that NC after NBT is consciously applied as a tool

with an aim of maintaining and strengthening some of the beneficial mindsets gained during NBT. The fact that several informants use the word "tool" when they describe aspects of their NC after NBT highlights an important value of the multispectral approach of the NBT in Nacadia. Namely the fact that NBT includes a broad spectrum of nature-based means with different focus and approaches to body, mind and environment: different nature-based awareness exercises and different nature-based activities, supported by conversation therapy, opportunities to try on you own, and homework (Corazon et al., 2018b). It offers the individual participants opportunities to explore and obtain the means that are most meaningful and beneficial to them during NBT, which in turn equips the participants with individual post-therapeutic tools concerning both body, mind, environment and possible synergies in between body, mind and environment.

The broad spectrum of NBT means makes the NBT more easily applicable to the individual participant's everyday life situations. The broad spectrum approach to human health from NBT in Nacadia can be said to find support in the contemporary view on stress and health in behavioural, nursing and health care in general, where a biopsychosocial view concerning both body, mind and environment is on the rise (Taylor & Francis, 2013; Melchert, 2015). It demonstrates NBT, natural features and NC as important potential tools for people to find support and maintain good health, and as such these are important factors to contemplate for landscape architects and urban planners as well as health professionals.

4.5 Mixed Methods

The statistical calculation of the data from the questionnaire survey shows that there is no difference in the frequency of visits to the informants' own gardens before and after NBT. This finding is inconsistent with the interview data, in which the informants generally stated that the frequency of their use of gardens after NBT had increased.

A reason why the statistical calculation shows no significance may be that the questionnaire was sent to the informant 12 months after participating NBT. That caused a difference of at least 14 months between pre- and post-tests. During the autumn and winter months, use of gardens on average are lower than during the summer months. Thus, for several informants who received NBT during the summer months, a constant or even reduced sequence of use of garden in the pre/post period was found. Pre- and post-tests from even seasons would probably have generated more reliable findings. For the present study, the impact of the seasonal-based factors on the frequency of NC offsets the possibility to measure the possible impact of NBT on the frequency of NC.

Despite of the insufficient quality of the questionnaire data, the use of mixed methods, which is recommended for health science (Taylor & Francis, 2013), made it possible for the authors to assess and understand the quantitative measures alongside the qualitative findings, and to develop a broader understanding of the informants' interaction with the environments.

4.6 Implications and Future Research

The present study highlights health-beneficial approaches to NC and asks for more comprehensive studies with a similar focus. Studies of the post-therapeutic period would be beneficial for a comprehensive understanding of the post-therapeutic process and to develop more knowledge of, for example, when and how NC means are applied and implemented in the participants' everyday life situations, and if some NC means are more beneficial and more easy to implement than others.

Future studies with pre- and post-tests focusing on stress- and health-related measures in association to human-nature interactions could help explain the health beneficial mechanisms and cause-effect of NC in relation to stress-related illnesses, and thus illuminate the most beneficial nature-based means applicable for everyday life situations. Future studies of NBT and the post-therapeutic period would benefit from an increased psychologically based focus on the phases of the informants' progression. Such a focus could be an advantage for finding how means from the NBT programme can be modified or added to ease the transfer and implementation of beneficial tools from NBT to everyday life, thus, supporting the participants' development efficiently during the period after NBT.

An increased understanding of different approaches to NC may inspire and motivate city planners and landscape architects to develop more health-beneficial green environments, to implement natural features in the built environments, or to let green environments remain green environments for the benefit of public health. Such nature-based landscape architectural initiatives find support from The European Union's research and innovation policy agenda on Nature-Based Solutions and Re-Naturing (*Towards an EU Research and Innovation Policy Agenda for Nature-Based Solutions & Re-Naturing Cities*, 2015), and from the World Health Organization's 'Urban green spaces: a brief for action', which is based on evidence compiled on urban green space (World Health Organization, 2017).

5. CONCLUSION

Using a mixed-method approach, the present study has presented an understanding of how informants diagnosed with stress-related symptoms

consume natural features differently after having participated in NBT compared with before such participation. A contradiction in the findings of the qualitative measures and the statistical measures was detected. The questionnaire data proved to be insufficient with regard to informing the present aim. The mixed method approach, however, helped the authors to establish, not only the changed frequency of informants' NC post NBT, but also a deeper insight into why and how they use the natural environments differently.

The content analysis showed that NBT provided informants with a new insight into NC. The quality of the changes in NC post NBT was determined and organised in four themes: 1) New approach to nature; 2) Awareness of self and environments; 3) New attitudes to everyday tasks; and 4) Maintaining beneficial mind-sets. The NBT (re-)awakened the informants' awareness of beneficial human-nature interactions. The overall new approach to NC is found to hold the essentials of 'absorption' and 'fascinations', which have used by theorists to explain nature's health-beneficial effect on peoples' positive emotions. NC post NBT helps the informants remember and motivates them to use and maintain some of the beneficial mind-sets they discovered during the course of the NBT intervention. NC post NBT can be considered as a beneficial health-promoting tool for transferring health-beneficial means from NBT into participants' everyday life. The present study suggests a comprehensive study focusing on post-therapeutic progression and studies with enhanced focus on the transmissibility of nature-based means from NBT to participants' everyday situations are needed.

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