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The Gardening Spirit: Evidence That Frequency of Gardening Precisely Predicts Ecospirituality

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This study sought to determine if ecospirituality, a reverential respect for earth, is associated with gardening. Previous research has established that gardening is associated with spirituality in ways that promote healing, hope, and coping with grief. This study sought to extend those findings, positing that an ecologically-based, sacred respect for the environment is plausibly both an antecedent to and a consequence of gardening. Therefore, we predicted that gardeners, because of their high degree of physical and emotional caretaking contact with the Earth, would show a greater ecologically-based spiritual connection with nature than non-gardeners. A sample of 138 participants completed a questionnaire that measured gardening attitudes, behaviors, and ecospirituality (Suganthi, 2019). We found a strong positive association between gardening and ecospirituality: the more frequently one gardens, the greater one's ecospirituality. Moreover, the increase in ecospirituality was remarkably graduated: those who never garden scored lowest in ecospirituality, with incremental and significant increases in ecospirituality as gardening frequency increased. Content analysis of open-ended responses on the survey suggest that the association between gardening and ecospirituality is mostly implicit. While previous research on gardening and spirituality relied primarily upon the interpretation of respondents' narrative answers to open-ended questions, this research established a strong, predictive relationship between well-defined gardening behavior and well-defined ecologically-based spirituality. The findings suggest that gardening may promote a reverential respect for Earth and environmental concern.

This study sought to determine if ecospirituality, a reverential respect for Earth (Suganthi, 2019), is associated with gardening. Previous research has established that gardening produces physical and mental benefits and is associated with spirituality in ways that promote healing, hope, and coping with grief. This study posits that a well-defined ecologically-based spirituality is likely associated with gardening and therefore, albeit a unique form of spirituality, also promotes wellness. Simultaneously primal and transcendent, Suganthi (2019) defines ecospirituality as, "a reverential attitude toward the environment in taking care of it while dwelling within its premises" and developed a scale with five subcomponents (dwelling, caring, revering, experiencing, and relating) to measure an individual's degree of ecospirituality. Such a sacred and reverential respect for the environment is plausibly both an antecedent to and a consequence of gardening, thereby creating a positive feedback loop in which gardening and spirituality are mutually reinforcing. We predicted that gardeners, because they have a high degree of physical and emotional caretaking contact with the Earth, would show a greater ecologically based spiritual connection with nature than non-gardeners. As a result, gardening may be both spiritually therapeutic and may also, speculatively, compel its practitioners to perceive anthropogenic ecological damage (e.g., water contamination) as sacred transgression.

Unlike forms of spirituality that emphasize specific doctrine, immateriality, or the supernatural, ecospirituality emphasizes our corporeal infusion with the natural world. In addition, ecospirituality is a non-denominational, prehistoric, indigenous wisdom tradition, in which nature is not an entity separate from humans (Reichel-Dolmatoff, 1976) but a core aspect of our being: Earth, like each individual human, has a living soul (Charles & Cajete, 2020). The role of this type of spirituality may manifest in religious ritual used to promote sustainable practice (Rappaport, 1967). Likewise, gardening and its therapeutic potential also have extensive historic roots, such as in ancient Mesopotamia (Foster, 1998) and during the Middle Ages (Gerlach-Spriggs, Kaufman, & Warner, 1998). Early psychiatric care facilities documented mental health improvements in patients who gardened, reasoning that it stimulated patients' senses and distracted them from their symptoms (Bishop, 2012). At its core, ecospirituality is a distinct conceptualization of spirituality that recognizes humans and their existential concerns as inexorably, immeasurably, and delicately entangled with the physical, natural environment.

Intuitively, the uneven terrain, frequent adverse weather, birdsong, nature scents, and other outdoor garden elements utterly absorb gardeners. Even superficially simple gardening tasks, for example, reaching down to pick up and feel a clod of dirt, activates a constellation of physiologically consuming sensations: the vestibular apparatus registers the change in head position (along with corresponding changes in the visual field), while the hands extract information-rich soil data. Hand-finger motion across the clod provides texture information and squeezing stimulates deep pressure receptors revealing a hidden rock or hardened clay. Thermal receptors index soil warmth while joint and muscle receptors assess approximate weight and, coupled with visual input, density of the dirt clod. Once soil is assessed, digging and planting activates muscle receptors that track tension, cramp, and fatigue, compelling gardeners to change hand and body positions and alter movements to cope with and complete tasks. But is gardening mere sensory stimulation and simple labor? Not at all.

The established physical and mental benefits of gardening (Scott, Massar, & Pachana, 2015; Wang & MacMillan, 2013; Stigsdotter & Grahn, 2002) may in part be due to the established benefits of high contact with nature (McMahan & Estes, 2015), described above, and the raw physical and cognitive intensity sometimes required. Electromyographic analysis of sixteen limb muscles during common gardening tasks found that digging activated the most muscles (Park et al. 2014) compared to raking, troweling, weeding, and hoeing. Gardening body positions and movements can cause pain, especially in the lower back (Park & Shoemaker, 2009). But the pain may be mitigated with body awareness and control. Shippen et al.'s (2015) biomechanical analysis of soil-shoveling calculated torques at the lumbosacral (lower back) joint and found that subjects generated more torque as the soil-shovel moved away from the body. A broad foot position that keeps the shovel close to the body lowers torque. Exercising such body awareness and control may promote gardening's therapeutic potential (Kamioka et al., 2014) due to its ability to induce psychological flow—complete absorption in the present moment and a loss of one's sense of space and time (Csikszentmihalyi & Csikszentmihalyi, 1992). Psychological flow is frequently experienced by gardeners (Pitt, 2014).

The spiritual aspects of gardening may be less well understood yet are likely similar to the remarkable experiences that sometimes accompany other nature outings. Spontaneous awakenings—a temporary expansion and intensification of awareness marked by significant perceptual, affective, and conceptual changes—are frequently triggered by outdoor nature excursions (Hardy, 1979; Taylor, 2012). Scott (1974) observed that strong feelings of depersonalization (a loss of a sense of identity) often occur in wilderness settings. Likewise, many gardeners experience a strong spiritual component in gardening. Unruh & Hutchinson (2011) identified several common spiritual experiences of committed gardeners, especially for those living with cancer or chronic disease, including feeling connected to a life force and gardening as a spiritual activity and journey. Adams, Pascal, & Dickson-Swift (2015) found that many older people believe gardening is spiritual in part because it promotes a recognition of a life force beyond their own, but to which they belong. Especially poignant is the power of gardening to make mortality salient, as gardening entails much death and rebirth and gardeners may consider that plots can survive after their creators and caretakers die. Japanese gardeners consider tree pruning as spiritual attunement, in which a meditative silence produces a ten- to fifteen-year vision of tree growth (Esaki, 2013). Gardening has a timeless quality and appeals to a gardener's sense of self untouched by illness and stress (Unruh & Hutchinson, 2011). Indeed, horticultural therapy has been found to be effective for the spiritual care of cancer patients (Nakau et al., 2013) and may provide some hope and optimism for pediatric oncology patients and their families (Cutillo et al., 2015).

Although previous research has established important connections between gardening and spirituality, no research has directly investigated whether ecospirituality, a unique and specific conceptualization of spirituality, and gardening are associated. Unruh & Hutchinson (2011), relying on in-depth interviews, found that spirituality in gardening was a result of gardeners' feeling connected to their gardens and through the mutually reinforcing process that occurs when garden caretaking produces garden growth and development. Gardens serve as a means to understand death and cope with grief and induce spiritual insights insofar as death, grief, and connection to nature and others (Unruh & Hutchinson, 2011) are profound existential and spiritual dilemmas. The Adams, Pascal, & Dickson-Swift (2015) study relied on 10 semi- structured interviews, indirectly gleaning spiritual aspects of gardening from hermeneutic (interpretative) phenomenological analysis of responses. Nakau et al. 2013 relied on the Functional Assessment

Table 1.
Correlations between ecospirituality and perceived importance of gardening, time spent gardening, and frequency of gardening.

Variable	Total Ecospirit Score	Gardening Importance	Time Spent Gardening	Frequency of Gardening
Total Ecospirit Score	1	Gardening Importance	Time Spent Gardening	Frequency of Gardening
Gardening Importance	.29*	1	Time Spent Gardening	Frequency of Gardening
Time Spent Gardening	.34*	.39*	Time Spent Gardening	Frequency of Gardening
Frequency of Gardening	.46*	.52*	.63*	1

*p < .01

of Chronic Illness Therapy-Spiritual Well-being scale (Peterman et al., 2002) to assess the effects of urban green space on the spiritual care of cancer patients. The Nakau study was limited in that it featured several therapies over 12 weeks (forest therapy, horticultural therapy, yoga meditation, and support group therapy) and so did not isolate gardening behavior. Cutillo et al. (2015) performed a literature review that described two studies relying on anecdotal data (i.e., nurses' reports) indicating that gardening promotes spiritual outcomes. This study attempts to modestly contribute to this small but important literature by determining if well-defined gardening behavior predicts well-defined ecologically-based spirituality. Establishing such a relationship may contribute to understanding how Earth caretaking and stewardship behaviors and beliefs develop.

Therefore, the present research sought to determine if gardening is associated with ecospirituality and to describe that association's rough contours. A questionnaire was designed to assess individuals' gardening attitudes and behaviors (how important it is to the person, how frequently the person gardens, how much time the person spends gardening, and the person's motivations for gardening). The questionnaire also posed an open-ended question about gardening that asked what the person thinks about gardening and how it makes them feel. The questionnaire also measured respondents' level of ecospirituality.

Method

Research Participants

A convenience sample of 138 participants (99 female; 29 male; 5 non-binary; 1 genderqueer; 4 unreported) completed the survey-questionnaire. The mean age was 32.26 years (SD = 16.48). Seventy-one participants reported a suburban childhood background, 47 rural, and 17 urban. When asked why they garden, 26.1% selected rewarding hobby, 22.5% selected food production, 21.7% selected to be outdoors, and the remaining wrote a variety of other reasons.

All participants resided in Asheville, North Carolina, a city of approximately 92,000 residents, in the Blue Ridge Mountains of southeastern U.S. The city features a temperate, four-season climate. All participants provided informed consent prior to participation.

Table 2.
Summary of mean ecospirituality scores by frequency of gardening.

	Number of participants	Mean ecospirit score	Standard deviation
I Never Garden	15	34.67	6.10
Rarely Garden	20	36.85	4.15
I Occasionally Garden	43	39.74	4.78
I Frequently Garden	38	40.68	4.33
I Very frequently garden	14	43.07	1.73

Materials & Procedure

Participants were asked to complete a brief survey-questionnaire. The survey asked participants to indicate how frequently they garden (never, rarely, occasionally, frequently, very frequently); how much time per session they garden (do not garden, less than 1 hour, 1 hour, 2-3 hours, more than 3 hours); why they garden (food production, rewarding hobby, to be outside, all of the above, write-in); and how important gardening was to them (not important at all to very important). Participants were also asked to briefly describe their experience with gardening and, if applicable, describe how gardening makes them feel or what they think about gardening in general. Participants were also asked to complete 10 items (2 items from each subcomponent, scaled from 1=strongly disagree to 5=strongly agree) from the ecospirituality scale described above. Sample items included "I seek meaning and purpose by my presence on this earth," "I have a sense of awe in participating in any action to safeguard the planet," and "I have an organic relationship with this universe."

Results

Gardening and Ecospirituality

A total ecospirituality score was computed for each participant, allowing a range from a low score of 10 to a high score of 50. An initial correlational analysis revealed that ecospirituality is positively, significantly associated with perceived importance of gardening, time spent gardening, and frequency of gardening. In addition, as would be expected, there were strong positive associations between perceived importance, time spent, and frequency of gardening. As can be seen in **Table 1** below, frequency of gardening was the strongest predictor of ecospirituality ($r = +.46$).

An analysis of variance on ecospirituality scores by frequency of gardening categories was statistically significant, $F(4, 125) = 8.90$, $p < .001$. Mean ecospirituality scores for each level of gardening frequency are reported in **Table 2**. The means reveal a remarkably gradient pattern in that as gardening frequency increases there is a corresponding increase in ecospiritualty. Post hoc comparisons using Tukey's HSD test indicated significant differences in ecospirituality across gardening frequency: very frequent and frequent gardeners scored significantly higher than rarely and never gardeners ($p <$

Table 3.
Categorical Response Frequencies to the Question: "Please briefly describe your experience with gardening. Please include, if applicable, how gardening makes you feel or what you think about gardening in general."

Category	n (%)
Gardening provides a sense of accomplishment (rewarding, productive, promotes sustainability, or provides food security)	50 (36%)
Gardening lowers anxiety (relaxing, stress relieving, peaceful, therapeutic, alleviates depression)	44 (32%)
Gardening connects one to earth and food	23 (17%)
Gardening helps one grow and maintain relationships through food sharing and community	20 (14%)
Gardening gets one outdoors	15 (11%)
Gardening provides sensory engagement, stimulation, or exercise	14 (10%)
Gardening promotes mindfulness or psychological flow	13 (9%)
Gardening changes perspective (a bigger picture, measure of seasonal time, a feeling of being part of life)	12 (9%)
Gardening is associated with a sense of sacred (closeness to God, spiritual benefits)	3 (2%)
Hobby	1 (<1%)

.05); and occasional and rarely gardeners, in turn, scored significantly higher than the never gardeners ($p < .05$).

Content analyses on questions

One hundred thirty-one (of 138) participants wrote responses to the open-ended question: "Please briefly describe your experience with gardening. Please include, if applicable, how gardening makes you feel or what you think about gardening in general." A content analysis was performed to identify themes in participants' responses and response frequencies are summarized in **Table 3**. Participant responses could be included in several categories.

Table 3. Categorical Response Frequencies to the Question: "Please briefly describe your experience with gardening. Please include, if applicable, how gardening makes you feel or what you think about gardening in general."

Discussion

The results of the present study confirm the predicted positive association between gardening and ecospirituality: the more frequently one gardens, the greater their ecospirituality. The increase in ecospiritually was remarkably graded along the gardening frequency categories—those who never garden scored lowest with incremental and significant increases in ecospirituality as gardening frequency increased. However, the association between gardening and ecopspirituality appears to be largely implicit: when asked to describe their gardening experiences, only three participants explicitly included terms related to spirituality. For example, one participant wrote, "I learn about design and science, my body is challenged through digging, tilling, weeding, planting, and *my spirit* is fed through the beauty, sense of accomplishment, connection to the earth, and enjoyment of my garden by others [ital. added]."

Consistent with previous research on spirituality and gardening (Unruh & Hutchinson 2011; Nakau et al. 2013; Adams, Pascal, & Dickson-Swift, 2015; Cutillo et al., 2015), our findings show that gardening features a strong spiritual component. While previous research relied primarily upon the interpretation of respondents' narrative answers to open-ended questions, this research established a strong, predictive relationship between well-defined gardening behavior and well-defined ecologically-based spirituality. Our respondents, when answering an open-ended question about their gardening experiences, rarely mentioned spirituality. Rather, they tended to write about the practical aspects of gardening, such as food production. Also, consistent with previous research on gardening's therapeutic power (Scott, Massar, & Pachana, 2015; Wang & MacMillan, 2013; Stigsdotter & Grahn, 2002), a large portion—one-third—of participants wrote that gardening relieves stress and is therapeutic. For example, one participant wrote, "[Gardening is] my therapy, calms me, helps me stay grounded and to appreciate little things in life," and another wrote, "Gardening helps me to alleviate depression." Also practically, getting outdoors and connecting to nature were frequently mentioned as an important part of the gardening experience.

Consistent with Unruh & Hutchinson's (2011) finding that gardener's with serious health issues view gardening as a way to bond with loved ones after dying, the social component of gardening was also frequently mentioned as an important part of the gardening experience (by 14% of participants). Whether gardening with loved ones, learning and teaching gardening techniques, or sharing produce with friends and family, gardening was perceived by many participants as social in nature. For example, one participant wrote, "I love sharing food with friends and neighbors too, as it bonds you to people by sharing our most basic need...food," and another wrote, "Bonding time with my family, my neighbors are always excited to see what we grow."

Speculatively, an implication of this study's results is that gardening may, implicitly, promote environmental concern. Resolving urgent ecological problems, such as climate change, widespread water contamination, and species loss requires mass behavior change (Hardin, 1968). Coercive legal force can change behavior but socio-political and cultural practices stall, weaken, or defeat attempts to legislate the prevention of ecological violence. As a result, moral suasion is frequently used to slow headlong ecocide. But appeals to save the Earth are fundamentally attitudinal (Feinberg & Willer, 2012), not behavioral, and therefore mostly powerless to reconcile the tragic estrangement between self and planet. The present results tentatively suggest that the promotion of gardening could help individuals replace anthropocentricism (a belief that humans are the center of existence) with ecocentrism (nature centered existence).

Although this study found a strong, impressively graded relationship between frequency of gardening and ecospirituality, the results are limited by a comparison of intact rather than randomly assigned (to different frequencies of gardening) groups. As such, it is not possible to conclude that gardening *causes* an increase in ecospirituality. It may be that those with strong, albeit implicit, spiritual feelings about Earth are inspired to frequently garden. Future research might examine whether non-gardeners or apprentice gardeners demonstrate an increase in ecospirituality and related beliefs as their garden frequency and experience grows.

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BIOGRAPHY

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Exploring a Migrant´s Sense of Belonging Through Participation in an Urban Agricultural Vocational Training Program in Sweden

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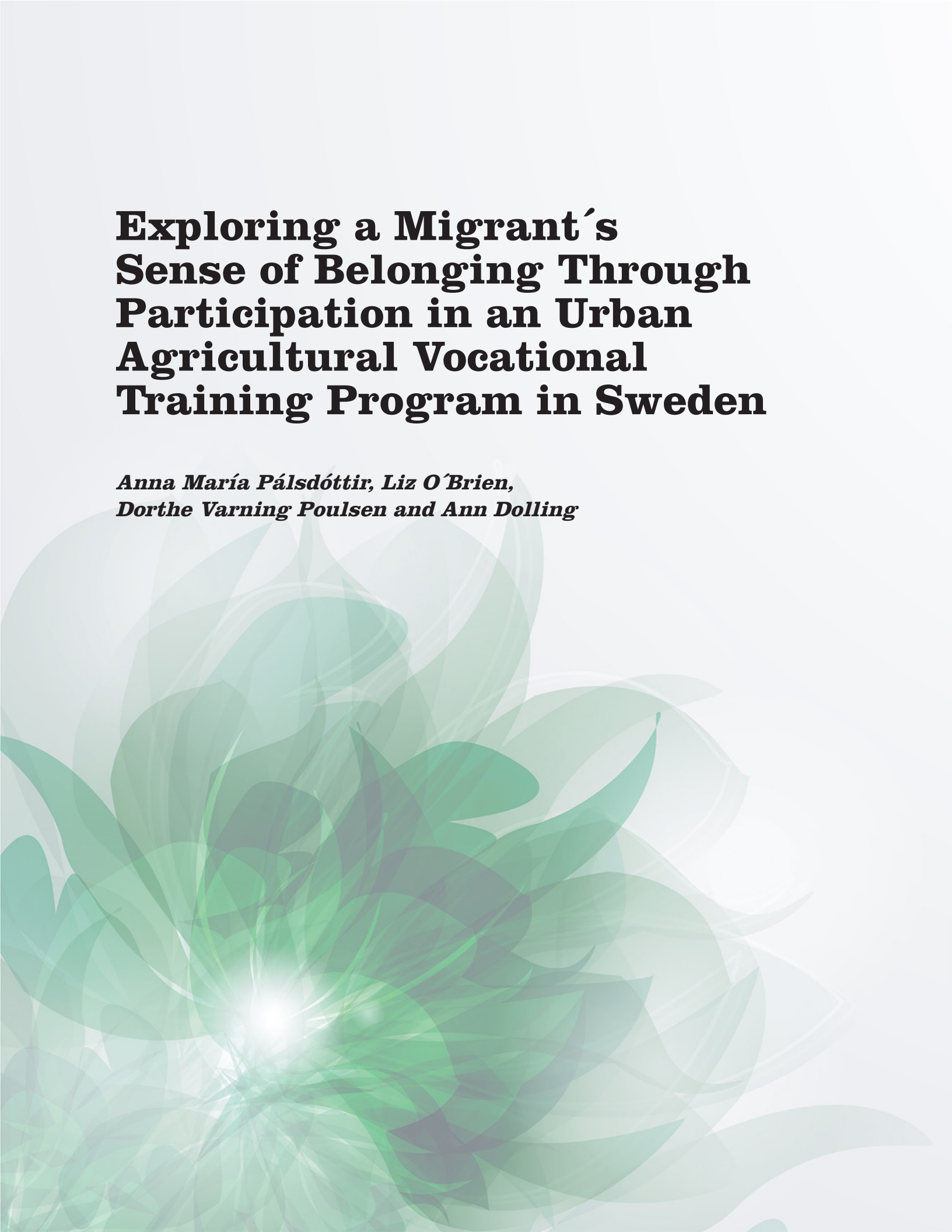

This study focused on migrants taking part in a urban agricultural vocational program called Växtplats Rosengård at Botildenborg in Malmö, Sweden. A semi-structured interview study was conducted with 14 trainees to explore whether a sense of belonging could be experienced during the 10-week vocational training program. Two main themes of "environmental and organizational context" and "cultivation and nurture" emerged, which illustrated that a sense of belonging and place attachment could be experienced. The sense of belonging was created by an inclusive and supportive environment that allowed for creativity through the planting, growing, and nurturing of plants. The program provided a connection to migrants' home countries by allowing planting of recognized vegetation; and by enabling and supporting the practicing of the language of the new country in which the migrants had arrived. Based on the findings, five key mechanisms related to fostering a sense of belonging in newly arrived migrants are discussed and proposed as potentially transferrable to similar contexts.

Background

Various aspects of migration are being monitored with great interest in Swedish society, including aspects that affect migrants' health and entry into the labor market (e.g., MILSA - a knowledge-based support platform for migration and health, and the Migration Studies Delegation [DELMI]). The opportunity to work and enter the labor market is considered one of the fundamental components of successful integration (Björngren et al., 2015; Östergren, 2015). Having a job is an important aspect of becoming financially self-sufficient and independent in a new country. Immigrants who are excluded from the labor market are at risk of social alienation and isolation. A study conducted for MILSA (Ikonen, 2015) found that social isolation was perceived as a significant problem by many new arrivals participating in the introduction program provided by the Swedish Public Employment Service. This may hinder the development of an individual's sense of belonging and sense of purpose in daily life, and, in so doing, contribute to ill health (Choenarom, et al., 2005). Maslow (1943) presented a hierarchy of five basic human needs – physiological, safety, belonging/love, esteem, and self-actualization – with *belonging* being the third most important of human needs. Furthermore, feeling a sense of purpose in life is considered one of the foundations of good health and well-being (Antonovsky, 2007). Studies have shown a correlation between meaningful activities and perceived quality of life and have demonstrated that meaningful activities can contribute to increased self-confidence and improved self-image (Aubin et al., 1999; Strong, 1998). The workplace can add a meaningful context to a person's life and become an arena where social relationships and networks can be formed (Waddell & Burton, 2006; Jahoda, 1982). A workplace, in which the individual can experience a sense of purpose, involvement, and respect for their work, can be perceived as a safe place where the individual can grow and develop. Good relationships with work colleagues and a sense of being part of the group are also important ingredients to perceiving one's workplace as a safe place (Swedish Work Environment Authority, 2012). The prerequisite for bonding with a place is for the individual to feel a sense of security in that place and in the social environment, as well as with other individuals in that context (Pálsdóttir et al., 2014). Interaction between the individual (emotional or mental) and the place (three-dimensional world) is created through interaction, an emotional process (Lewis, 1996). Scannell and Gifford (2010) presented a model of how an individual can bond

with a place, suggesting that *place attachment* consists of three main components – person, process, and place. The framework is made up of (a) the person (i.e., who?), (b) the psychological process (i.e., how/in what way is the person affected?), and (c) the properties of the place (i.e., what is the bond to?). The *process* relates to how a place can become meaningful to the individual and how they are affected by their interaction with it. This process may involve recognition, in the new place, of past experiences and perceptions from a previous place, as well as an attempt to reconstruct the new place with objects they like, in order to create a sense of perceived familiarity (Stodolska et al., 2017). Bonding with a new place can serve several important functions at both the individual and the group level. One of these functions is to engender a sense of belonging, which is important for establishment and integration at a new place (Giuliani, 2003). In a systematic review on the topic of *sense of belonging*, Mahar et al. (2013) concluded with this definition: "…a *subjective feeling of value and respect derived from a reciprocal relationship to an external referent that is built on a foundation of shared experiences, beliefs or personal characteristics.*" Halse (2018) discussed the breadth of the concept of belonging and how the term has become the subject of interest in various different disciplines including, for example, in political science, migration studies, integration studies, philosophy, and cultural studies, as well as in education studies. Halse (2018, p. 3) argued that the term can also mean *belongingness* and be defined to mean "*… that one belongs to or is a member of a particular societal group, solidarity, collectivity, or organization.*"

Feeling part of a bigger context, being seen and being loved (i.e., having a sense of belonging), according to Wilcock (2006), is also about bonding with other people, and is thus connected to social inclusion. It is also regarded as an essential element in meaningful occupations and horticulture has been identified as one such meaningful occupation, enhancing energy and personal growth (Pálsdóttir et al., 2014; Millet, 2008; Rappe et al., 2008; Wästerberg et al., 2020). Studies conducted in both the U.K. (e.g., Bishop & Purcell, 2013) and the U.S. (e.g., Hartwig & Mason, 2016; Helmayr et al., 2020) suggested that the act of performing horticultural activities together with others was an important factor in helping refugees settle in a new country. In addition to the mental and physical benefits of practicing horticulture as a hobby, these studies identified social interaction through horticulture as an important mechanism for building a sense of belonging. The work could be done without the need for fluency in the new language (English), creating the space and opportunity for social connections between the refugees and neighboring gardeners of allotment plots or urban community gardens. The fulfillment gained from growing their own produce provided both concrete and meaningful experiences for the refugees and, when shared with others, strengthened relationships and networking. Many of the refugees were unable to continue in their previous occupations when they moved to the new country, which resulted in a loss of identity. For those refugees that had practiced horticulture in their previous lives, practicing horticulture in the new country (i.e., the U.K. and the U.S.) served as an important link between their past and present lives. This, in turn, helped them to reconnect with the identity of their former selves.

The aim of this study was to investigate if a sense of belonging could be experienced through participation in a horticultural vocational program, *Växtplats Rosengård*, in Malmö, Sweden.

Method

The study was designed as a single case study using semi-structured interviews focused on trainees' experience of participating in a 10-week horticultural vocational program. In this section, the venue for the project Växtplats Rosengård, the program as well as the data collection and analysis methods are described in detail.

The Växtplats Rosengård project at the venue Botildenborg

Participants were recruited from the *Växtplats Rosengård* project, a vocational training program for unemployed migrants living in the county of Skåne (Geite, 2019). The project was delivered by the company Xenofilia AB at a venue called Botildenborg in Malmö, Southern Sweden. The house at Botildenborg has a long history of providing a safe haven for both children and adults in vulnerable life situations (see http://botildenborg.se). The area at Botildenborg totals approximately 1.3 ha, and includes the old red brick house of *Botildenborg*, a surrounding park of 6000m^2, and growing fields of 7000m^2 (Figure 1 and 2a).

The *Växtplats Rosengård* project ran from September 2016 until August 2019, and was a collaboration between several different stakeholders, including

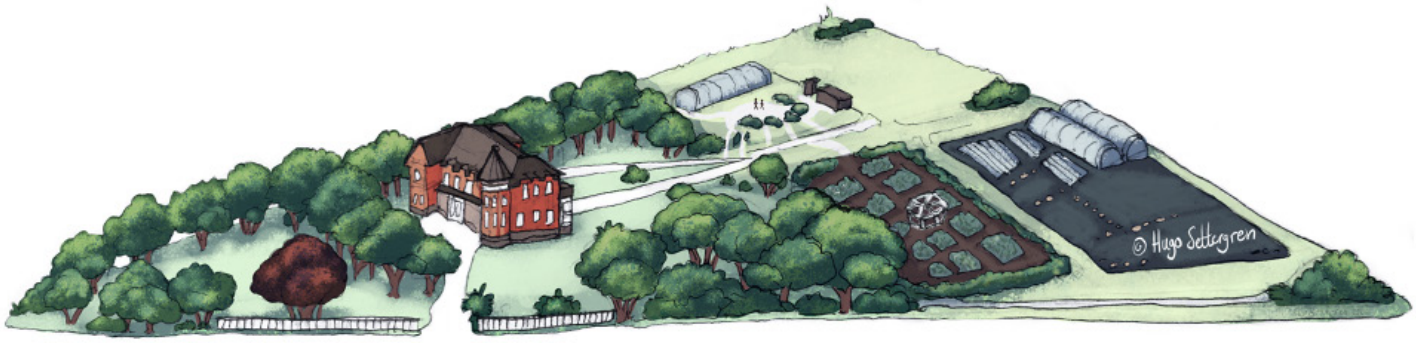

Figure 1. A bird's eye view of Botildenborg; the park around the manor house is about 6000m2 and the growing field (behind the park) is about 7000m2. *Illustration Hugo Settergren*.

the Swedish Public Employment Office, which ran the establishment program for migrants. The project was financed by the Swedish European Social Fund Council (ESF), an authority which works on behalf of the Ministries of Labor and Social Affairs. The overall aim of the *Växtplats Rosengård* project was to increase the employability of migrants living in, or near, the municipality of Malmö.

The Vocational Training Program

The program consisted of two blocks: The first was a 10-week vocational education and training at Botildenborg; and the second was a 12-week vocational training at a workplace related to the occupation practiced by the trainees. These workplaces included private enterprises and/or large companies in Malmö or nearby municipalities. This study focused solely on the first block conducted at Botildenborg. During this 10-week training, the migrants participated in an educational program that focused on different aspects of working in Sweden (e.g., laws and regulations, rights and obligations as employees, and a language course on the specific terms used in the different focal occupations for the work placements) and on the Swedish labor market. Three main topics of vocational training were offered: (a) Construction and Building; (b) Urban agriculture; horticulture and cultivation (the target group for the current study) (see Figure 3); and (c) Cooking and Catering. The migrant trainees chose one of these topics for their 10-week program, and either participated 100% (five working days each week) or 50% in combination with the "Swedish for migrants" (SFI) language program. In total, ten groups went through the project, including 202 trainees, 45 of whom were women (Geite, 2019). The vocational training program ran every weekday for an eight-hour working day, which included shared coffee breaks and lunch. The overall project was led by an occupational therapist, where professionals in the given occupation led each working group (a certified builder, two trained horticulturists, and a master chef). The program also offered the trainees short courses on how to write a resume, and together with an occupational therapists who offered motivating conversation and mapping of their interests and vocational skills to support the writing of the resume. The conversation also included aspects of the trainees' interest for future work after ending the program.

In order to create an inclusive atmosphere, the trainees and the staff shared the same lunch room and had their breaks and lunches together. At the start of the working day, each group gathered together to go through the agenda for the day. The working group leaders worked alongside the trainees and shared the everyday work tasks. There was a clearly stated policy that encouraged a non-judgmental approach and respect for each other; the staff discussed these issues on a regular basis with the trainees, as well as leading by example. The leaders also made a point of recognizing each trainee's knowledge, skills, and previous working experience.

The Horticulture program group was led by two trained horticulturists who were responsible for teaching the trainees about horticulture and different aspects of cultivation. The participants spent their days outdoors or in the greenhouses. The trainees learned about the different cultivation methods and crops grown in southern Sweden. The work performed by the trainees included cultivation in the fields, in the raised beds, and in the plastic greenhouse tunnels. They also developed

Figure 2a & 2b. The Botildenborg manor house is a hub for social gatherings. Originally built in 1866, the house was totally renovated between 2017 and 2019 by migrant trainees participating in the Construction and Building vocational program of the *Växtplats Rosengård* project. Figure 2b featuring the growing field and one of the greenhouse tunnels built by the trainees in the Horticultural program. *Photos: Anna María Pálsdóttir.*

Figure 3. Working and growing together, the trainees and the horticulturists in the Horticultural program. *Photo copyright: Xenofilia AB*. Published in agreement with the people appearing.

the infrastructure on the site by, for example, building the raised beds, laying out the walking paths, and putting up fences around the cultivation fields (Figure 2b).

Data collection

This research was conducted as a small sub-study of a larger study, "Horticulture is my Security," run by the Swedish University of Agricultural Science (SLU) (no publications available). Participants from Groups 6 and 7, who participated in the Horticulture vocational program during 2018, were invited to take part in an interview study. The study was conducted as a retrospective semi-structured interview study (Chase, 2005), which focused on participants' experience of being part of the vocational program at Botildenborg, and, specifically, on whether horticulture occupation could enhance their sense of belonging. A total of 14 people agreed to take part in the study: Nine men and five women, with a mean age of 44 years, ranging from 26 to 66 years old. The interviewees were from the Middle East (n=11) and Africa (n=3), and they had been in Sweden for about one year. The study participants were broadly representative of the overall group participating in the *Växtplats Rosengård* project in terms of gender, age, and cultural background.

Interviews

Semi-structured interviews were conducted with each participant, during the week that the trainees completed their 10-week vocational training at Botildenborg, and before they then started their 12-week work placement training at local businesses. The interviews were conducted by the first author with support from an certified interpreter in their respective language.

The focus of the interviews was to investigate if, and in what way, the specific Horticulture training program might contribute to and support the trainees´ sense of belonging. The participants received both written and verbal information (with the support of an interpreter if needed) about the study. All participants had the chance to ask questions about the study before deciding on participation. Participation was voluntary and could be ended at any time without explanation or any impact on the trainees' participation in the vocational program. The individuals who chose to participate provided their written consent. Each interview was performed at the Botildenborg venue and took about 40 to 60 minutes.

The structure of the semi-structured interviews was as follows: A short discussion of their background and previous experience of horticulture; and an exploration of aspects of their lived experience of participating in the Horticulture vocational program at Botildenborg. The informants were given a large degree of freedom to bring up and talk about aspects that were important to them in relation to the main theme. The interviews were recorded with the participants' consent. However, three individuals did not want their interviews to be recorded but were still happy to participate. These interviews were documented as handwritten notes. The handwritten notes from these three individuals were used as supplementary material in the analysis. The eleven audio recorded interviews were transcribed verbatim and analyzed using Interpretative Phenomenological Analysis (IPA) (Smith et al., 2009).

Data analysis

Interpretative Phenomenological Analysis (IPA) is rooted in phenomenology, and the method aims to explore in detail the participants' individual experiences and perception of a phenomenon. The method is used increasingly within the field of psychology, as well as in the wider social research (Pietkiewicz & Smith, 2014). This analytical approach was suitable for this study, which aimed to identify whether the participants experienced a sense of belonging. Data were analyzed following the stepwise procedure described by Smith and colleagues (Smith et al., 2009). The results are presented anonymously at a group level. The method acknowledges the researcher's previous knowledge and experience of the topic as an important aspect of data interpretation. The first author initially read all of the interviews and suggested the main themes; the final themes were then discussed and agreed on in collaboration with the other authors.

Ethnographic Approach

The first author spent several days at Botildenborg over the time that the informants participated in the vocational training program. This was undertaken in order to gain a deeper understanding of the intervention as a current whole phenomenon (Fetterman, 2007). All the participants were informed about the researcher's work and, by group consensus, gave consent for the researcher to carry out participant observations and work with the groups on several occasions during the 20 weeks of training (10 weeks for each of the two groups).

Ethical Considerations

Prior to the interviews, the Swedish Ethical Review Authority's advice was sought concerning ethical

approval, which the authority stated on this occasion was not needed as participation was voluntary and the participants were not being treated for any health-related issues. However, the study did follow the ethical standard for conducting research on people/humans; that is, the participants received both oral and written information about the study, were able to ask questions before deciding on participation in the study, and were able to withdraw from the study at any given point without an explanation. All data were handled in accordance with the recommendations of the Swedish Ethical Review Authority for similar studies and followed SLU's data handling policy in accordance with the General Data Protection Regulation.

Results

The Interpretative Phenomenological Analysis (IPA) of the interviews yielded two main themes.

Theme 1) the Environmental and Organizational Context

The trainees perceived the Botildenborg venue as a safe meeting place, where they were treated with respect and kindness, without judgement based on, for example, language skills, ethnic background, or gender. The participants described a clear framework and a well-structured working timetable. They also emphasized that the leaders made them feel at ease and suggested that working together with the leaders´ was important for them to feel secure in the setting. The attitudes of the employees, in terms of being inclusive and "seeing" the individual, and their clear communication, were considered important factors by the trainees in feeling that they were all treated as equals. The trainees felt they were treated with respect by all, making their time in the project a positive experience, or as expressed by one of the participants: *"When I was here, I had a very good time here. There was love. We have love here, and the employees are very good, nice, so I had it good here."*

The physical environment was perceived as appealing, and the building (the old red brick house) was perceived as beautiful and had positive associations with its history of being a place that embraced people. The garden area was perceived as a creative space where it was possible to experiment with horticulture and learning about and growing different plants. The participants were able to contribute to and develop the outdoor environment by building facilities in the garden, such as new growing beds and walking paths, pergolas and in that way to "make their mark" on Botildenborg. The produce from the vegetable garden was used in the kitchen and the post-harvest produce was often consumed together during the shared lunches. To participate in the vocational program seemed to create space for a pleasant working atmosphere: *"It is interesting to work here. You work your brain and have an enjoyable time when you talk and joke with the others in some way."*

This contributed to the context and could be perceived as safe and secure, and provided an opportunity for the trainees to engage in the work, learn new things, and extend their network by making new contacts. At Botildenborg, the sense of belonging and community was strongly associated with the place, being an equal in the group, and learning new skills and language. The hope for a future in the new country was expressed as follows: *"... I just want a future /.../ We are in Sweden. It is the country for us. We need to do everything here. We have to learn; learn more about Sweden."*

Theme 2) cultivation and nurture

In the context of Botildenborg, growing things together was perceived as a neutral act without ethnic and cultural values. Cultivation was used in the program as a broad term and included various activities, such as propagation, tending of the crop (cultivation), harvesting, and post-harvest handling. In addition, the cultivation work involved preparing fields for cultivation, and building cultivation boxes and fences around fields. This gave the participants the opportunity to challenge themselves both physically and mentally; to take responsibility; and to perform activities based on their own abilities, interests, and what they were learning throughout the program. The trainees said that they felt that the working environment was inclusive, where everyone could take part, regardless of gender, age, ethnicity, or earlier cultivation experience. Some participants were experienced growers, while others had never had never touched soil before becoming involved in the project. They appreciated learning about the common plants grown in Sweden and, at the same time, many felt "at home" when they recognized plants from their native countries, for example, and plants from Syria, Congo, or Zimbabwe, such as parsley, tomatoes, onions, and potatoes. Recognition of the familiar created a sense of belonging: *"...it represents my culture."* With this sense of security, participants were able to develop an interest in what plants were grown in Sweden and in what way (i.e., different cultivation techniques). The participants also described how cultivation enabled

them to learn and practice the Swedish language in a real-world context, and how much can be learned in-situ (sometimes known as scenario-based language learning). This was an important experience in the beginning of the program, especially for those with limited Swedish language knowledge. Those trainees who attended the program 50% of the time and attended SFI for the other 50% also mentioned that it was easier to find the courage to speak when at work rather than at the language school. When attending the vocation program, they felt at ease and this, in turn, motivated them to speak and develop their language skills (in Swedish). They also described how the program enabled them to take responsibility, to do something for themselves, and to be creative. This, in turn, aroused their curiosity and instilled a feeling of satisfaction: *"I am accomplishing something."* This sense of responsibility and accomplishment was accompanied by a desire to be independent, to be able to support themselves, and to be self-sufficient, or as expressed by one participant: *"You long for a job to be able to support yourself and not be dependent on the Swedish Social Insurance Agency and live off benefits /.../ I like working and earning my own money."* All the above aspects were described as an important part of feeling secure, growing, and developing as a person.

Discussion

The trainees expressed the three main components that characterize place attachment (Scannell & Gifford, 2010) i.e. place, person, and process, where the *place* is Botildenborg; the *person* is the trainees and the staff at the *Växtplats Rosengård* project; and the *process* refers to how an outdoor secure and supportive place, (Botildenborg) becomes meaningful for the participants through familiarity and practical involvement. The trainees pointed out that feelings such as familiarity, for example, recognizing plants from their own country, and aspects of learning about cultivation, opened opportunities to learn about Swedish food, culture, and language. This can be referred to as cultural integration (Gentin et al., 2019). For those with earlier experience of cultivation, engagement in familiar activities can be a way to foster the sense of belonging in a new place (Gentin et al., 2019). Biglin et al. (2020) described how a group of refugees described a feeling of being together created a calming experience of belonging through embodied social interaction. Also, Scannell and Gifford (2017) argued that developing place attachment was not only important and beneficial for personal growth and freedom, but also for gaining control over an environment and making connections to nature. Scenario-based language learning was found, in a real-life context, to be important for active learning of both everyday Swedish and work-related terminology. This has also been recognized for refugees doing gardening and horticultural therapy program in Cincinnati, USA that it was easier to learn the English language in a real-life context (Trauth, 2018). The trainees explicitly stressed that they had improved their language skills as a result of the motivating environment, and as a result of using both body and mind for learning. Learning with all the senses, outdoors, is recognized as a successful pedagogical approach to learning new skills, gaining new knowledge, and learning a language (Cornell, 2015; O'Brien et al., 2011).

The feeling of being loved and cared for is considered an important aspect for fostering a sense of well-being (Tay & Daeiner, 2011) and was proposed as one of the five basic needs for humans to thrive and develop (Maslow, 1943; 2015). The positive atmosphere within the program and the participants' experience of an easy learning process for new skills are connected. Here, the relationship can become equal between the staff and the participants (Jordan & Marshall, 2010; Noyce & Simpson, 2018). Positive contact between the trainees and the staff was also found to be an important factor in the recovery process for refugees undertaking vocational training program to join the Danish labor market because it strengthened the feelings of trust between participants and staff (Varning Poulsen et al., 2020). Connecting to nature is also an important aspect in this context. Jax et al. (2018) proposed that caring for nature is an essential element of human well-being and that relational values are engendered when people care for nature, such as through growing plants. The concept moves beyond the focus of people as beneficiaries of nature to a reciprocal relationship, with benefits to both people and nature. The concept of human engagement in horticulture illustrates that caring for plants is universal and that this involves not only providing food but can also nurture social cohesion, mental health, and physical health (Relf & Lohr, 2003). Therefore, using horticulture in vocational training for migrants can be a beneficial approach for helping them settle in a new country (Bishop & Purcell, 2013).

The open and welcoming attitude of the staff in the trainee program seemed to be a source of joy and

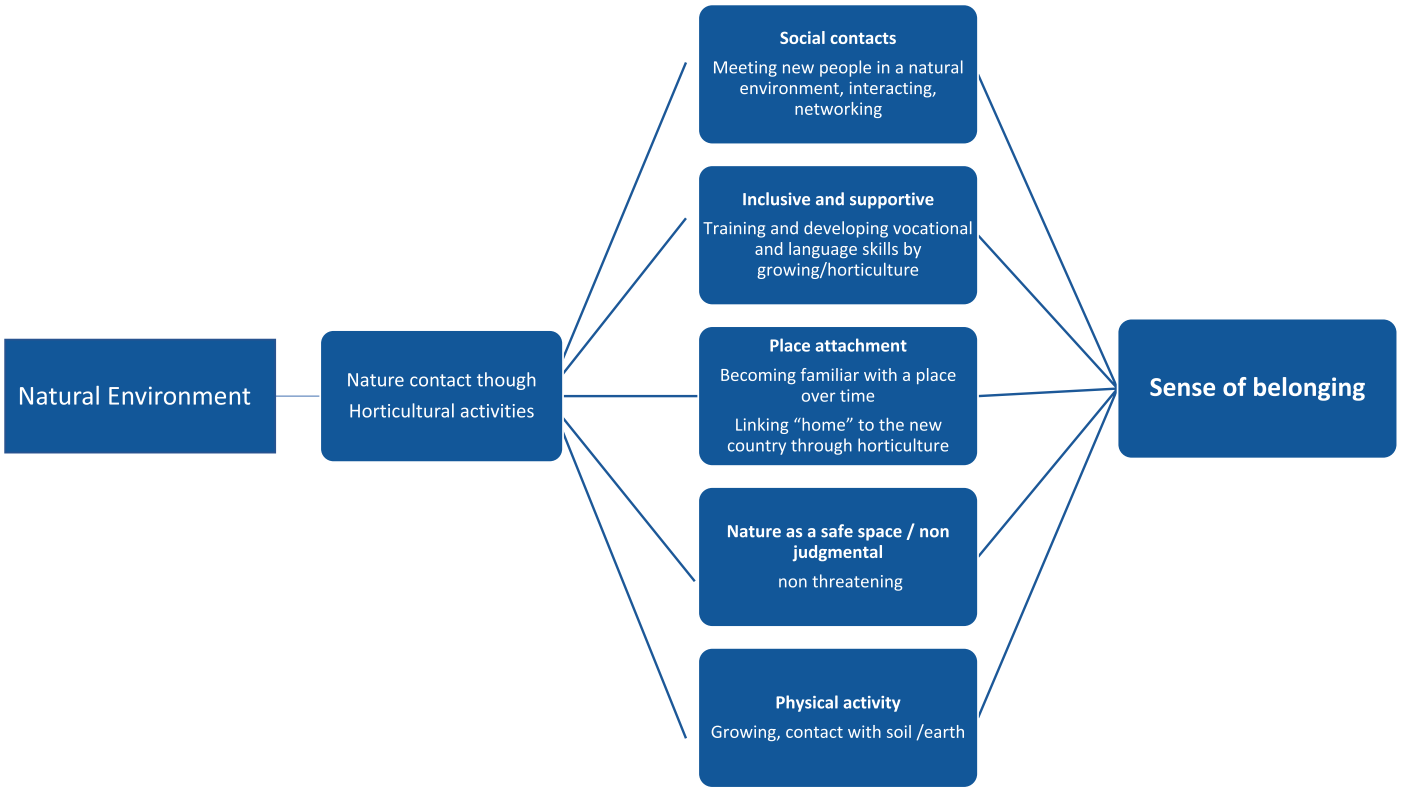

Figure 4. Suggested key mechanisms for creating a sense of belonging through participation in the 10-week *Växtplats Rosengård* horticultural vocational training program at the Botildenborg venue in Malmö.

supported the sense of belonging in the participants, through a combination of meaningful occupations. Giuliani (2003) argued that one of several important functions of place attachment is a sense of belonging, which can alleviate the feelings of social alienation and isolation often identified by new arrivals as obstacles within the introduction program for migrants provided by the Swedish Public Employment Services (Ikonen, 2015). Through the meaningful outdoor activities offered in the vocational training program, the participants were able to challenge themselves and develop their skills, and so experience a sense of accomplishment. This can also be interpreted as having self-control and enjoying the activities performed; in other words, the participants were able to experience self-rewarding value from completing meaningful activities (Persson et al., 2011). As stated by Aubin et al. (1999), meaningful activities, for example, horticultural activities, can contribute to increased self-confidence and improved self-image. A daily life dominated by unsatisfactory and meaningless occupations can result in loss of vocational competence, an important prerequisite for good health and general well-being (Morville, 2014). The participants demonstrated the desire and ability to enter the Swedish labor market, and to become financially self-sufficient and independent in their new home country. The outdoor vocational training program, with its focus on cultivation and growing, seems to offer the potential to support the sustainable integration of foreign-born individuals who are excluded from the labor market, and to provide them with a route to future employment or further training (Geite, 2019; Asking, 2019). Participation in the vocational program seems to support greater self-confidence, and strengthen the trainees' nature based vocational skills and language, fundamental elements for connecting to a place and society (Robson, Sampson and Gifford, 2010). The acquisition of cultural skills, knowledge, and understanding of common practice, such as how the labor market works in Sweden and how horticulture is

conducted in the Swedish context, can be regarded as a part of cultural integration, whereas social interaction and acquiring new friendships across cultures can be regarded as interactive integration (Getin et al., 2019) that can support the development of place attachment (Stodolska et al., 2017).

From the current study, we identified five key mechanisms that can create a sense of belonging (Figure 4). An inclusive and non-judgmental approach is essential for creating the feeling of a safe and non-threatening space, where one can grow through social interaction and be physically active in horticultural vocational training. Other studies (Bishop & Purcell, 2013; Diamant & Waterhouse, 2010; Ekstam et al., 2021; Harwig & Mason, 2016; Varning Poulsen et al., 2020) have identified similar mechanisms that can create a sense of belonging through meaningful occupations such as horticulture. The activities (that are not entirely dependent on verbal communication), the mutual work (doing) and the self-rewarding value of horticulture (being), all together can create and support the sense of belonging. For that to happen, the environment needs to be perceived as physically and emotionally safe. In occupational science, the aspects of *doing, being,* and *belonging* facilitate the process of *becoming* (Wilcock, 2006); in other words, the future oriented process enables the individual to move on with their lives and not become stuck in a particular life situation (Hammell, 2004). Through the creation of a sense of belonging, the trainees in the 10-week vocational program have the prospect of *becoming*.

Conclusions

This study sought to explore whether a sense of belonging could be created through the *Växtplats Rosengård* vocational horticultural program at the Botildenborg venue. The two main themes of "environmental and organizational context" and "cultivation and nurture" identified by the research illustrate that a sense of belonging can emerge during 10 weeks of vocational training. We recognize the fact that the trainees did not mention any negative aspects of participating in the program. At the time of the interviews, the participants still had 12 further weeks of work placement training away from Botildenborg, and so a follow-up interview at the end of the full 22-week program might have revealed additional aspects of their experience that may have been less beneficial for their entry into labor market. However, the material collected in this study provides some insight into how and why a sense of belonging was experienced during the 10-week program. We suggest similar future programs should focus on the mechanisms identified above, that is, being inclusive and supportive; allowing for creativity through the planting, growing, and nurturing of plants; providing a connection to migrants' home countries by allowing the planting of recognized vegetation; and enabling and supporting the practicing of the language of the new country in which the migrants have arrived. The role of the staff in contributing to a positive atmosphere and finding the right balance between making demands of and caring for the participants, must also be part of the concept. The vocational program can help to prepare the trainees for entering the Swedish labor market and provide them with transferable skills that they can use for future employment or further training in their new country. Given the small size of the study, it is difficult to generalize to a broader context; however, it does provide insights into how horticulture in a safe environmental context can be used to provide meaningful occupation and to foster a sense of belonging for migrants in the new country. The suggested key mechanisms for supporting a sense of belonging could be implemented in a similar context using other types of activity program.

Study limitations

To conduct an interview through a third party (certified interpreter) can be challenging. First, it is not only about establishing trust between the interviewees but also with the person interpreting what is said. Ikonen (2015) identified the challenge that interviewees did not always trust the interpreter. This can result in that the interviewees not giving a full or detailed reply to the questions. However, we cannot be sure if this is the case for this study but like to argue otherwise as the translated information was detailed. To address this, a second opinion i.e. having the recorded interview checked by another interpreter could be added before the analysis starts to ensure that all information provided by the interviewees is included. Also, having different interpreters (especially for the Arabic-speaking informants) for the interviews can be problematic as there are personal differences between the interpreters although all are certified. To have one or two certified interpreters for the task throughout the study would be preferable but this was not possible due to the structure and system to book interpreters at the university (governmental body).

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Conflict of interest

The authors declare not conflict of interest.

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BIOGRAPHY

Dr Anna María Pálsdóttir is a assistant professorand senior lecturer at the Swedish University of Agricultural Sciences (SLU) at the department of People and Society. She is a trained horticulturist by profession and holds a BSc in biology & horticulture sciences as well as MSc and PhD in landscape planning and environmental psychology.

She works with conceptual development and transdisciplinary scientific evaluations of nature-based and nature- assisted interventions that are conducted in various outdoor environments for different target groups. She also conducts research on the content and design of sustainable health-promoting outdoor environments for human health and well-being. The research is conducted in close collaboration with national and international universities, governmental offices and stakeholders. During 2015-2020 she was the PI for evaluation of three different nature-based vocational training programs for migrants supported by the Swedish Employment office in a collaboration with both private and public stakeholders.

Anna María is one of the founders of the master program Outdoor Environments for Health and Well-Being and in a collaboration with other of educators built up courses on *nature-based interventions* (focus on landscape and outdoor environment and health promoting features) and *nature and animal assisted interventions* (focus on occupations and activities) as well sensory expression in outdoor environment.

Dr Liz O'Brien is head of a dynamic Social and Economic Research Group at Forest Research in the Great Britain. Forest Research (FR) is the research agency of the Forestry Commission and Great Britain's principal organisation for forestry and tree-related research. Her work focuses on understanding the complex relationships between forestry, the environment and society.

She is currently finishing leading a six year programme on 'Valuing and governing forest ecosystem services,' which is interdisciplinary, and is about to lead a five year programme on the Societal benefits of trees and forests. Liz was involved in the United Kingdom National Ecosystem Assessment Follow-on project on the 'shared, plural and cultural values of ecosystems'. She has recently been a work package leader on an EU Cost Action on the social and environmental benefits of green infrastructure, leading a team focused on socio-cultural benefits. She has a strong focus on values, health and wellbeing, inequalities and land manager behaviours.

Dr Dorthe Varning Poulsen is an assistant professor at the University of Copenhagen, department of Geoscience and Nature-resources. She have a background as physiotherapist, a M.Sc. in Sport and Welfare and a Ph.d in Nature-based therapy. As a member of the interdisciplinary research group *Nature, Health & Design,* she conduct a wide range of interdisciplinary research on the relationship between natural environments and human health. Dorthe have a special interest in developing nature-based therapy for special groups as refugees, veterans with PTSD, Victims of domestic violence. Currently she is responsible for planning and implementing a work package in project Move Green, which will examine the effect of rehabilitation in specially designed natural environments for older people at risk of falling and younger adults with spinal injuries. The project addresses the need for developing rehabilitation methods in natural environments within the area of rehabilitation, for example, at hospitals and municipal health centres.

Dr Ann Dolling is assistant professor and senior lecturer at the Swedish University of Agricultural Sciences (SLU) at the department of Forest Ecology and Management. Her focuses is interdisciplinary research on human health its effects on visiting and staying in different forest environments and how this knowledge can be used in various activities such as nature and health companies, lifestyle changes and when deciding on forest management methods. She also works with nature-based integration with the goal to facilitate the integration of immigrants in the Nordic countries with the help of forest and nature.

Ann is currently working with the project "Nordic Nature Health Hub" - a Nordic virtual toolbox for nature entrepreneurs and everyone who visits and moves in nature. The intention is to develop tools and verified knowledge about the health effects of nature, respect for natural and cultural heritage in an inclusive environment and to create new opportunities for health and nature entrepreneurs.

She teaches botany and about forest and health in the Forestry master's program and about nature-based interventions in the master's program Outdoor Environment for Human Health and Wellbeing.

Cultivating Care: Trauma, Homeless Veterans, and Nature-Based Therapy

Becca Hart & Steve Zanskas
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Homeless veterans experience compounding trauma as a result of their experiences both overseas and on the streets. The complexities reveal a tangled web of mental illness, substance abuse, and destructive behaviors that make routine housing-first solutions seem ineffectual, archaic, and misguided. Nature-based therapies, however, can supplement more conventional rehabilitation modalities to cultivate meaningful growth for this hard to reach population. Nature has been used for centuries in the healing process, but in recent decades, we have seen mounting evidence to support nature-based therapies as effective interventions for treating maladaptive mechanisms of trauma; namely issues concerning trust, emotional regulation, and socialization. Nature-based therapy is identified as a multidimensional yet practical approach for building out effective care programming aimed to cultivate the psychosocial health of homeless veterans.

Cultivating Care: Trauma, Homeless Veterans, and Nature Therapy

The impacts of trauma can create rippling, detrimental effects in the lives of the most privileged and financially secure. For the cross-section of the population that has both served in the military and experienced homelessness, the effects of trauma can be life threatening. In this case, trauma often compounds, exacerbates, and generally complicates existing physical and psychological conditions, unjust societal infrastructures, and current circumstances. The lasting effects of trauma make it difficult to connect with and care for veterans who have experienced homelessness.

However, nature-based therapy can address posttraumatic responses exhibited by this population by contributing to positive psychosocial health outcomes. We can analyze the ways in which nature-based therapy is suited to treat the complex trauma experienced by previously homeless veterans by first examining homelessness trauma, veteran trauma, and the lasting effects of trauma as it pertains to emotional regulation, trust, and socialization. Understanding trauma allows us to more fully appreciate the capacity of nature-based therapies as trauma-informed interventions.

Homelessness Trauma

The U.S. Department of Health and Human Services defines a homeless individual - "an individual who lacks housing… including an individual whose primary residence during the night is a supervised public or private facility (e.g., shelters) that provides temporary living accommodations, and an individual who is a resident in transitional housing," but the reality is the experience of homelessness is extremely dynamic and nuanced (Somerville, 1992; Silva, Silvestrini, Poellnitz, Prado, & Leite Junior, 2018). Homelessness does not just impact the physical realm, but also the emotional, psychological, social, and spiritual (Somerville, 2013; Zare, Ross, Strevel, & Alfayez, 2017).

Point-in-time statistics from 2018 reveal that on any given night, approximately half a million people are homeless in the United States (Henry, Mahathey, Morrill, Robinson, Shivji, & Watt, 2018). Those experiencing homelessness are disproportionately of minority status and have high rates of mental illness, intellectual disabilities, and substance abuse (Klop, Evenblij, Gootjes, de Veer, & Onwuteaka-Philipsen, 2018). Half of the homeless

population is over 50 years old and often faces extenuating physical and medical problems related to age (Social Solutions, 2016).

Wacquant (2007) eloquently explains three ways in which our society tends to confront marginalized and outcast populations like those experiencing homelessness. We (1) attempt to socialize the group according to our preferences, (2) medicalize the group by prescribing substance abuse and mental health disorders across the group, or (3) criminalize the group and reduce the rights of its members. These societal perspectives are antiquated, inhumane, and prevent mobility. There is a dire need for alternative approaches to the care for the homeless population. Silva et al. (2018) call for new practices which "understand the plurality of the homeless" (p. 492).

Research points to permanent supportive housing as a viable solution for homelessness (Cusack, Montgomery, Blonigen, Gabrielian, & Marsh, 2016). But shelter isn't everything. It is important to recognize the widespread impact of homelessness on an individual and their wellbeing. Goodman, Saxe, and Harvey (1991) suggest homelessness to be a potential risk factor for the development of an emotional disorder. The stressors and consequences of homelessness can be intense enough to diminish an individual's capacity to cope and even bring on symptoms of psychological trauma. The experience of street living involves many precursors to trauma, including losing one's home, exposure to unsafe shelters, and of course, the often traumatic events that led up to having to leave one's home (Goodman et al., 1991). People who are currently or who have previously experienced homelessness adhere to fatalistic views, coupled with feelings of powerlessness and apathy (Somerville, 1992). Situations that arise within the context of a homeless experience (harassment, chronic fear, etc.) are often deeply traumatic as well (Avina & O'Donohue, 2002; Dattilio, 2004).

Fitzpatrick, Kemp, & Klinker (2000) explain the unfortunate algorithm leading to circumstances of homelessness. Their research points to the relationship between *microcosmic factors*, conceptualized as personal experiences involving mental illness, trauma, and substance abuse disorders, and *macrocosmic factors*, conceptualized as social situations such as unemployment, access to healthcare, and poverty. The experience of being homeless then becomes a multiplicative equation of unfortunate circumstances.

Homelessness presents a multitude of obstacles (frequent high-risk or unsafe situations), which can complicate and magnify previously existing *microcosmic factors* (maybe a mental illness that predated the homeless experience). This potentially results in maladaptive coping behaviors that in turn perpetuate situations of homelessness; for example, self-medicating through substance abuse which prevents an individual from holding down employment (Heerde, Hemphill, & Scholes-balog, 2014). The repercussions of a homeless experience become just as complex as the myriad of pathways leading to life on the streets (Powell & Maguire, 2018).

Veteran Trauma

Post-traumatic Stress Disorder

Service-related trauma has been recognized for centuries. In 1870, Arthur Meyers used the term 'soldier's heart' to describe men who experienced tremors, fatigue, and even fainting in combat situations. Throughout the following decades, social scientists would revisit this concept using different terminologies; 'shell shock,' 'soldier's heart' and later, 'post-traumatic stress disorder' (American Psychiatric Association, 1980; Kardiner, 1951; Myers, 1870; Myers, 1916).

Today, we are familiar with this phenomenon as PTSD. PTSD can be thought of a "failure to recover" from witnessing or experiencing a traumatic event that elicits intense fear, helplessness, or terror (Kirkpatrick & Heller, 2014, p. 339). It is often a physiological response to experiencing or witnessing a life-threatening event, like combat, a natural disaster, a car accident, or sexual assault. However, more researchers are pointing to *small t* traumas (chronic illness, sexual harassment, and other situations causing severe emotional distress) that might not meet the contextual criterion identified in the *DSM-V,* but result in just as many symptoms of PTSD (Avina & O'Donohue, 2002; Dattilio, 2004). The *DSM-V* regulates the diagnosability in terms of symptoms regarding intrusiveness, avoidance, negative cognitions, and mood (American Psychiatric Association, 2013).

Among the veterans coming home from the recent wars (Operation Iraqi Freedom/Enduring Freedom/New Dawn or OIF/OEF/OND), the Veterans Administration estimates 11-20% suffer from posttraumatic stress disorder (US Department of Veteran Affairs). Around 30% of Vietnam veterans are expected to have experienced posttraumatic stress during their lifetime (US Department of Veteran Affairs). However, because PTSD was not accepted by the medical community as a

disorder until the third edition of the Diagnostic Statistical Manual in 1980, many Vietnam veterans suffering from trauma related to their service went untreated (Van Putten & Emroy, 1973). Many were given a diagnosis of schizophrenia or psychomotor epilepsy because their flashbacks were deemed as hallucinations. However, these disorders were considered pre-existing and the Veterans Administration would not treat them. Other veterans were diagnosed with LSD abuse (again, because of the hallucinatory symptoms) and were denied medical care because before 1976 the VA did not cover substance abuse rehabilitation (Van Putten & Emroy, 1973). As a result, many cases of PTSD have gone untreated.

Neurobiological Trauma

In addition to the psychological traumas of war, we must also consider the physical traumas as well. Traumatic Brain Injuries (TBI) are injuries that result from blunt external forces that disrupt brain functioning (Johnson et al., 2013). While TBIs vary in severity (mild, moderate, & severe), they cause lasting effects such as memory loss, fatigue, irritability, and attention deficits (U.S. Department of Veterans Affairs, 2019b). Veterans from recent wars with traumatic brain injuries face a nearly 50% comorbidity rate with PTSD and are twice as susceptible to develop PTSD if they suffer a physical injury during their time in the service (Hoge et al., 2008; Koren, Norman, Cohen, Berman, & Klein, 2005; Kulka et al., 1990; Pitman, Altman, & Macklin, 1989). Care avoidance, or the tendency to turn away from necessary care as a perceived means of protection, among this group is high and they have low attendance/high dropout rates for mental health care appointments (Erbes, Curry, & Leskela, 2009; Schout, De Jong, & Zeelen, 2010). Findings like these lead some researchers to deem the neurological complications that result from both PTSD and TBI as "additive, if not multiplicative" (Sherin & Nemeroff, 2011).

Homeless Veterans

Veterans face complex re-entry obstacles after military separation, including a lack of transferable skills and lingering physical and mental health issues. When they return to civilian life, veterans are often met with a shortage of affordable housing, unlivable incomes, and increasingly difficult to maintain support networks (National Coalition for Homeless Veterans). Some advocates point to the ways in which homelessness emulates military life as a reason behind these significant numbers. The intensity and violence of living on the streets, as well as primarily dwelling outside, is not so different from the experience for armed forces' personnel in war zones (Ellis & Singer, 2014). Researchers find veterans to be over-represented among the homeless population, with current point-in-time estimates at 8.6% (Henry, et al,, 2018; Fargo et al, 2012).

Another component of neurological trauma for this population is cognitive decline as a result of abusing drugs and alcohol. Substance abuse is the most common psychiatric disorder in the homeless community (Fazel, Khosla, Doll, & Geddes, 2008). Almost half of all homeless veterans surveyed in 2013 report suffering from co-occurring disorders of substance abuse and mental health issues (100,000 Homes Campaign, 2013). Post-traumatic stress disorder and the symptoms that result are also linked to high rates of substance abuse (Jacobsen, Southwick, & Kosten, 2001). Researchers find significant levels of co-morbidity between traumatic brain injury and substance abuse (Sacks et al., 2009). The effects of long term substance abuse can result in impairments to learning retention, memory, and decision-making (Ornstein et al., 2000; Rogers et al., 1999; Solowij et al., 2002).

Homeless veterans suffer from higher-than-average rates of addiction, mental illness, and infectious disease (Cox et al., 2017). Just one instance of homelessness significantly increases the risk of future homelessness, meaning housing this vulnerable population is not enough to treat the experience of homelessness (Cusack et al., 2016). Homeless veterans, in particular, experience a compounding trauma from the complexities of both veteran and homelessness status (Goodman, Saxe, & Harvey, 1991; Sherin & Nemeroff, 2011). If not addressed, these traumas can be debilitating and prevent productive transition into society.

Effects of Trauma

Physiologically speaking, experiencing trauma affects the Sympathetic Nervous System (SNS) and the Parasympathetic Nervous System (PNS) - which work together in the Autonomic Nervous System (ANS). While the PNS controls the body at rest, the SNS is responsible for the *fight, flight, or freeze* response (Bicknell-Hentges & Lynch, 2009). The SNS system is triggered easily and frequently in individuals with PTSD. When the SNS is stimulated the body produces increased rates of adrenaline and cortisol, sending the body into a state of hyperarousal. Chronic SNS arousal has harmful effects including increased limbic irritability (which is related to

emotional regulation management), the risk of depression and anxiety, and even damage to the brain (Scaer, 2005; Siegel, 2003).

The effects of trauma run deeper still. Trauma impacts an individual's emotional health, psychological health, and even social health. Broadly, we can conceptualize these interrelated wellness domains as 'psychosocial health' (Donatelle, 2007). Additionally, growing bodies of data reveal the ways in which psychological trauma preys upon an individual's neurological systems much in the same way as a traumatic brain injury (Sherin & Nemeroff, 2011).

Neurobiological disability, whether it be from a TBI or cognitive decline from substance abuse or psychological trauma, has its own crippling impact on psychosocial health (McCarthy et al., 2006; Whiteneck et al., 1992). Simply looking at recovery from (and treatment for) trauma-related disorders in terms of either psychosocial health or neurological health falls short. For the purposes of understanding the complex and cyclical relationship between trauma, neurobiological disability, and psychosocial health, we will analyze three domains of wellness that are impacted in an individual impacted by trauma; emotional regulation, trust, and socialization.

Emotion Regulation

Emotional regulation is the process of experiencing, navigating, and exerting emotional responses (Gross, 1999). Healthy management of complex and negative emotions (such as depression, anxiety, and shame) permits individuals to control their behavior and resist potentially harmful impulses. On the other hand, researchers have shown that ineffective emotional regulation is related to aggression, substance abuse, deliberate self-harm, and other dysfunctional behaviors (Fox, Axelrod, Paliwal, Sleeper, & Sinha, 2007).

Detachment, depression, anxiety, self-destructive behavior, and recklessness are all psychological symptoms associated with trauma (Kirpatrick & Heller, 2014). In the brain, trauma can induce memory loss and contribute to a state of 'mental defeat'- or a loss of autonomy and control associated with feeling ashamed, guilty, and powerless (Brewin & Holmes, 2003). Individuals with neurological disabilities also exhibit high rates of anxiety and depression (Bonanno et al., 2012; Brennan, 2002; Canzian et al., 2012; Vu et al., 2014).

When an individual is not able to effectively manage their emotions, they may turn to maladaptive behaviors, or "short-term attempts to regulate negative emotions in the absence of more adaptive strategies" (Powell & Maguire, 2017, pg. 366). Indeed, difficulty regulating emotions among those experiencing homelessness is linked to maladaptive coping mechanisms like substance abuse (Compas, Malcarne, & Banez, 1992; Wills, Sandy, Yaeger, Cleary, & Shinar, 2001; Wong et al., 2013). Recent studies reveal that healthy emotion regulation management has the potential to minimize the self-destructive responses that create and sustain experiences of homelessness (Powell & Maguire, 2017).

Trust

Individuals experiencing trauma sometimes avoid care because they view the social services offered to them as unhelpful or feel they have been manipulated by services in the past (Schout, De Jong, & Zeelen 2010), which can contribute to further feelings of suspicion and mistrust towards outreach (Rowe, Fisk, Frey, & Davidson, 2002). These kinds of paranoid and delusional thoughts have the potential to perpetuate the state of homelessness because such beliefs impede the use of healthy coping strategies (Powell & Maguire, 2018). Paranoid thinking is thought to be linked to the risk of homelessness because of the lack of trust for institutions, people, and the denial of symptoms that lead to destructive actions. Thus, those facilitating outreach to individuals with backgrounds of homelessness must be perceived as trustworthy in order for services to be effective (Kryda & Compton, 2009).

The stigmatization of mental illness, as well as personal attitudes towards self-reliance, mental health, and treatment, lead to care avoidance among those with mental health issues (Greene-Shortridge et al., 2007). Coupled with trauma-induced feelings of shame and guilt, mistrust, and neurobiological upset, care avoidance in regards to treatment seems inevitable for this population. According to interviews with individuals experiencing homelessness in New York, effective outreach workers should be empathetic, good listeners, and spend quality time with the individual. By facilitating more in-depth experiences with individuals experiencing homelessness, community outreach workers can build more trusting relationships with their clients and encourage them to return to services consistently (Kryda & Compton, 2009).

Socialization

Many individuals coping with PTSD struggle in their relationships with others because of communication discrepancies, trust issues, and problems with emotional regulation and intimacy (US Department of Veteran

Affairs, 2019a). Researchers have found PTSD to be positively correlated with poor work and family satisfaction levels (Vogt, Smith, Fox, Amoroso, Taverna, & Schnurr, 2017). The same study reported the effects of PTSD to negatively impact the dynamics of intimate relationships. Across the board, research appears to confirm the association of posttraumatic stress symptoms and impaired social relationships (Koenen, Stellman, Sommer, & Stellman, 2008; Lunney & Schnurr, 2007).

Emotional numbing and withdrawal are cited as significant mechanisms of PTSD that contribute to the decline in quality of social relationships among veterans with PTSD (Campbell & Renshaw, 2013). Likewise, neurological disabilities can inhibit an individual's capacity to establish and manage social relationships (McCarthy et al., 2006). When we consider the impact trauma has on the neurobiological system, the correlation between trauma responses and poor social relationships does not seem out of the ordinary (Sherin & Nemeroff, 2011).

Nature-Based Therapy as Trauma-Informed Care

Researchers have identified positive outcomes in the psychological, cognitive, and socialization domains as the benefits of nature-based therapy and gardening activities for older adults and general populations (Barton & Pretty, 2010; Buckley, Brough, & Westaway, 2018; Nicholas, Giang, & Yap, 2019; Wang & MacMillan, 2013).Broadly speaking, nature-based therapy (NBT) is a therapeutic modality that incorporates nature settings and engagement with nature in a rehabilitative process (Berger & McLeod, 2006). Counselors who utilize nature-based therapy seek to amplify and facilitate the restorative and collective elements of the natural world for clients (Berger, 2009a, 2009b; Berger & McLeod, 2006). Researchers point to two main frameworks in which experiences of nature promote well-being and positive psychosocial health outcomes.

The first, Stress Reduction Theory, claims that nature stimulates our Parasympathetic Nervous System (PNS) and actually decreases stress because of our innate and evolutionary preference for luscious landscapes. These kinds of nature scenes evoke a response because they suggest qualities of sustenance and protection - in turn, we respond positively psychologically (Ulrich et al., 1991). The second framework, Attention Restoration Theory, suggests experiencing nature induces a different type of concentration, or *soft fascination*, to activate in our brains which provide restoration for mental fatigue rather than depleting the mind (Kaplan, 1995).

Implications for Emotion Regulation

Interactions with nature are linked to improved mental and emotional health (Ward et al., 2011). Nature and gardening experiences reduce stress levels and improve depressive symptoms for participants (Pálsdóttir, Grahn, & Persson, 2014; Edwards, McDonnell, Merl, 2013). A recent meta-analysis of 22 case studies examining the effects of gardening on health found gardening to significantly impact positive health outcomes by reducing mood disturbances and increasing quality of life (Soga, Gaston, & Yamaura, 2017). Furthermore, many researchers have speculated that a growing disconnection from nature plays a role in failing physical and mental health (Berger, 2009a, 2009b; Berger & McLeod, 2006; Reber et al., 2016).

A 2016 study analyzed the effects of injections of a common and harmless soil bacteria, *Mycobacterium Vaccae* or *M. vaccae* for short, in mice (Reber et al., 2016). *M. Vaccae* mice showed reduced levels of stress compared to their counterparts not injected. For example, the mice met face-to-face with an alpha male mouse in a situation that typically evokes a dominant-subordinate relationship. However, *M. vaccae* mice were unphased by this upset and actually showed 50% fewer *fight or flight* reactions when forced into the subordinate position (Reber et al., 2016).

M. vaccae injections were also found to be responsible for reduced anxiety levels when mice were placed in situations with an unpredictable outcome (Lowry et al., 2007). These responses have led researchers to believe contact with soil positively impacts reactions to "approach and avoidance" conflicts. Some are even beginning to explore a possible PTSD vaccine using a probiotic strain with similar immunoregulatory abilities to *M. vaccae* (Schlanger, 2017).

Implications for Trust

Nature-based therapy has the potential to positively impact care avoidance tendencies that are prevalent among the homeless population. Through small demonstrations such as seed sprouting, the composting of "dead" plants to feed new life, and even the changing of seasons, experiences in nature reveal an equilibrium of interconnectedness that foster feelings of connection (Reese & Myers, 2012). Christensen (2009) calls for *reconnection* as an essential step to effective psychiatric street outreach for marginally housed populations; claiming that reconnecting to a community of care "signals that the person has once again

established a tether to a social network that had previously been ruptured, [and] is crucial for continued healing and inclusion" (p. 1039).

Care avoidance among the homeless population can be conceptualized in two ways (van Laere & Withers, 2008). The first, and most commonly studied, is in terms of healthcare and accessing necessary medical attention. But the other side of care avoidance is reflective of engagement in social care, like shelter programming, housing, financial health, and social activities. Engaging with nature can foster a sense of togetherness, which makes trusting one another easier, but it can also increase socialization rates in community settings (Ward et al., 2011; Harris, 2017).

A systematic review into the effects of natural environments on psychosocial health for individuals with neurological disabilities found that access to and interactions with nature contributed to positive emotional and social health outcomes for patients with dementia (Lakhani, Norwood, Watling, Zeeman, & Kendall, 2019). If we understand dementia as a decline in cognitive functioning (and in a way, similar to the neurobiological disabilities experienced by veterans who have experienced homelessness), then it is not difficult to conceptualize how the natural environment might contribute to wellness for those suffering from the neurobiological effects of trauma.

Concepts such as humanity, dignity, and equality have been cited as crucial for establishing trusting relationships with the homeless population (Klop et al. 2018). Growing bodies of evidence point to the efficacy of street pastors and spiritual caregivers in their work with this group in particular (Christensen, 2009; Klop et al., 2018; Kryda & Compton, 2009). This can be attributed to a methodology of *low-threshold contact* characterized by respect, substantive conversations (not just medically driven), and quality time spent without the threat of care-referrals. Nature-based therapies offer an opportunity to build trust between a homeless client and a community outreach worker as such activities act as an exercise in compassion and community.

Nature-based therapies do not overtly emphasize cognitive introspection or trauma reflection and individuals with trauma backgrounds may be more receptive to this type of intervention (Steenkamp, Litz, Hoge, & Marmar, 2015; Tanielian, Tanielian, & Jaycox, 2008).

Often, the focus of these interventions is on developing a recreational skill (i.e. planting, cultivating, harvesting, general plant care, etc.) as opposed to direct treatment intervention for PTSD or substance abuse. During the task-oriented process, articipants call upon problem-solving skills to arrive at a solution rather than defaulting to the maladaptive coping skills they have developed in the face of difficulties (Gelkopf, Hasson-Ohayon, Bikman, Kravetz, 2013; Wheeler, et al. 2020)

Implications for Socialization

Most of the studies regarding the positive outcomes of nature-based and horticultural interventions have pointed to physical and mental health, but a recent meta-analysis explored the benefits of community gardening and horticultural interventions as they related to specifically to psychosocial well-being (Spano, et al., 2020). Researchers investigated seven case studies to determine impact in social domains such as cohesion, social support, positive social interaction, and shared emotional connection. The results of the analysis found community gardening and horticultural therapy treatment activities to have an overall positive effect on psychosocial well-being (Spano, et al., 2020). Indeed, many of these nature-based activities are inherently relational (Veen, Van der Berg, Visser, & Wiskerke, 2016; Rogge, Theesfeld, & Strassner, 2018).

For example, a study observing green care farms (farms that engage participants with agricultural activities to encourage psychosocial and physical wellness) at nursing home facilities revealed green care farm residents to be engaged in significantly more social interactions than residents in the traditional facilities (de Boer et al., 2017; Hine, Peacock, & Pretty, 2008). Myren, Enmarker, Hellzen, & Saur (2017) found similar trends when examining the impact of green care farms and traditional care facilities for persons with dementia. In comparing relationship between residents and staff, they found the bond developed between the two groups at green care facilities to be much stronger than at traditional facilities. The authors cite sharing meals and gathering around food as modalities for genuine connection for green care farm residents and staff.

Another study monitored the impact of a 10-week nature-based therapy Danish war veterans with PTSD over the course of a year. Data analysis revealed the veterans had refined their coping skills for dealing with stressful family situations during their nature therapy program (Poulsen, Stigsdott, & Davidsen, 2018). Each of the veteran participants expressed feeling solidarity with the other

group members over the 10 weeks as well, which hints at the mechanisms of connection that a relationship with nature produces (Poulsen, et al., 2018; Ottosson, 2001). Experiences in nature and the cooperative qualities of farming cultivate meaningful connections for participants.

But it's not just green care farming that that promotes social engagement. In a recent study conducted to examine the improved psychological symptoms in veterans after brief outdoor recreational experiences, a four-month follow up revealed participants had taken it upon themselves to create a Facebook group to stay connected to others they had met during the group recreation (Wheeler, et al. 2020).The results of this same study suggest the *type* of outdoor recreational activity to be immaterial to the positive outcomes found (Wheeler, et al., 2020) - leading us to believe other nature-based therapeutic activities would likely elicit similar prosocial behaviors.

Indeed, community gardens create a space for community development - especially for minority and low-income groups because of their ability to offer sanctuary and cultural cohesion (Salvidar-Tanaka & Krasny, 2004). Reearchers following gardening groups at low-income housing sites found connecting with others and helping each other out as common themes behind garden participation (Wang & Glicksman, 2013). In addition to helping one another in the garden and showing their garden handiwork with family, participants shared their abundant harvests with other housing residents that did not participate in the garden program (Wang & Glicksman 2013).

The Veterans Affairs Medical Center (VAMC) in Salem, Virginia offers quite an example of the community development fostered by nature-based therapies. A 2014 randomized study investigated the effects of horticultural therapy versus non-horticultural occupational therapy on a Veterans Administration (VA) 28-day Substance Abuse Rehabilitation Treatment Program (SARRTP) in terms of physiological health and symptom reduction (Lehmann, Detweiler, & Detweiler, 2018). The plan was to expand upon the pilot project the following year, but due to logistical complications, this never happened. However, two years later, researchers discovered patients in the new cohorts of the same 28-day SARRTP had continued gardening in raised beds for the two growing seasons since the original program had ended. Indeed, some of the original horticultural therapy participants had returned to participate in the 28-day program the following spring and taught their fellow veterans horticultural skills to cultivate and maintain flowers and vegetables in the beds. The veterans were so enthusiastic about their horticultural endeavor that they set up a direct line of communication with VA staff to find volunteers and additional materials for their garden (Lehmann, Detweiler, & Detweiler, 2018).

Conclusion

Many people not specifically trained in trauma therapy operate under the assumption that effective treatments for trauma focus on past or excessive exposure. However, to help clients fully recover, there is much work that needs to be done in the here-and-now (Van der Kolk, 2015). Nature can act as a powerful platform for trauma processing by improving cognitive functioning, incorporating mind-body practices, and providing individuals with the opportunity to gently explore issues with a peripheral and non-cognitive modality (Berger, 2009a, 2009b; Berger & McLeod, 2006; Berger & Tiry, 2012; Kaplan, 1995; Ulrich et al., 1991). Nature-based therapy offers promising positive health outcomes for those inflicted by the torments of trauma (Barton & Pretty, 2010; Buckley, Brough, & Westaway, 2018).

Therapies that call upon the the natural environment provide powerful interventions that address maladaptive mechanisms of trauma in terms of emotional regulation, fostering trust, and facilitating socialization and engagement. As such, nature-based therapies should be used to rehabilitate previously homeless veterans suffering from compounding and complex trauma. Green care farming, community garden plots, and raised beds are accessible, relatively inexpensive, engaging, and aesthetically-pleasing platforms to promote community outreach and development targeting this unceasingly marginalized group (de Boer et al., 2017; Hine, Peacock, & Pretty, 2008). The time has come to implement more creative and intentional rehabilitation strategies for the hard-to-reach homeless veteran population.

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BIOGRAPHY

Becca Hart became a farmer to feed people. After several grueling seasons of growing food and a whole lot of reflection, she came to realize just how nourishing agriculture could be. It was in the field - literally- where Hart discovered a unique way to connect more deeply with others, the world around her, and to cultivate growth. Hart is now a graduate student at University of Memphis in the Clinical Rehabilitation Counseling program. Originally from Florida, she has lived abroad in Panamá as well as spending several years working on organic farms around the country.

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Conceptual Biophilic Design In Landscape Architecture – A Design Concept For A Health Garden In Iceland

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Through the use of an evidence-based health design landscape architecture model (EBHDL), a design concept has been developed to create a health garden located in Iceland. The conceptual structure is based on specific aspects of biophilic design, on current knowledge of nature's positive effects on human health, on empirical studies, and on post-occupational evaluation from the Alnarp Rehabilitation Garden in Sweden and the Nacadia Therapy Garden in Denmark. The concept is being implemented at Hrafnhólar farm in Iceland and will become a valuable part of the vocational rehabilitation program managed by the Janus Rehabilitation Center. The health garden at Hrafnhólar farm will be the first of its kind in Iceland and will become an important behavioral setting for research on new vocational rehabilitation approaches worldwide.

Introduction

Nature-based intervention (NBI) is a concept in which the intervention is both supported and grounded in the natural environment. It includes different outdoor spaces where natural elements such as plants, trees, animals, insects, stones, soil, fire, coastlines, and water are presented (Corazon, 2012; Kristjánsdóttir et al., 2020; Pálsdóttir et al., 2018c; Sahlin, 2012; Vujcic et al., 2017). In Scandinavia, nature-based intervention programs have been launched for individuals with stress-related mental disorder or clinical depression with the intention of facilitating recovery. This has been undertaken in health garden contexts (Corazon et al., 2010; Eriksson et al., 2010; Grahn et al., 2010; Tenngart Ivarsson, 2011), peri-urban agricultural landscapes (Gonzalez et al., 2011; Höglund, 2020; Stigmar et al., 2016), and rural landscapes, e.g., forests (Corazon et al., 2019; Sonntag-Öström et al., 2014) in which meaningful on-site occupations (activities) (Persson et al., 2007) that embrace nature are utilized to assist the rehabilitation process. These interventions focus on achieving outcomes such as changes in cognitive, emotional, and physiological conditions (Corazon et al., 2010; Varning Poulsen, 2015); perceived levels of stress (Millett, 2008; Sonntag-Öström et al., 2011); positive effects on direct attention (Sahlin et al, 2016); return to work rate and overall function (Nordh, Grahn & Währborg, 2009; Pálsdóttir, Grahn & Persson, 2014a); the client's own perception of the rehabilitation process (Eriksson et al., 2010; Sahlin, Matuszczyk, Ahlborg & Grahn, 2012; Wästberg, Harris & Gunnarsson, 2020) and how experiences from the nature-based intervention have been integrated into everyday life (Eriksson et al., 2010). The results of these studies indicate beneficial effects for the target group and together form an important foundation for implementing NBI in Swedish healthcare (Stigmar et al., 2016).

All of the above nature-based interventions in Scandinavia are being implemented in environments dominated by natural elements. Some are in designed spaces, i.e., healing gardens (e.g., Nacadia and Alnarp Rehabilitation Garden) but others take advantage of the natural outdoor space as it is (e.g., at farms, at forest sites, and in an agricultural landscape). The phenomenon and the concept of natural settings in health care have been referred to by many names, for example, restorative garden, healing garden, sensory garden, care farm, and urban green therapeutic space (Stigsdotter et al., 2011). It is not easy to arrive at a universal definition of 'garden,' nor 'health garden,' as gardens may vary in

size, content, purpose, and use (Stigsdotter et al., 2011; Ross, 2001). The outdoor environment can either be designed according to evidence-based health design principles or used just as is without any interference. From this perspective, it is important to bear in mind that not all natural environments support human health. It is therefore important to apply the EBHDL model in order to realize the potential positive outcomes the potential positive outcomes (Stigsdotter, 2012). Health gardens can facilitate therapeutic programs by providing sensory stimuli for both passive and active interaction with the natural milieu (Diehl, 2009). Health gardens are intended to, and can, improve an overall sense of well-being, support therapeutic processes (Cooper Marcus & Barnes, 1999), and mitigate stress-related mental exhaustion (Cordoza et al., 2018; Ulrich et al., 2020) by using diverse design approaches to fulfil the garden's intention (Bengtsson, 2015).

The aim of the current work is to describe the design process and create an evidence-based conceptual design for a health garden located in Iceland, adhering to the EBHDL architecture model.

Evidence-based health design process

Within evidence-based landscape architecture, a new branch called Health Design (HD) has emerged, defined as the conscious design of green spaces and gardens to be used in a specific way to support health processes and result in improved health outcomes (Stigsdotter, 2015). In order to gain a better understanding and

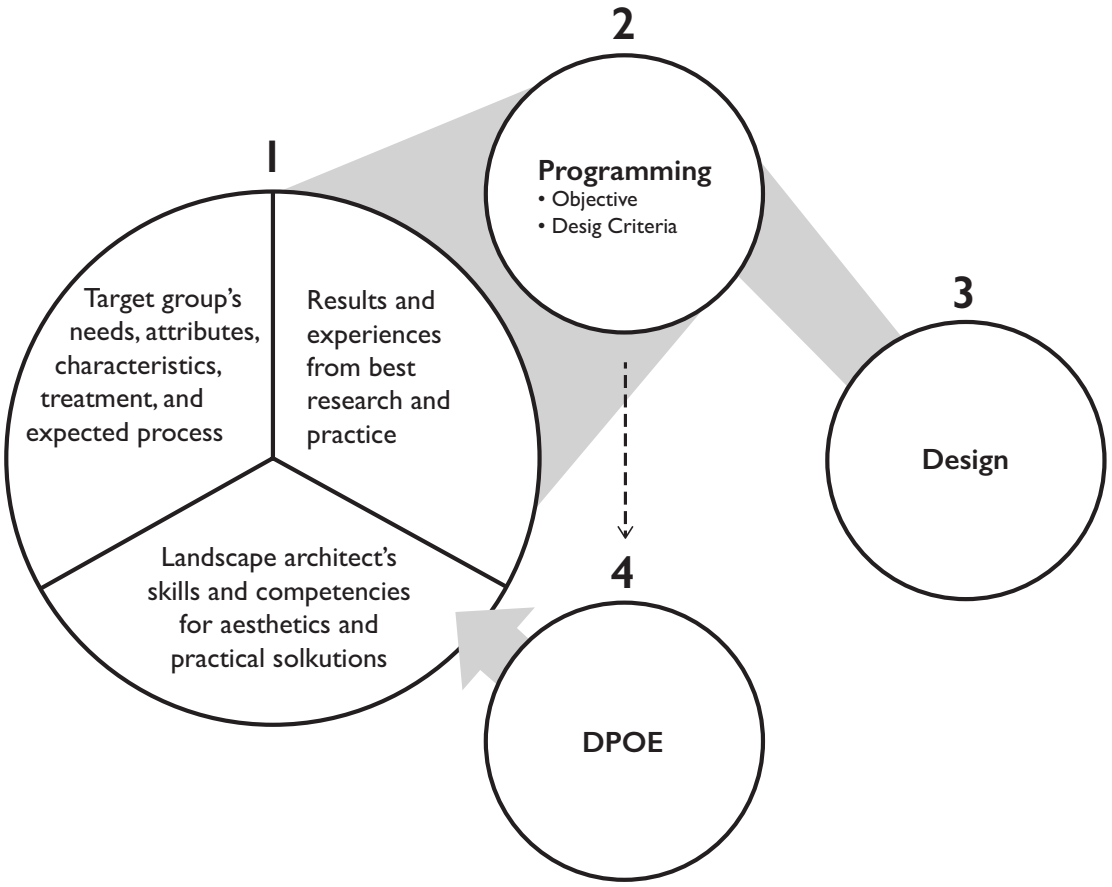

Figure 1. The evidence-based health design in landscape architecture model is a continuous design process, extracting new knowledge about a supportive environment through each cycle that the evidence-based health design in landscape architecture process runs. Reproduced with permission from Sidenius, U. et al., 2017.

knowledge of what can be considered a health-improving environment, it is essential to have a combination of the EBHDL architecture model and diagnostic post-occupancy evaluation (DPOE) (Sidenius, 2017) (p. 17). This evidence-based health design process needs to contain salutogenic ingredients that can improve social, psychological, and physical health and be based on the most current evidence for what achieves the best results in terms of a supportive environment in health design (Stoltz, 2020; Vischer & Zeisel, 2008; Bengtsson & Grahn, 2014).

In the model presented by Sidenius et al. (2017) and Stigsdotter and Sidenius (2020), the EBHDL process is made up of four steps (Figure 1). The first step combines three aspects, namely, the designer's expertise, experience, and professional skills; the current knowledge base; and scientific results regarding the needs of the specific client group. The second step involves determining the objectives and design criteria, i.e., what aspects the design should cover regarding the expected outcome of the supportive environment in terms of the health-related outcomes for the clients. The third step in the process involves creating a new design for the setting of the nature-based interventions, based on the two previous steps of the EBHDL process (see Figure 1). The fourth and final step is a diagnostic post-occupancy evaluation, i.e., an evaluation of the function and outcomes of the EBHDL architecture model (Cooper Marcus & Sachs, 2014). The diagnostic post-occupancy evaluation process can include both qualitative and quantitative measures (Lygum et al., 2019). It can also be applied in other type nature-based interventions, thereby evaluating and validating the treatment program (Corazon et al., 2012). This scientific process will be utilized at Hrafnhólar farm once the rehabilitation program has started.

In Europe, there are, to our knowledge, only two examples of full-scale behavioral nature-based settings that are based on the EBHDL architecture model and that employ longitudinal diagnostic post-occupancy evaluation. One is run by the Swedish University of Agricultural Sciences in Alnarp and the other by the University of Copenhagen, in Denmark. Both universities have established health gardens for the purpose of studying the interaction between human beings and the physical outdoor environment in designed healing gardens (Adevi, 2012; Corazon, 2012; Pálsdóttir, 2014; Varning Poulsen, 2015; Sidenius, 2017; Stigsdotter, 2003; Tenngart Ivarsson, 2011). The research work in the Alnarp Rehabilitation Garden has been ongoing since 2002. The garden was originally designed to support recovery for individuals suffering from stress-related mental illnesses (Stigsdotter & Grahn, 2003). Since 2012, the garden has also been utilized for other groups of clients, in which instance some adjustments have been made to the outdoor environment (Pálsdóttir et al., 2018b; Pálsdóttir et al., 2020; Bengtsson et al., 2020, pp. 9). The original design of the Alnarp Rehabilitation Garden was based on different theories regarding the healing and restorative effects of gardens (natural environment) incorporating the positive aspects of human occupations, i.e., *doing* and *being* (Grahn et al., 2010). At that time, there had been little research on nature's positive effects on human health, so the garden's design was mostly based on theoretical considerations.

The design of the Nacadia Therapy Garden, which opened in 2011, was grounded in the experience and scientific knowledge gained through the research conducted at the SLU Alnarp Rehabilitation Garden (Corazon et al., 2010), which highlighted nine superior criteria for the EBHDL architecture model. These included features such as using natural materials and providing an environment that confers feelings of safet*y* and coherence, and that is easy for clients to understand and move around in (ibid; Stigsdotter, 2012). Substantial research had been conducted by the time the Nacadia Therapy Garden was designed, so the design process included state of the art knowledge on the specific aspects of nature that support human health. Both gardens are designed to support client recovery from mental illnesses or mental fatigue (often clients with stress-related mental illnesses and PTSD (ICD-10 F43) and continue to be a foundation for scientific research. The scientific evaluations have covered clients' outcomes in terms of health and well-being, but not covered here (see e.g., Grahn et al., 2018; Pálsdóttir et al., 2014a; Pálsdóttir et al, 2020; Whärborg et al., 2013) and the qualities supporting clients' health during the interventions (Adevi, Uvnäs-Moberg & Grahn, 2018; Corazon, 2012; Pálsdóttir, 2014; Varning Poulsen, 2015; Sidenius, 2017; Tenngart Ivarsson, 2011).

Biophilic design

Within the NBI concept, nature-inspired restorative design approaches serve to reshape the relationship between nature, humans, and constructed environments. These nature-inspired design approaches, such as designed biophilic spaces, can offer humans a restorative connection to nature that reduces stress and contributes to beneficial health and well-being (Beatley & Newman

2013; Hartig, Bringslimark & Patil, 2008; Hung & Chang, 2021).

One essential influence is the extension of *biophilia* (Wilson, 1984) and its impact on contemporary design approaches, such as evidence-based design (Abdelaal & Soebarto, 2019). Biophilic design relates to the 'ability of architectural design to influence an individual's physiological and psychological states as an extension of the biophilic connection to nature' (Söderlund & Newman, 2015), where the main characteristics of biophilic design relate to e.g., natural patterns and processes, human-nature relationships, and place-based connections (Kellert, 2008; Wilson, 2004). According to Kellert's biophilic concepts (2008, pp. 5-15), biophilic design recognizes two basic dimensions: 1) the *organic or naturalistic* dimension and 2) the *place-based* or *vernacular* dimension. These two dimensions can be related to six biophilic design elements: *environmental features, natural shapes and forms, natural patterns and processes, light and space, place-based relationship,* and *evolved human-nature relationships*. In turn, these relate to 70 attributes of biophilic design, which can be associated with perceived and experienced attributes such as color, water, prospect, refuge, and views. Pursuing and adhering to these basic principles of Kellert's biophilic dimensions, design elements, and related attributes are likely to result in improved outcome in biophilic design (Kellert, 2008).

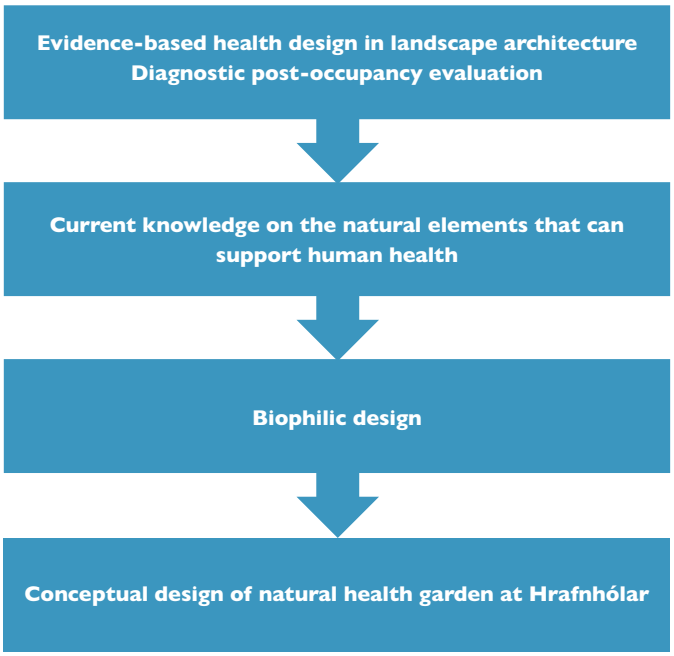

Figure 2. The novelty of the Hrafnhólar natural health garden's design is that it will be based on the model of evidence-based health design in landscape architecture that includes diagnostic post-occupancy evaluation of the Alnarp Rehabilitation Garden (ART) and Nacadia, representing the current knowledge about the natural elements supporting human health. In addition, it will incorporate biophilic design philosophy so as to create a new conceptual biophilic design in the Hrafnhólar natural health garden.

In the design concept presented in this article, Kellert's (2008; 2012) proposed restorative environmental design concepts have served as an inspiration and a guide throughout the design process.

A new design concept for a natural health garden

The concept proposal for the natural health garden at Hrafnhólar farm is based on the EBHDL process (Figure 2), and it is inspired by current scientific knowledge about how natural elements can support human health, with a focus on biophilic design adopted to Icelandic nature and the rather harsh weather conditions. The garden design needs to take into account the local climate, native vegetation, and the abundance of gravel, stones, cliffs, and mountains in Iceland, as well as the deep-rooted impact that these natural features can have on Icelanders, both culturally and experientially. The uniqueness of the current work is that the process now takes a third loop in the EBHDL process, as it includes up-to-date knowledge from the diagnostic post-occupancy evaluation of two world-leading behavioral research settings, i.e., the Alnarp Rehabilitation Garden and the Nacadia Therapy Garden (Figure 2). To the best of our knowledge, this has not been done before. The natural health garden at Hrafnhólar farm is not only the first of its kind in Iceland, but also the first of its kind to follow the EBHDL architecture model, referencing comprehensive compiled knowledge generated from research in two behavioral settings i.e., the Alnarp Rehabilitation Garden and the Nacadia Therapy Garden as well as drawing inspiration from biophilic design.

The venue – Hrafnhólar farm

Hrafnhólar farm is located at the southwest corner of Iceland, about 6 km from the coast at an altitude of 120 m. The overall size of the farm is approximately 1000 ha, of which 30 ha is farmland, but the bulk of the Hrafnhólar area consists of rolling hills and mountain slopes (Figure

3 and 4).

The growing season for plants is only about 3 months, and temperatures rarely exceed 15°C. Winters are relatively mild but can be very stormy, with wind speeds often above 20 m/s. Several days a year, the wind speed may even reach 35-45 m/s.

Hrafnhólar farm is nested in a shallow valley, surrounded by Mount Skálafell to the east and Mount Esja to the north. In this section of Mount Esja, the majestic Móskarðshnjúkar forms three prominent peaks, which can be seen and admired from the farm.

Although the farm is only 25 km from Reykjavik city center, it is quite secluded and, therefore, ideal for creating an ambience of solitude and calmness. The health garden will be positioned at the junction of farmed land and wilderness, quite close to the farm buildings. The calmly flowing Leirvogsá River outlines the southern border of the health garden, but Tröllafoss, the biggest waterfall in the county of Reykjavik, is located just 2 km upstream. From there, Leirvogsá gushes forward in an impressive gorge for about 1 km before slowing to become tranquil as it reaches the Hrafnhólar health garden area. Within the boundaries of Hrafnhólar, the landscape is a blend of rock formations, meadows, heather, and an occasional shrub. Hrafnhólar farm is part of the national afforestation scheme, and the area's surrounding hills have been planted with forest seedlings, still in the early growth phase. The health garden will cover about 5 ha.

Concept dimensions

Naturalness – a safe permissive sanctuary constitutes the overall concept dimension for the natural health garden at Hrafnhólar farm. As such, the garden will be in harmony with the Icelandic landscape and its natural elements and colors. A *place-based* design that respects the landscape ecology and topology is essential to create a balanced impression for the mind and the senses. However, the landscape dimensions within the garden will be adapted to the needs of a sustainable health garden program, mainly

Figure 3. A) Tröllafoss (Troll's fall) in the river Leirvogsá; B) Leirvogsá River in a gorge upstream from the health garden. The Hrafnhólar farm can be seen in the distance (Photo: Arnór Víkingsson).

Figure 4. Overview of the farm Hrafnhólar (to the left) and on the right from the farm is where the natural health garden will be built. The river, Leirvogsá, seen in the middle (Photo: Anna María Pálsdóttir).

by expanding the number of tree canopies. For practical reasons, the inclusion of evergreen trees is absolutely necessary to provide shelter during harsh winter storms.

The design concept is divided into three levels, with the first level representing the overall theme of the natural health garden, i.e., *naturalness*, which is the closeness to the perceived natural appearance of the landscape, where the natural elements dominate the constructed environment and mostly have the characteristics of the native vegetation of the Icelandic landscape, as if being part of it (see Figure 5). The entrance to the natural health garden will be the exception to this; here, evergreen trees will dominate the vegetation as a means of connecting the garden area with the seedlings being grown in the planted forest in the surrounding hills (see Figure 8). The overall concept of *naturalness* (Figure 5) reflects direct and indirect human experiences and is coherent with

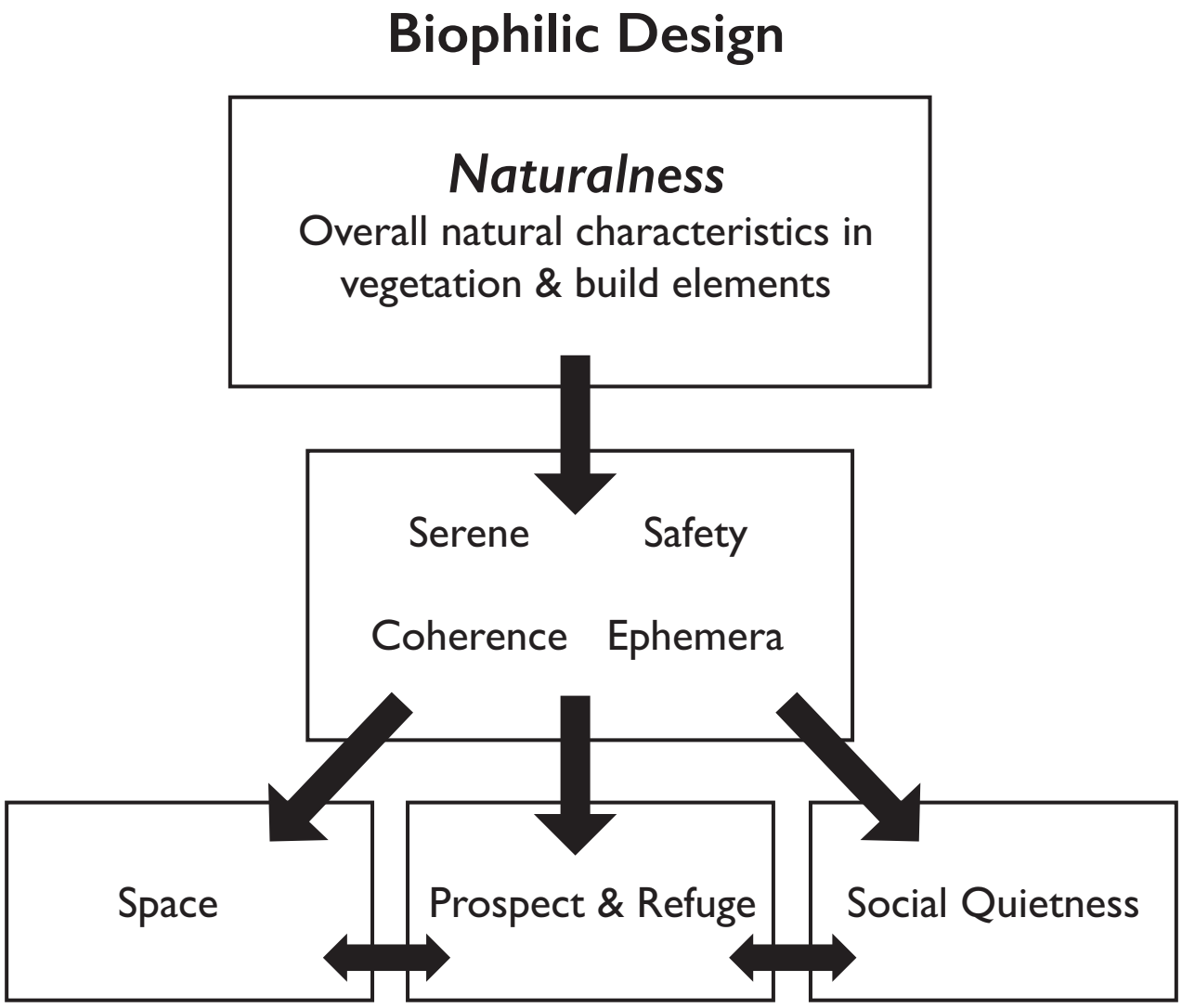

Figure 5. The design concept is divided into three levels, where the first level represents the overall theme of the natural health garden - naturalness. The second level contains the sub-themes: safety, coherence, ephemera, and serene. The third level contains four main conceptual aspects: space, prospect, refuge, and social quietness.

the spirit of the venue (Hrafnhólar farm). It corresponds to Keller's (2008; 2012) two basic dimensions: 1) the *organic or naturalistic* dimension and 2) the *place-based or vernacular* dimension and related elements and attributes.

The second level of the design concept contains the sub-themes of *safety, coherence, ephemera,* and *serene (serenity)*. These are based on findings from earlier research and are conceptualized in Figures 5-7. The clients' need to feel *safe* in the environment is not only essential but can be considered a prerequisite for their desire to stay in the environment (Poulsen, 2015; Pálsdóttir, et al., 2014). Fostering a sense of security and minimizing the risk of mental and physical unpleasantness are important to the clients' use and enjoyment of the environment (Bengtsson & Grahn, 2014; Kellert, 2012). *Coherence*, as in a clear structure, is necessary, so that clients/visitors can easily interpret and understand a place (Corazon et al., 2010; Kaplan, Kaplan & Ryan, 1998). An excessively complex structure or an overabundance of contrasting textures can deplete mental capacity, and so *coherence* is key for mental restoration (Pálsdóttir et al., 2018a; Tenngart Ivarsson, 2011). *Ephemera* are identified as one of nine key components used to describe landscape characteristics (Tveit & Ode Sang, 2014) and epitomize the seasonal changes in natural elements, landscapes, and weather. Observing seasonal changes has been reported as something that creates a sense of connection and, in turn, a feeling of being calm and mentally restored (Adevi, 2012; Kaplan & Kaplan, 1989). The sub-

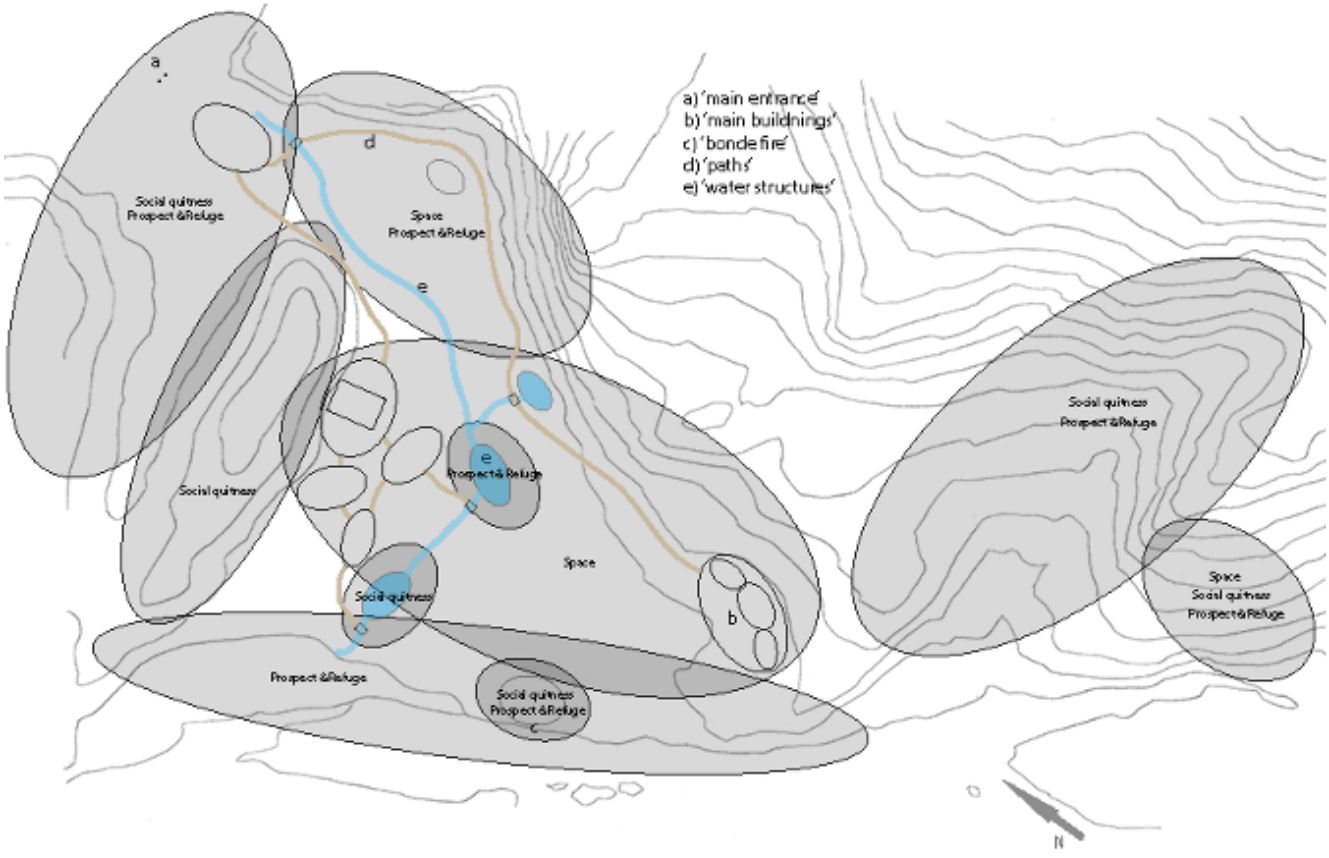

Figure 6. Implementation of the conceptual design at Hrafnhólar farmland. The garden will cover about 5 ha. (Illustration: Petra Thorpert).

theme *serene (serenity)* is strongly associated with the experience of visual and auditory impressions, where the stimuli are in balance with the client's needs and condition (Cerwén, Pederssen & Pálsdóttir, 2016; Pálsdóttir et al., 2018a).

The third level of the design concept contains four main conceptual aspects: *space*, *prospect*, *refuge*, and *social quietness* (Figure 5), which are used to promote stress reduction, health, and well-being. *Space* as a restorative concept has been mentioned in many studies (Kaplan, 1990; Grahn & Stigsdotter, 2010; Pálsdóttir et al., 2018a) and relates to human experiences of spacious green environments, where environmental features are seen and experienced as part of a larger whole. Appleton's (1975) Savannah theory (*prospect & refuge* theory) proposes that seeking optimal sites for a safe shelter and simultaneously having visual control over the surrounding landscape is supportive for clients with stress-related illnesses. Studies indicate that a balance between *prospect* and *refuge* is crucial for cleints/particpants with stress-related illnesses to feel comfortable and safe in the rehabilitation environment (Adevi, 2012; Sdenius, 2017; Pálsdóttir et al., 2018a; Norcross & Wampold, 2011). Additional elements for patient groups with stress-related illnesses relate to the conceptual term *social quietness* (Pálsdóttir, 2014; Cerwén, Pedersen & Pálsdóttir, 2016), which refers to the importance of being alone with nature and highlights the need for experiences of solitary engagement with nature in order to process emotions and experience mental restoration.

Figure 6 shows the overall *place-based* conceptual setup, divided into different sections which reflect the main conceptual aspect. The term *space* relates to experiencing the environmental features as part of a larger context, while at the same time having a sensory experience and being able to move freely without being hindered by adjacent features. In the areas labelled *prospect and refuge*, the clients/participants are surrounded by and embedded in greenery, complemented with views that are consistent with the surrounding scale. *Social quietness* in Figure 6 refers to the client's/participants´ s group's need to be alone with nature and undisturbed by the presence of others. The area is intended for both *doing* and *being*, where the /users can either participate in horticultural and garden activities together with others or enjoy the

Figure 7. An overview of the health garden at Hrafnhólar, Iceland. The main entrance will be in the northwest corner, above the greenhouse (to the left). The tree-domed greenhouse; the base will be like the Icelandic traditional buildings with stone and turf walls/base and the roof will be a transparent dome (like the one in Alnarp Rehabilitation garden). The surrounding areas have been planted with forest seedlings as part of the national afforestation scheme (Illustration by Hugo Settergren).

garden spaces in solitude. For an overall illustration of the conceptual framework implemented in the landscape at Hrafnhólar, see Figure 7.

Biophlic inspiration

The concept of evidence-based biophilic design is directly related to Kellert's (2008 or 2012) basic dimensions of *organic or naturalistic* and *place-based* or *vernacular* relationships and acts as a fundamental framework and inspirational foundation for the conceptual outcomes. The most important locations where the concept has been actualized in detail are (a) the main entrance, (b) the main buildings, (c) the bonfire, (d) the paths, and (e) the water structures (see Figure 6). These connect directly or indirectly to Kellert´s biophilic elements of *place-based relationship, evolved human-nature relationships*, *natural patterns and processes, and environmental features.*

In terms of the biophilic and nature-based intervention aspects, the main entrance will encourage the patients to walk through an area dominated by *prospect and refuge*, embedded in vegetation and hidden under canopies. This area aims to capture Keller´s biophilic element of *evolved human-nature relationships,* linked with *coherence* as well as *prospect and refuge*. Figure 6 shows the main buildings and the area between, dominated by the characteristics of *space*. These areas stimulate the qualities of organic growth and cultural connection, and represent Kellert´s (2008; 2012) biophilic elements of *natural patterns and processes* and *place-based relationships*. Located at the east side of the natural health garden, the main garden house consists of three modules and is made of Icelandic traditional turf and stone walls, and is covered by glass domes (Figure 7, on the top right side of the illustration). The idea of having a dome house/roof is an inspiration from the research conducted in the Alnarp Rehabilitation Garden, where the shape of the dome was perceived as

Figure 8. Shows the main entrance to the health garden. Although not part of the Icelandic flora, the dominating vegetation at the entrance will be "green" i.e., evergreen conifers will embrace the visitors when they enter the garden, regardless of the season but with some Icelandic birches in the center of the entrance to create light (Illustration by Hugo Settergren). Hrafnhólar farm is a part of the afforestation program in Iceland, and this evergreen area will connect the garden with the area planted with spruce and pines.

calming, as if under the sky itself (Pálsdóttir, 2014). The traditional greenhouse is located in the southern part of the garden, nestled in the surrounding horticulture garden (Figure 7 on the left side of the illustration), where focus is on both *doing* and *being* as the users can participate in horticultural and garden activities. In the middle of Figure 6 the bonfire area is sheltered by shrubs (*prospect*) and sight cover (*refuge*), where the conceptual design corresponds to being undisturbed and alone with the nature (*social quietness*).

The main water structure in the natural health garden is a small stream that runs from the main entrance towards the horticultural area. On its route through the garden, the stream forms the two main ponds surrounded by vegetation, with the aim of creating a sense of *social quietness* and *prospect and refuge.* This water structure is designed to represent living growth and development through time and to be a reflection of ageing. As such, it relates to Keller's biophilic elements of *natural patterns and processes* and *evolved human relationships to nature*.

Although not part of the Icelandic flora, evergreen conifers will be the dominating vegetation at the entrance, so as to embrace the visitors when they enter the garden, regardless of the season (see Figure 8). This mini forest site at the entrance, will in time, connect the garden to the newly planted conifer forest in the adjacent hills, currently in the seedling stage. The natural health garden will have one main path, starting at the main entrance and heading in two directions - one leading to the main garden houses and the other to the horticulture garden (Figure 9). Pre-existing small paths in the landscape, formed by the grazing sheep that roamed the land for hundreds of years, will also be part of the path system. Within the horticulture garden area, paths will connect the horticultural beds and ponds.

At a more detailed level, Kellert´s (2008) biophilic element termed *environmental features* is directly related with the evidence-based biophilic concept design of the Hrafnhólar health garden, where characteristic features of the natural environment, such as the color scheme, mirror Icelandic nature and reflect the seasonal changes (*ephemera*) accordingly. The buildings and constructions in the garden will be dominated by natural materials such as turf, stones, wood and grass walls, inspired by the traditional Icelandic turf houses, and water is present in different forms (the *Leirvogsá River,* and a small stream leading to a large pond). There is a three-domed greenhouse, where the base replicates traditional Icelandic buildings with stone and turf walls, and the roof is a transparent dome (similar to the one in the Alnarp Rehabilitation Garden). The elements in the

Figure 9. A view facing the garden and horticulture area (to left) and the walkway up to the main buildings; a combination of traditional turf base/walls and the three-domed greenhouse, on the right (Illustration by Hugo Settergren). The idea of having a domed house/roof is an inspiration from the research conducted in Alnarp Rehabilitation Garden (Pálsdóttir, 2014; Pálsdóttir et al., 2018).

health garden will be coherent, where no odd objects, elements, features, or colors will be present, and the vegetation will be designed to be lush and abundant without being excessive. It will include deciduous and evergreen shrubs and trees, as well as bulbs, annuals, and perennial plants in soft colors. The purpose of this is to enhance the feeling of *serenity*. The natural health garden should provide a sense of security, where the users are sheltered by the landscape and surrounding vegetation, and are able to rest and recover, away from everyday hassles and curious passers-by (Figure 9).

The main biophilic design elements and attributes used in the Hrafnhólar health garden concept are taken from Kellert's *place-based relationship* to enhance, for example, local familiarity, and cultural and ecological connection; *evolved human-nature relationships*, focusing on key aspects of the innate human relationship to nature, such as, order and complexity, security and protection; *natural patterns and processes*, encouraging reflection on the processes of ageing, the passage of time and organic growth; and *environmental features,* to draw attention to well-known properties of nature, e.g. natural colors, natural smellscape, water, fire, views and vistas. In the context of biophilic and nature-based intervention aspects, the main objective for the overall conceptual design of this natural health garden in Iceland is to provide a supportive naturalistic environment. The soundscape is dominated by natural sounds that can facilitated mental restoration (Cerwén, Pedersen & Pálsdóttir, 2016).

Future perspectives

The natural health garden at Hrafnhólar farm will become an important part of a rehabilitation program managed by the Janus Rehabilitation Center in Reykjavík and is intended to help debilitated individuals in need of nature-based rehabilitation. The garden will be utilized by several groups of people in need of vocational rehabilitation, although the main focus will be on young adults (16-25 years old) with mental health problems who belong to the NEET group (Not in Education, Employment or Training) (Power et al., 2015; Rowell, et al., 2018). The term NEET has been coined to define the growing problem of inactivity and social dysfunction among 5-16% of young adults in Europe (Organization for Economic Co-operation and Development, 2018). About 20% of the NEET population in Iceland have significant mental health problems including anxiety, depression, and attention deficit and hyperactivity disorder (Arnardottir, 2020), conditions that studies have shown can be improved with exposure to nature. Unfortunately, many of these young adults have adopted a sedentary lifestyle and are often disengaged from nature. The Janus Rehabilitation Centre has been heavily involved in the rehabilitation of these young adults, and we are confident that the availability of Hrafnhólar health garden will be a valuable addition to the rehabilitation options already at hand. Additionally, the Janus Rehabilitation Centre plans to engage in a rehabilitation program for individuals suffering from stress-related illnesses (burnout), using the Hrafnhólar health garden to improve subjective well-being, engagement, sense of meaning and purpose, as well as decreasing mental distress (O'Brien et al., 2011; Bratman et al., 2015; Bratman et al., 2019). Each target group will have a nature-based intervention program tailored to their specific needs in order to achieve the rehabilitation goals. If required, the detailed garden plan will be adapted for the clients´ mental and physical abilities. Such a comprehensive holistic rehabilitation approach requires a collaboration between the healthcare sectors and experts in nature-based interventions. The clients will also benefit from the successful methodologies currently employed at the Janus Rehabilitation Center, including psychosocial approaches, empowerment, motivational interviewing, and the use of artificial intelligence to assist in structuring the rehabilitation program at the individual level (Siggeirsdóttir et al., 2011; Haraldsson et al., 2018). At Hrafnhólar farm, on the premises adjacent to the salutogenic environment of the health garden, the intention is to capitalize on diverse farm-related activities adapted to each individual's interests and needs, thus supporting the rehabilitation process. Among such activities are attending to horses, goats, dogs, and hens; planting trees; and growing vegetables.

The natural health garden at Hrafnhólar will be the first of its kind in Iceland and will become an important behavioral setting for research on new approaches in nature-based vocational rehabilitation. This work will also contribute to a new cycle of evidence-based health design in landscape architecture through diagnostic post-occupancy evaluation of nature-based interventions and natural health gardens. The interventions at Hrafnhólar natural health garden will be subjected to scientific evaluation. The regular use of many internationally approved questionnaires, as already practiced at the Janus

Rehabilitation Center, will create numerous opportunities to study the impact of various interventions on the well-being, health and function of the participants.

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BIOGRAPHY

Anna María Pálsdóttir is an associate professor and a senior lecturer in landscape architecture and environmental psychology at the Swedish University of Agricultural Sciences (SLU) at the dep. of People and Society. She is a trained horticulturist and holds a BSc in biology & horticulture sciences as well as MSc and PhD in landscape planning and environmental psychology. She works with conceptual development and scientific evaluations of nature-based and nature-assisted interventions that are conducted in various outdoor environments for different target groups. She also conduct research on the content and design of health-promoting outdoor environments and how we can shape and build sustainable outdoor environment for public health and well-being. Anna María has a long experience working in interdisciplinary research team in environmental phycology, landscape architecture, health and occupational sciences.

Petra Thorpert holds a PhD in landscape architecture and her research projects mainly focus on perception of landscape and its relationship to landscape aesthetics and human health. The projects are often multidisciplinary, involving ecologists, environmental psychologists and artists covering both urban- and natural environments. Her doctoral thesis is built on studies performed in the urban green contexts and explores colour influences on human perception and related experiences.

Vilmundur Gudnason is director of the Icelandic Heart Association and professor in cardiovascular genetics at University of Iceland. He is an owner and chairman of the board of Janus rehabilitation. Obtained a medical degree in Iceland and a PhD at University of London. He is the PI of the AGES-Reykjavik study, based on the 50-year-long Reykjavik study, and for the REFINE Reykjavik study of younger generations.

Hugo Settergren holds a B.Sc. in Landscape Architecture, has as an intern at FOJAB Architects begun to improve work procedures regarding the ecosystem services in architectural design projects. He also works as an Illustrator, Graphic Designer and Landscape Architect and has executed various creative works for clients such as Bonnier Magazines, Lund Municipality and Malmoe University among others. Currently he is a student at the M.Sc programme of Sustainable Urban Design at Lund University.

Arnór Víkingsson is a cofounder of the rehabilitation center Thraut in Reykjavik Iceland, intended for people with fibromyalgia, operating since 2011. He is also a consulting rheumatologist at Landspitali University Hospital in Reykjavik. Arnor received his MD degree at University of Iceland in 1985, and subsequently from 1988 to 1995, he studied internal medicine and rheumatology at University of Wisconsin in Madison. Vikingsson has served as a secretary of the Icelandic Medical Association and chairman of the Educational council of the Icelandic Medical Association.

Kristín Siggeirsdóttir; the founder/owner and Managing director of Janus Rehabilitation in Reykjavik Iceland since 2000 and Managing director of development at the Icelandic Heart Association. She graduated from the University of Lund, Sweden in 1991 as occupational therapist and received her MSc 2001. Under her leadership the company has received an award for excellent results and innovation. Ms. Siggeirsdóttir has served on a Ministry of Health committee for vocational rehabilitation.

Author Guidelines

You are invited to submit manuscripts for consideration for publication in the Journal of Therapeutic Horticulture. Manuscripts may include research projects, case studies, program and services descriptions, therapeutic practice descriptions, therapeutic horticulture philosophies, therapeutic design project descriptions, relevant book reviews, and other related topics.

Manuscripts should be submitted to one of the following sections:

Research
Includes manuscripts of research reports and case studies that contain research components such as a research question, objective, literature review, data collection and analysis, and results and conclusion.

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Includes manuscripts describing horticultural therapy and related programs, case reports, teaching techniques and tools, and other related items.

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Includes manuscripts on the design, history, and/or theory of gardens and other landscapes as they relate to the field of horticultural therapy.

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Includes manuscripts on such topics as education and training, professional or organizational issues, legislative issues, or other related areas.

Horticultural Therapy and the Community
Includes manuscripts on the interaction of horticultural therapy issues and the community at large.

Upon Reflection
Includes thoughts on the more philosophical, reflective, and/or spiritual aspects of therapeutic horticulture.

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Manuscript submissions to the JTH should be sent as an e-mail attachment in Microsoft Word. Manuscripts must represent original material that has not been previously published or that is not under consideration for publication elsewhere. In addition, authors are required to submit an abstract of the manuscript and a brief biography. If the author does not have mastery of the English language, the manuscript must be professionally translated before being submitted.

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