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# Forest Therapy for Women with Gynaecological Cancer—A Feasibility Study to Find New Alternatives in Cancer Rehabilitation

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**Abstract:** Cancer can have a significant impact on one's life situation, with many patients reporting psychosocial discomfort, worry, anxiety, fear of recurrence, depression, tiredness/fatigue, sleep problems, pain and numerous other problems even long after active medical treatment. Psychosocial support during cancer rehabilitation has proven to be insufficient. In a recent debate article, the scientific committee of CancerRehabFund, Sweden, demands more rehabilitation alternatives for individuals living with cancer. Nature-based treatment is one of the alternatives mentioned as the way forward, but more research is needed. Therefore, we want to evaluate the patient's experience of a ten-week forest bathing intervention, as an add-on to the standard care, and whether it can improve general health and well-being in women suffering or recovering from gynaecological cancer. The study will run between the autumn of 2022 and until the end of 2023. It is a prospective single-case study, including quantitative and qualitative approaches using validated self-administered instruments (pre–post measurements) and semi-structured interviews (post) on women's lived experience of the 10-week forest bathing intervention. The quantitative outcome measurements will be the quality of life, fatigue and depression/anxiety. There will also be a questionnaire on perceived sensory dimensions experienced in the forest environment. The study will include 24 participants, divided into four groups of 6 participants. Once a week for ten weeks, the participants will be offered a session of a 2.5-hour stay in the forest with breathing exercises, slow movement, time in silence and privacy and a social gathering to conclude each session. Before and after each session, the participants will be invited to fill in the Profile of their mood state to describe their mood/feelings. There will be three different forest locations with varied forest cover types, i.e., evergreen, deciduous and mistands. Participation in this study will be voluntary, and all results will be anonymously presented on a group level. This paper is a protocol paper describing in detail the venues/forest sites, the forest therapy intervention and the scientific methodological approach for evaluating the ten-week intervention. To our knowledge, this is the first study on forest bathing for cancer survivors in Sweden. The Swedish Ethical Review Authority has approved the study [Dnr 2022-02083-01].

**Keywords:** nature-based therapy; shin-rin yoku; cancer rehabilitation; forest bathing; outdoor therapy; nature-assisted interventions; public health; health care; cancer care; palliative care; grieving; compassion; sense of coherence (SOC); occupational balance



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## 1. Introduction

### 1.1. Rehabilitation in Gynaecological Cancer

Cancer can have a significant impact on one's life situation. Even though many cancer survivors report good health, studies report significant ongoing health problems or unmet needs in up to 20%–30% of patients, most commonly concerning fear of recurrence and

other psychological needs [1,2]. The picture of cancer survivorship is complex, even within the subgroup of gynaecological cancer in Sweden. The 5-year survival rate in endometrial cancer is 80% [3] compared to only 50% in ovarian cancer [4]. The latter often has a substantial effect on everyday life, with reported health issues including psychosocial discomfort with worry, anxiety, fear of recurrence, depression, tiredness/fatigue, sleep problems, pain and numerous other issues long after active medical treatment [5–7]. Cancer survivors report poor health more often than controls, make significantly greater use of health services and use more social welfare benefits [8].

In recent years, treatments that can prolong living with active cancer are becoming more prevalent; hence, an increasing need for long-term support and care is needed [2]. The first Swedish national guideline for cancer rehabilitation was published in 2014. It takes on a broad perspective of health, stating that it aims to 'prevent and reduce the physical, psychological, social and existential consequences of cancer and its treatment...'. The rationale in the guideline states that patients and relatives often find psychosocial support to be insufficient, both during and after treatment, and its focus is not only on specific medical conditions but emphasises the biopsychosocial model of rehabilitation medicine with a focus on body functions, teamwork and a rehabilitation plan [9].

Rehabilitation from cancer has been studied and discussed internationally since the 1970s, but the progress in the advances has, until recent years, been slow [10]. A recent evaluation of Swedish cancer rehabilitation reveals several areas for improvement, including suggestions for meeting places for patients to share experiences and greater cooperation between other rehabilitation resources outside traditional health care. It also reveals that most of the interviewed patients feel that rehabilitation alternatives have not been actively offered by health care, causing them to seek other options [11].

In a recent debate article by the scientific committee of the CancerRehabFund, the concept of precision medicine was highlighted. Finding rehabilitation alternatives adapted to the client's needs is warranted, and the concept can be extended to develop equal and accurate means for supporting the client's health and well-being. One suggested alternative is different types of nature-based interventions [12].

### *1.2. The Use of Nature-Based Interventions, Forest Therapy and Forest Bathing*

Nature-based interventions (NBI) are health interventions performed and supported in nature and include different outdoor settings dominated by natural elements [13–15]. NBIs have been identified to improve people's health and well-being [16–18]. Little is known about the possibilities of NBIs for cancer patients, although different types of NBIs have shown an encouraging picture [19]. In a Swedish study of spirituality-oriented coping in the individual patient, nature has been a critical coping strategy used by people suffering from cancer [20].

The use of NBIs in forest environments has no precise definition, but the terms 'forest therapy' or 'forest programme' usually refer to a forest intervention including additional treatment applications, and there is a great difference in content, duration, time and types of sites used for the programmes [21]. Some results of forest bathing programmes have shown promising results for the patients/participants. A forest healing programme of 16 cancer patients in Korea has shown positive effects on depression, perceived stress and cortisol levels [22]. In a small Japanese study, forest therapy has been used in the spiritual care of cancer patients with improvements in functional and spiritual well-being [23].

Forest bathing, or shinrin-yoku, is regarded as a type of forest therapy. Initially, it is a Japanese practice of immersing oneself in nature using all the senses [24]. The practice is conceptually related to the practice of mindfulness but with a focus on the experience of nature [25]. During the 1980s, the practice was incorporated into Japanese preventive health care [24]. The practice has been increasingly recognised and studied for its potential effect on mental relaxation, anxiety, cardiovascular health, respiratory function and immune defence [26]. Depression, anger, tension and fatigue, which all can be seen in patients diagnosed with cancer, decrease with forest bathing [27–29].

### 1.3. Forest Bathing in Cancer Rehabilitation

A newly published article summarises the beneficial effects of forest bathing on human health, including stress management, sleep, anxiety, depression, anger, fatigue and vigour, suggesting its utility in rehabilitation medicine [30].

In the rehabilitation of exhaustion disorder, forest bathing reduces stress and improves mood [31,32].

Forest bathing has been shown to increase the activity of human natural killer (NK) cells and intracellular levels of anti-cancer proteins and could even play a role in preventing cancer [33].

There is an ongoing study in Denmark examining whether a nature-based rehabilitation programme can increase the quality of life and reduce stress in men post-cancer [34], but results have not yet been presented.

However, to our knowledge, no studies have been conducted in the Nordic countries where forest bathing is used in the rehabilitation process of female, gynaecological cancer patients. Therefore, there is a need for innovative studies on the feasibility of nature-based interventions, and mainly forest bathing, as a rehabilitation alternative for both cancer survivors and clients undergoing treatments.

The aim of the study is to determine whether forest bathing, as an add-on intervention to standard care, could be a feasible contribution in cancer rehabilitation and could improve general health and well-being in women suffering or recovering from gynaecological cancer. The objectives are as follows:

- Is a nature-based group intervention with forest bathing perceived as beneficial by the participants?
- Which aspects of the intervention are perceived as beneficial vs. non-beneficial?
- Which aspects of the forest site are perceived as beneficial vs. non-beneficial?
- Can forest bathing improve quality of life and mood, and reduce anxiety/depression and fatigue?
- What problems or complaints are positively affected by the intervention?
- What components of the forest bathing intervention contribute to the effect?

## 2. Materials and Methods

This feasibility study is a prospective single-case study that examines a 10-week forest bathing intervention as an add-on to the standard care for women suffering or recovering from gynaecological cancer. The methodological approach includes qualitative and quantitative methods using validated instruments and semi-structured interviews. The study will run over about one year, starting in the late autumn of 2022. Participation is voluntary, and all results will be anonymously presented on a group level. The Swedish Ethical Review Authority [Dnr 2022-02083-01] has approved the study.

### 2.1. Participants and Recruitment

The inclusion criteria are adults with a diagnosis of gynaecological cancer undergoing treatment or post-treatment check-ups at the gynaecological department at the Central Hospital in Kristianstad and living in nearby municipalities. Patients with signs of stress, lack of sleep or otherwise distress who are assessed as able to participate in a stress-reducing group activity will be asked if they want to participate. Exclusion criteria are as follows: physical and/or psychological inability to attend the intervention. Staff members at the clinic will recruit eligible participants through direct contact at the clinic or by phone call. Moreover, advertisements will be placed at the clinic to reach out to potential participants visiting the clinic. A physician specialising in gynaecological cancer will perform the final assessment of eligibility for participation.

Standard rehabilitation care will be offered according to the patient's needs. Standard care could most commonly include conversational therapy at the hospital location, traditional physiotherapy, medical yoga and contact with the hospital church for conversation or counselling.

The study will include 24 participants divided into four groups of 6 participants in each group. The first group started in the autumn of 2022, and the remaining three will run until the end of 2023.

### 2.2. The Intervention

The intervention is a 10-week forest bathing programme and is offered as an add-on to standard care. A 10-week programme was chosen based on the knowledge that recovery from exhaustion disorder takes several months, and that physical and cognitive training needs at least 5 weeks up to 6 months to obtain positive effects on the body and mind [35–37]. The intervention sessions are held once a week and comprise a 2.5-hour stay in the forest with breathing exercises, slow movement, time in silence and privacy and a final coffee break together (Figure 1). The length of the walk during the entire forest bathing session is not the main aspect; rather, it entails strolling for a short distance—thus, time and not distance are the focus. Thus, the length of the walking path may vary from time to time but is on average about 1 km.

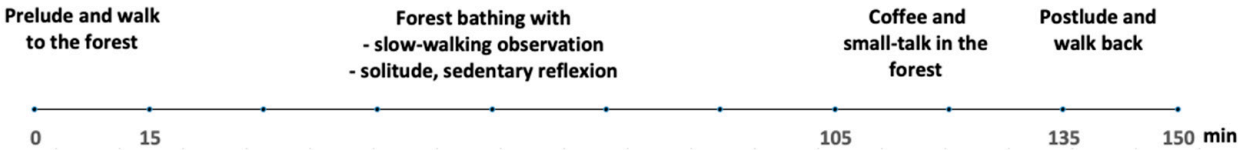


**Figure 1.** Timeline for each forest-bathing session, with arrangements and activity in the forest. There is a clear start and end of the session, where the participants walk to the forest and back from the forest. The forest bathing session is about 90 min, followed by a 30 min coffee/tea break, summing up the day, before heading back to the parking lot.

All sessions are led by the same forest guide, with many years of experience in leading groups in forest bathing.

Each session has four main parts:

Prelude/Welcome

The session starts at the parking lot, where the guide meets the participants before entering the forest. The mood questionnaire is filled in. Thereafter, the group strolls to the chosen track for the day's session. The pace is adjusted based on the individual who walks the slowest. This walk lasts about 15 min.

Forest bathing

Landing: The participants are verbally guided to stop and redirect the focus from a potentially stressful environment to the present forest through a short breathing exercise or presence of mind. A theme for the day is introduced; for example, movement, patterns, sounds, colours, fragrances or changes in nature. The theme is used to guide the participants to new thoughts during their slow walk in the forest, and to take the focus away from more stressful thoughts. The themes are chosen by the forest guide before or in connection with the forest bathing, often inspired by the weather or other circumstances at the forest site at that given moment. The focus of the session is to facilitate and support a restorative experience and being present at that moment.

Activity: The participants are then guided to move along the chosen path, slowly and without a specific purpose. They are encouraged to follow where their bodies lead them and are allowed and encouraged to leave the path to investigate the surroundings, although in a slow and forward movement. On several occasions, the forest guide reminds the participants of the day's theme. Special focus can be placed on particular parts of the nature to be explored by all the senses, sometimes with the help of simple tools such as a magnifying glass. The participants are encouraged to engage in nature with all of their five senses.

Time in sedentary solitude: For at least 20 min, the participants are encouraged to find a place for solitude and silence. They are offered a hammock, sleeping mat and/or blankets, depending on their preferences. After about 20 min, the forest guide walks around and asks the participants to get up at their own pace.

Coffee and small-talk.

The forest bathing session is completed by filling in the mood questionnaire before a coffee break together in the forest, sometimes by a fire. During the coffee break, the conversation is free, but guided if necessary, by the forest guide to ensure a relaxing atmosphere and inviting tone for all group members. This coffee break lasts about 30 min but can be adjusted to meet the needs of the group.

Conclusion and goodbye.

The day ends with a walk back to the cars. This is also about a 15 min walk.

### *2.3. The Forest Sites/Venues*

The intervention will be performed at three different forest sites in Skåne in southern Sweden. The sites are chosen to give a geographical spread, and to reduce travel distance for the participants; hence, all 10 sessions are performed at the same site for each specific group.

All sites are situated along the Skåneleden trail which consists of 1300 km of marked trails under the primary responsibility of the Skåne Regional Council and crosses both private and government-owned land and passes through many recreational centres throughout Skåne (Figure 2).


**Figure 2.** Map of the county of Skåne, with the hiking trail Skåneleden in orange; Women´s Clinic in Kristianstad in City of Kristianstad ①. The three forest sites used of the intervention; Hovdala ②, Kullaskogen ③ and Fulltofta ④. [Map: based on Lantmäteriet by Ellinor Arvidsson: 2023].

At each site, the group will start with the first forest bathing session on a relatively short trail with good accessibility and a non-strenuous walk. Based on the physical capacity and preferences of the group members, weather or other circumstances, the choice of trail within site could be varied according to the choice and experience of the forest guide.

Each new trail is checked by the forest guide before the session to ensure the condition and safety of the area, making sure the location is suitable for forest bathing activities. The forest trails will be tested by the researcher, together with the guide, before being used and have been approved by all authors.

Hovdala (Figure 3) is a recreational site south of the city of Hässleholm in central Skåne, Sweden. The main centre is the Hovdala Castle, offering a parking lot, a restaurant, toilets and a small shop, and serves as the meeting point for each forest bathing session. From the castle, multiple walking trails can be accessed, often by a short trip by car to get away from the more well-visited trails. The area is situated by the lake Finjasjön, which can be seen or glanced from some of the trails. The vegetation is mostly broad-leaved forest, including beech (*Fagus sylvatica*), oak (*Quercus robur),* hornbeam (*Carpinus betulus*), birch (*Betula pendula* and *B pubescens*), alder (*Alnus glutinosa*), hazel (*Corylus avellana*) and ash (*Fraxinus excelsior*). Large parts of the Hovdala area are a nature reserve with old trees and large amounts of dead wood but there are also some areas of production forest, mainly spruce (*Picea abies*).

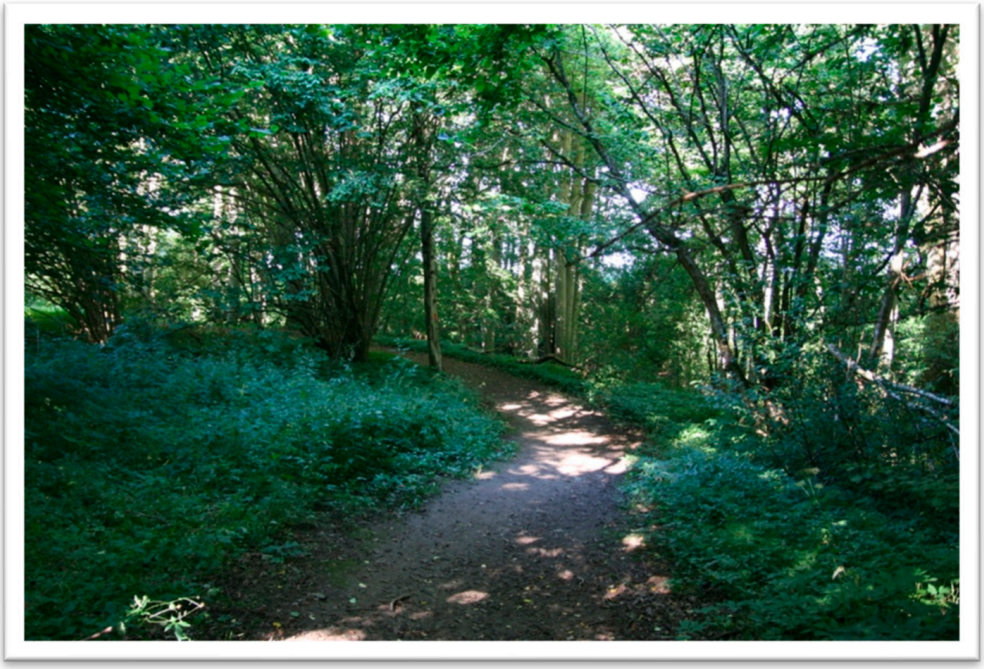

**Figure 3.** The lake Finjasjön can be glanced between the trees from a trail in Hovdala. [Photo: Hanna Anundi].

Kullaskogen (Figure 4) is a recreational area situated about 35 km north-east of the city of Kristianstad in the north-eastern part of Skåne. The meeting point is the parking space at the historical farm buildings of Sporrekulla, where there is a fireplace, sitting area and toilets. The trail is only a short walking distance away, and the area of the forest bathing is mainly production forest with a monoculture of older spruce way, and the area of the forest bathing is mainly production forest with a monoculture of older spruce *Picea abies*) with some birch (*Betula pendula* and *B pubescens*), beech (*Fagus sylvatica*) and oak (*Querqus robur*). The ground vegetation is mostly green moss. The area contains many objects of cultural heritage with pruned trees, old ruins and stone fences. The trail passes over a small creek and is a bit hilly, but with a well-beaten path. The area is quiet and far away from traffic.

Fulltofta (Figure 5) is situated just north of Hörby, in the middle of Skåne. The area is a well-visited recreation centre with a Nature centre as the meeting point, where there is an exhibition centre, café, toilets and several rest stops. The trail chosen for the forest bathing is situated in a less visited part of the area with a mixed forest mainly consisting of spruce (*Picea abiec*), pine (*Pinus sylvestris*), birch (*Betula pendula and B pubescens*), oak (*Quercus robur)*, beech (*Fagus sylvatica*), maple (*Acer platanoides*), lime (*Tilia cordata*) and a small bog with sparse tree vegetation.

**Figure 4.** Spruce and stone fences in Kullaskogen. [Photo: Marianne Larsson].

**Figure 5.** Mixed forest in Fulltofta and the forest walking path. [Photo: Marianne Larsson].

### *2.4. Outcome Measurements*

The focus of this study is on the patient's experience of the intervention and the forest sites. Secondary outcomes are the quantitative evaluation of the quality of life, fatigue and depression/anxiety (Figure 6).

For the 10-week intervention, there will be a pre-post evaluation using validated self-administered questionnaires regarding quality of life (EORTC QLQ-C30) [38], fatigue (QLQ-FA) [39] and depression/anxiety (HAD) [40].

The EORTC QLQ-C30 is the quality of life instrument mainly used for research on cancer patients in Europe [38]. The instrument comprises 30 items, 28 of them concerning symptoms or difficulties, rated on a four-graded scale with a higher score indicating a worse condition. Two items (total health and total quality of life) are graded on a seven-graded scale, with a higher score indicating better health and quality of life.

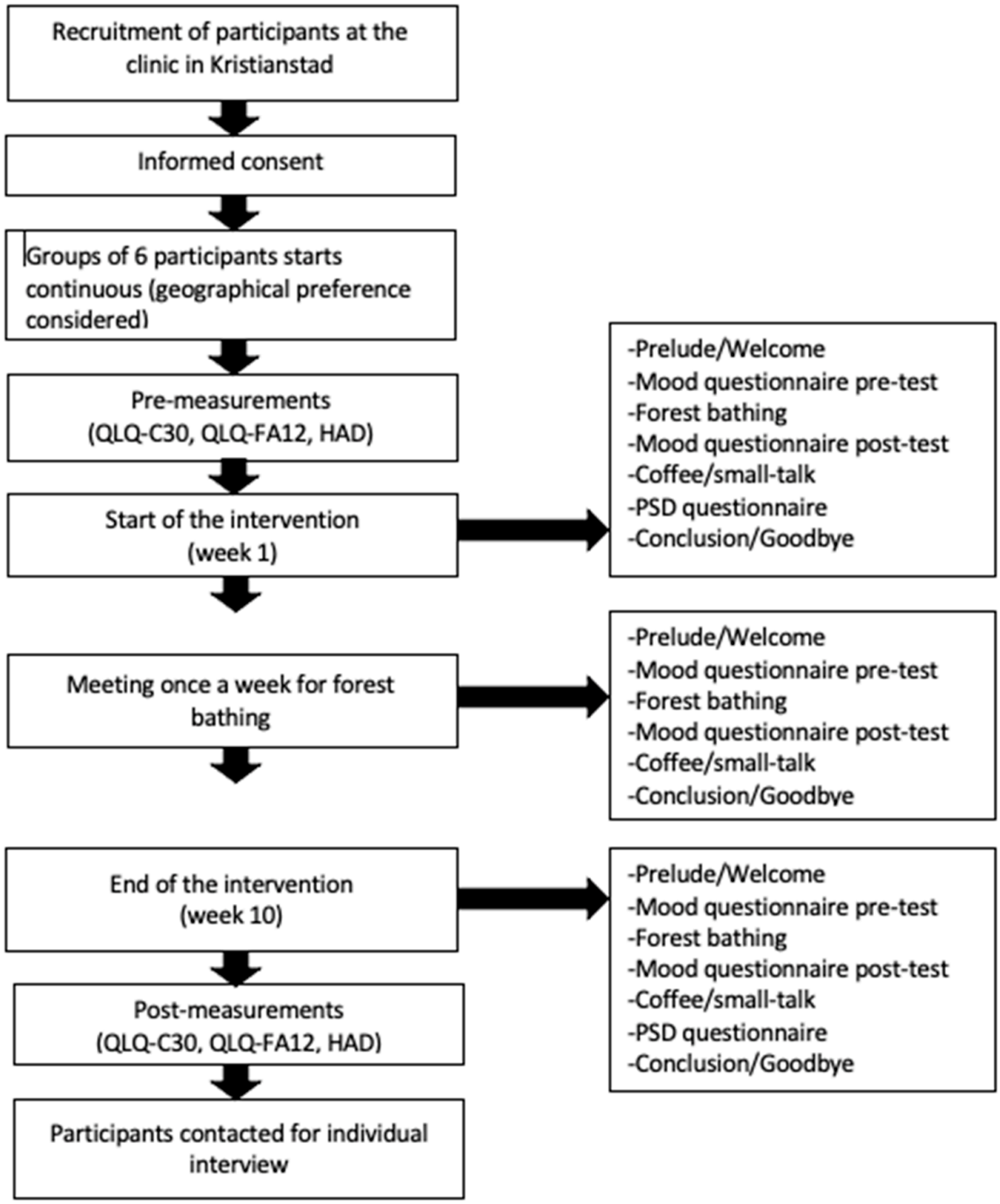


**Figure 6.** Overview of the study; recruitment of patients to the study, from start to the end of the intervention, including post–pre measurements and offer for voluntary interview.

The EORTC QLQ-FA12 is designed to complement the EORTC QLQ-C30 concerning fatigue symptoms, including physical, emotional and cognitive symptoms. It consists of 12 items rated on a four-graded scale, with a higher score indicating a worse condition.

The Hospital Anxiety and Depression scale (HAD) is a commonly used screening instrument for anxiety and depression [41]. It comprises 14 items, with seven concerning depression and seven concerning anxiety. The answers are graded on a four-graded scale with a total score of 0–21 and a cut-off of >=8 points, indicating an emotional disorder.

The mental state of the participants will be evaluated using a questionnaire before and after each forest bathing session. The questionnaire includes six items rated on a 10-graded

scale and includes perceived tenseness (tense/relaxed), fatigue (exhausted/alert), mood (sad/happy), irritability (irritated/harmonious)], restlessness (restless/peaceful) and clear-headedness (mentally distracted/clear-headed). Higher scores indicate a better mental state. The questionnaire is based on validated instruments such as the Profile of Mood States and the Zuckerman Inventory of Personal Reactions [42,43], but in a simplified form to minimise any mental strain on the participants [44].

### 2.5. Interviews

All participants will be asked to participate in a semi-structured interview shortly after the 10-week intervention ends. Participants can leave out any questions they find challenging to respond to. They can also end the interview at any time without explanation. The focus is on lived experience, and there are four main themes for the semi-structured interview: (1) the experience of participating in the intervention, both positive and negative, (2) the well-being of the participant before, during and after the intervention, (3) the experience of being in a group and (4) the experience of the forest sites. The participant can also add any aspects they find interesting to the interview.

The interviews can be conducted face-to-face, online or by telephone and will be about 40–60 min long and performed by the second and the third authors, both of whom are non-clinical personnel. The interview will be recorded and transcribed verbatim for data analysis.

### 2.6. Perceived Sensory Dimensions (PSD)

For each forest site, the participants will be asked to fill in a questionnaire regarding perceived qualities found in the environment [45,46]. The environmental qualities will be assessed using the Perceived Sensory Dimensions scale, comprising 32 questions on nine dimensions including: natural, cultural, cohesive, diverse, sheltered, open, serene, social and comfort. The qualities are rated by the perception of presence from 1–5, where 1 = not at all and 5 = completely. Moreover, the participants are asked to rate how important the quality is for them on a scale of 1–5, where 1 = not at all and 5 = matters very much/important to me.

### 2.7. Data Analysis

The study population will be described using descriptive statistics. For the quantitative measurements, a two-tailed paired sample t-test will be used to determine if there is a difference between the pre–post measurements. The hypothesis is that a change will occur over time, i.e., improved quality of life, decreased fatigue, depression/anxiety and improved mood. A $p$-value less than 0.05 is considered statistically significant. For the Perceived Sensory Dimensions (PSD), each dimension will be summarised.

The interviews will be analysed using Interpretative Phenomenological Analysis (IPA) as an appropriate method for understanding a person's lived experience in a real-life context [47].

### 2.8. Ethical Considerations

All potential participants will receive written and oral information about the study before deciding on participation. Before participating in the intervention, all participants will provide written informed consent. The study is conducted in accordance with the Declaration of Helsinki (World Medical Association, 2013), and the participants can withdraw from the study at any given point without further explanation.

The possible adverse effects of the study, including possible negative psychological impact or environmental risks, have been analysed. The forest bathing session will be cancelled if the Swedish Meteorological and Hydrological Institute (SMHI) issues a weather warning of the intermediate (orange) warning or worse. The forest guide has special training in first aid in a forest environment. Furthermore, both the nature guide and the participants have the possibility to receive support from a hospital conversational therapist

for psychological needs if needed. All participants and the guide receive insurance through SLU.

The collected quantitative data will be anonymised for all clinical personnel, and the results will be presented at a group level. When presenting data from individual interviews, special care will be taken to ensure the anonymity of the participants. All data will be handled and stored by SLU according to current rules and guidelines for research documents. The Swedish Ethical Review Authority [Dnr 2022-02083-01] has approved the study.

## 3. Discussion

This is a feasibility study to test if a nature-based intervention in the form of forest bathing as an add-on intervention to standard care, could be a feasible rehabilitation measure for women with gynaecological cancer and signs of distress. The intervention addresses several new aspects of cancer rehabilitation, e.g., meeting up with peers outdoors instead of in the indoor hospital environment. The intervention makes use of the forest environment, which is potentially stress-reducing and health-promoting. The study focuses not only on the possible health benefits but also on the mechanism of the intervention in a combination of which physical attributes in the forest setting can support their recovery. Further studies should include an RCT approach comparing standard care and forest bathing as a means of broadening the available alternatives for cancer rehabilitation as requested by the scientific committee of the CancerRehabFund.

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**Institutional Review Board Statement:** The study was conducted in accordance with the Declaration of Helsinki, and approved by the Swedish Ethical Review Authority [Dnr 2022-02083-01].

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** Not applicable.

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**Conflicts of Interest:** The authors declare no conflict of interest.

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