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Nature-based supportive care opportunities: A conceptual framework

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Title Nature-based supportive care opportunities: A conceptual framework

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ABSTRACT

Objective Given preliminary evidence for positive health outcomes related to contact with nature for cancer populations, research is warranted to ascertain possible strategies for incorporating nature-based care opportunities into oncology contexts as additional strategies for addressing multi-dimensional aspects of cancer patients' health and recovery needs. The objective of this study was to consolidate existing research related to nature-based supportive care opportunities and generate a conceptual framework for discerning relevant applications in the supportive care setting.

Methods Drawing on research investigating nature-based engagement in oncology contexts, a 2-step analytic process was used to construct a conceptual framework for guiding nature-based supportive care design and future research. Concept analysis methodology generated new representations of understanding by extracting and synthesizing salient concepts. Newly formulated concepts were transposed to findings from related research about patient-reported and healthcare expert-developed recommendations for nature-based supportive care in oncology.

Results Five theoretical concepts (themes) were formulated describing patients' reasons for engaging with nature and the underlying needs these interactions address. These included: connecting with what is genuinely valued, distancing from the cancer experience, meaning-making and reframing the cancer experience, finding comfort and safety, and vital nurturance. Eight shared patient and expert recommendations were compiled, which address the identified needs through nature-based initiatives. Eleven additional patient-reported recommendations attend to beneficial and adverse experiential qualities of patients' nature-based engagement and complete the framework.

Conclusions The framework outlines salient findings about helpful nature-based supportive care opportunities for ready access by healthcare practitioners, designers, researchers and patients themselves.

INTRODUCTION

Health and Nature is an emerging and expanding research field exploring nature's impact on health and wellbeing. Interest in the topic is gaining scientific attention across different healthcare [1], social science [2], and planning and design disciplines [3]. The topic has permeated medical philosophies throughout human history as recorded in folklore, visual and literary arts, and historic interpretations about the human relationship with nature [4].

Research efforts today link with a global need to investigate and innovate effective solutions to modern healthcare challenges, such as the rapidly rising incidence of cancer diagnosis [5]. Patients may require ongoing care to deal with health challenges resulting from their exposure to cancer treatment toxicity, co-morbid health conditions and late and long-term effects [6]. Reducing the burden of cancer and supporting those affected by cancer has become a healthcare priority. Supportive care and health promoting interventions are being developed, which align with the World Health Organization's broad definition of health, where health is not only related to the absence of disease but a state of complete physical, mental, and social wellbeing [7]. This multi-dimensional understanding of what constitutes an acceptable state of health and wellbeing poses unique pressures on healthcare systems to deliver oncology services that not only cure but also promote high quality of life for as long as possible.

Given cancer's potential challenges to physical and psychosocial functioning, and adverse effects on wellbeing and quality of life [5], the potential beneficial effects of contact with nature may have particular relevance for this population. Such health strategies centre on patients' own resources for regaining and maintaining health even when subjected to pathogenic biological or psycho-social stressors [8]. To determine the usefulness and feasibility of support strategies, which incorporate nature-based aspects, an inquiry is needed into how patients deal with their cancer within their own life contexts, and how they appraise nature's role in these processes. The present study was undertaken in recognition of the issues outlined above and was designed to carefully explore research evidence of how nature experiences factor into patients' health behaviours in personal and clinical circumstances.

Literature Review

Literature linking health benefits to contact with nature demonstrate multi-disciplinary effort to investigate basic mechanisms underlying healthful human-nature interchanges [9-11].

Two prominent lines of theorizing on the human relationship with nature underwrite the literature today. The first, Attention Restoration Theory (ART) springs from environmental psychology [10], while the second is grounded in psycho-evolutionary theory and is commonly referred to as the Aesthetic Affective Theory (AAT) [9]. It is outside the scope of this paper to outline in-depth the underpinnings used to substantiate the models, however, they warrant brief mention.

ART proposes a relationship between human cognitive functioning and the natural world. Kaplan and Kaplan [10] suggest that stimuli received through nature enable a person to relax and passively scan the environment rather than intensively process external impressions as required in more demanding urban environments. This attention system is thought to allow focused attention to rest; thereby aiding recovery and protecting from stress and mental fatigue [10]. AAT borrows from the Biophilia Hypothesis [11] and follows a psycho-evolutionary perspective suggesting that humans maintain an inherited affection for living things and still possess the ability to assess an environment from a survival perspective within a fraction of a second. Positive human-nature interactions are explained based on the following dual mechanism: If the environment assessed to be safe, one can relax; if the environment life-affirming and supportive, positive affect may increase [9].

Healthcare design and planning literature outlines evidence of health benefits derived from environmental factors related to the healthcare setting [12]. Access to nature and natural features in healthcare settings have shown to improve health outcomes such as reducing length of hospital stay [13], improving staff wellbeing [14]. Furthermore, some literature suggests that nature in healthcare settings may improve healthcare service satisfaction [15].

Evidence for various therapeutic nature-based modalities for mixed clinical populations support claims about health outcomes through purposeful engagement with nature [16]. Findings show positive association between therapeutic nature-based engagement and lowering physical discomfort during surgical procedures [17], reduced length of hospital stay [18], and reduced strength of pain medication [18], improved psychological wellbeing [19], and reduction in healthcare usage [20].

There exists, however, a paucity of literature about healthful nature-patient interchanges in oncology contexts. Limited available literature relies on qualitative reports from various therapy gardens and single attempts to integrate nature activities into other types of supportive care or therapeutic modalities [21, 22]. Although these accounts

contribute lower level evidence than clinical trials, they are successful in eliciting cancer patients' subjective experiences with nature and reveal unique patient needs.

Defining “Nature Experience”

“Nature Experience” has been conceptualized through different disciplinary lenses extending beyond direct contact and engagement with nature [23]. A broader definition is especially useful in healthcare contexts in order to recognize creations containing and representing natural elements that can be experienced in varied settings, combinations and intensities. The present paper puts forward the following working definition of nature:

Nature in this study includes the phenomena of the physical world collectively, including various forms of vegetation and habitats, natural and humanly designed landscapes, natural cycles, processes and weather, wildlife and domestic animals, and other features and products of the earth, including man-made creations which creatively organize and depict these nature elements.

Aim

A comprehensive research program was undertaken with the overarching objective to generate deeper understanding about nature's role in cancer patients' health and recovery experiences. The aim of the present paper is to consolidate findings arising from this program of research into a new framework to: 1) Determine salient patient needs arising from reported nature experiences, 2) Consolidate patient-reported and expert-developed nature-based recommendations, and 3) Discern clinical relevance and application in oncology settings and supportive care practices.

Research program

The present study draws on five publications (shown in Table 1) resulting from a research program led by the first author. The research program included a systematic review and meta-synthesis of existing literature [24] and four additional studies informed by this review and meta-analysis. Each publication investigated issues concerning nature engagement in oncology contexts and reported primary data or generated new understandings compared to on existing literature relevant to the topic. In order to produce a coherent and topic specific concept analysis, the present study includes principally the research outlined in Table 1.

Table 1 Overview of publications included in the framework

Focus	Participant s	Data collection	Method	Contributi on	Reference
Cancer patients'	240 cancer	Literature	Systematic	Theory	Study 1

descriptions of nature experience	patient s across 11 studies	review	literature search and meta-synthesis		[24]
Cancer patients' descriptions of nature experience	20 patients	Semi-structured interviews	Grounded Theory	Theory	Study 2 [25]
Patients' recommendations for nature-based care opportunities	20 patients	Semi-structured interviews	Deductive content analysis	Patient-reported recommendation	Study 3 [26]
Reactions to nature-based design intervention in oncology waiting room	73 patients, 13 staff, 52 carers, 5 'other'	Questionnaire Survey	Descriptive statistics	Nature-based intervention	Study 4 [27]
Experts' recommendations for nature-based care opportunities	38 healthcare and design experts	Online questionnaires	Delphi structured feedback process	Expert-developed recommendation	Study 5 [28]

METHOD

The framework was developed using a systematic approach for further developing the theoretical concepts resulting from Studies 1 and 2 in light of new insights into the uptake of a nature-based design intervention in an oncology waiting room gained in Study 4, and cancer patient and healthcare expert recommendations for nature-based care opportunities developed in Studies 3 and 5. Concepts are theoretical formulations, which organize inherent elements of empirical experience through representing shared attributes and patterns of a given phenomenon [29]. Clear conceptualization of ideas allows categorization, which is important for ordering our understanding and enabling deeper grasp of a phenomenon [30].

A 2-step process was employed to develop concepts that derive from relevant theory and patient-reported data while grounding in relevant contexts to maintain clinical relevance (see Figure 1). Firstly, using concept development methodology [30], salient themes and categories were extracted from the theoretical body of work with the aim to glean existing patterns and relationships within the data and generate new formulations of understanding (concepts). Next, synthesized qualitative data were extracted and clustered according to their conceptual and descriptive similarities and further categorized into new summarizing formulations (see Figure 2). In this step, for example, the theme 'Being elsewhere, seeing and feeling differently' and the Study 1 categories 'Gaining distance (break) from everyday strain', 'Contrasting the clinical experience', and 'Visual escape, a different way of being

elsewhere' were found to converge with the Study 2 category 'Maneuvers away from the cancer experience' and were subsequently synthesized into a new concept labelled 'Distancing from the cancer experience'. In step 2, patient-reported recommendations and expert-developed recommendations were re-read and analysed to determine their points of convergence (overlaps) and divergence. Data were scrutinized side by side to draw out conceptual similarities and to determine patterns of overlap. When necessary, raw data was re-read to clarify the descriptive basis from which the recommendations in question were generated to ensure cogent conceptual overlap. In this step, for example, the patient recommendation 'Natural design features (other than water)' was found to conceptually overlap with the expert recommendation 'Indoor design to maximize use of biophilic elements: Natural materials, natural colours, air flow (e.g., windows that open safely), and natural light' and were consequently considered overlapping recommendations'.

The use of concept analysis methodology has received commentary in nursing research [31], which argues for a distinction between theoretical and "colloquial" approaches to analysing and developing concepts in order to maintain epistemological and ontological clarity when constructing theory. Accordingly, scientific literature is privileged and qualitative research regarded problematic in nursing theory construction [31]. This juxtaposition, however, was criticized based on the premise that all theories are created in, and bound to some degree by context, including the historical and social meanings in which theories were originally explored [32]. The methodology adopted in this study follows an iterative procedure for qualitative concept synthesis [33]. Epistemologically, our approach recognizes complementarity between theoretically grounded and context rich data to inform conceptual analysis of novel material.

Figure 1 Schematic illustration of 2-step process for determining and linking patient needs with patient and expert recommendations

[INSERT HERE]

RESULTS

Studies 1 and 2 produced theoretical understanding about cancer patients' nature experiences and extended the more general theory base on healthful human-nature interactions. Study 2 captured contextually specific scenarios, unique to the circumstances confronting cancer patients, which identified nature as a helpful support structure and means for consolation and normalization in cancer's extraordinary challenge to personal selfhood.

Expanding on existing health and nature theory, these insights discern a further pathway and dimension of nature’s role in health and recovery scenarios relating to oncology contexts. This theory model produced in Study 2 captures an innate capacity and desire to draw on nature as a familiar and safe context for mentally and physically exploring the threat posed by cancer and normalizing a life and future now changed by it. Patient-nature interchanges are suggested to espouse nature as a resource for dealing with variously challenging cancer experiences.

Study 1 and 2 contributed empirical data from 260 cancer patients (240 and 20 respectively) across the lifespan with varying diagnoses, including survivors and palliative patients. Combined, these two studies produced 10 themes and 27 categories to describe the varied and rich dimensions of nature experience in the unique life context of persons diagnosed with cancer. Figure 2 schematically illustrates the synthesis process, which elucidated points of convergence between the two sets of findings. Thematic statements are provided in Table 2 and further descriptive detail can be found in the Online Appendix. The analysis yielded five newly formulated concepts to describe important patient needs that underpin the framework’s central concerns, namely: (A) continued connection with what patients value in their lives; (B) Gaining distance from cancer experiences through distraction and elements contrasting clinical scenarios; (C) Meaning-making through exploring and normalising a newly presented cancer reality; (D) Finding comfort and safety in familiar and unthreatening contexts; and (E) Vital nurturance through enriching physical activity and aesthetic experiences.

Figure 2 Schematic illustration of the synthesis procedure that yielded five new concepts (A-E) from 10 themes (T1-T10) and 27 categories

[INSERT HERE]

Table 2 Core concepts developed from synthesis of studies 1 and 2 representing patient needs

Concept (patient need)	Description	Origin (see Online Appendix)
A. Meaningful connections	Nature motivates agency for maintaining and/or regaining connectedness with valued aspects of patients’ lives. Engaging with nature can facilitate patients’ connection with themselves, others and loved ones, and with their personal pasts and anticipated futures.	Study 1: T1, T1.2, T1.3, T1.4, T1.5 Study 2: T9.25

B. Distancing from the cancer experience	Nature is a unique context that contrasts and temporarily distances patients from clinical experiences in the hospital and those occurring in personal environments. Nature can be accessed within and outside the hospital to escape ambient and imminent clinical stressors and provide retreat from unnecessary discomfort and suffering.	Study 1: T2, T2.7, T2.78, T2.79 Study 2: T10.26
C. Meaning-making, reframing the cancer experience	Nature can facilitate opportunities for psychological exploration. Recognizing inner and outer worlds reflected in nature can rouse metaphorical thinking and offer pathways for reconstitution and new understanding to deal with changing life narratives helping to move towards a new normality.	Study 1: T3, T3.10, T3.11, T3.12 Study 2: T8, T10.27
D. Finding comfort and safety	Nature is an immediately accessible support structure; a physically inhabitable construct as well as a psychological place invested with personal significance with the potential to comfort.	Study 1: T4, T4.14, T4.16, T5, T5.17, T5.18 Study 2: T9, T9.24
E. Vital nurturance	Nature provides rich materials for a range of sensory and aesthetic experiences scalable to varying levels of engagement for nurturing and enlivening patients. Nature can motivate physical activity and provide opportunities for sustaining familiar activities as well as discovering new ones.	Study 1: T6, T6.19, T6.20, T7, T7.21, T7.22 Study 2: T9.23

Practice-based perspectives

Study 4 contributes findings from a nature-based design intervention in an oncology waiting room, showing mostly positive impact on 143 patients, staff and carers who deemed artificial nature design materials an acceptable alternative to prohibited live plant materials when aiming to aesthetically enhance clinical spaces. The intervention further showed that, from a managerial perspective, such nature-based design interventions are feasible and can be carried out at minimal cost with very little to no ongoing maintenance burden.

Study 3 (n=20) contributed patient-reported, and Study 5 (n=38) expert-developed, recommendations for nature-based care opportunities. Study 3 yielded twelve opportunities for nature-based care initiatives and eight critical factors considered with caution (barriers) when adopting nature-based design and care practices in oncology contexts. Study 5 represents an investigation into healthcare and design expert knowledge about nature-based supportive care and resulted in ten expert recommendations for opportunities and ten implementation barriers rated of highest importance according to expert views. Figure 3 schematically illustrates points of overlap between patient and expert recommendations and presents their collective concerns. A summary and practical examples are provided in Table

3. Further examples and descriptive detail can be accessed in the Online Appendix.

While the framework focuses on points of convergence, it bears highlighting the ways in which patient and expert perspectives diverged. Of the twelve patient-reported opportunities, seven were not rated amongst the ten most important opportunities by experts. The opportunities reported by patients but not highly appraised by experts include: contact with animals, nature art, contact with water, nature-based distraction for accompanying clinical procedures, nature-based events and entertainment, nature-based mental techniques for distraction and reflection, and integrating nature-based elements into existing healthcare services and treatment processes. Four barriers were named by patients but were not considered of high importance by experts. These include: caution around allergic reactions, negative triggers (memories), overwhelm when engaging with nature, and sensory overstimulation. Table 3 outlines overlapping opportunities (n=5) and barriers (n=4) reported by both patients and experts.

Figure 3 Schematic illustration of overlaps between patient and expert recommendations

[INSERT HERE]

Table 3 Overlapping patient and expert recommendations for nature-based care opportunities

Expert recommendation (Study 5)	Patient recommendation (Study 3)
Opportunities	
1. Window views from clinical areas onto nature, garden, sea, sky, weather, people watching, greenery, trees, outside world, daylight, night sky, escape, movement, change, without glare, attention to privacy (one way views)	Views to nature
2. Indoor design to maximize use of biophilic elements: Natural materials, natural colours, air flow (e.g., windows that open safely), and natural light	Natural design features (other than water)
3. Physical exercise adapted to patient requirements: stroll garden, walking paths with points of interest and distance markers (plant species, medicinal plants), meandering trails, resting points, exercise opportunity for staff, nature walks, mindful walking, mobility and balance training, gardening tasks, assisted walking, nature exercise rooms, labyrinths	Physical activity promotion
4. Design for privacy: Zoning, screening, semi-enclosed spaces, restful, contemplative and solitary spaces, some outdoor spaces shielded from inside views, separate but nearby spaces for staff to retreat (away from patients and workplace)	Desired engagement (sensory and private)
5. Socializing: Range of seating options, gathering and communal	Social opportunities

spaces, BBQ area, children play areas, semi-private enclosures for personal conversations

Barriers

1. Inappropriate design choices and execution: limited greenery, cold and stark, too much hardscape (concrete, glare), uncomfortable seating, too demanding, complex, static or boring environments, insufficient shading, materials too hot to the touch, structures/sculptures that cast odd shadows	Appropriateness
2. Inaccessibility: Heavy, locked doors, no electronic door opener, barriers, thresholds, doorways and pathways too narrow for wheelchair or gurney access or for two wheelchairs to pass, too wide paver joints become tripping hazards, insufficient seating, co-opted as smoking areas, access for the very sick and frail not considered	Safety
3. Inauthenticity of nature-based design elements: fake plants, fake scents, tokenistic, corporate design (“cutting edge” award seeking designs)	Healthcare investment (misguided)
4. Mainstream values (decision makers) don't prioritize nature-based opportunities or “design thinking”	Not valued / not interested

Framework for nature-based supportive care practice and design

The synthesized concepts illuminate care needs reported in the context of patients’ nature experience. Interestingly, some incongruity was found between the identified patient needs and the recommendations contributed by experts. It emerges that recommendations reported by patients, but not rated highly by experts, respond more directly with patients’ reported needs. Perhaps, unsurprisingly, experts considered more practical aspects of nature-based opportunities, while patients focused more on experiential qualities. To integrate expert knowledge with attendant patient values, the framework includes their joint (overlapping) views but also includes additional patient contributions from Study 3 (indicated with * in Figure 4).

Figure 4 Framework for adopting nature-based care opportunities in supportive care design and practice

[INSERT HERE]

*indicates additional patient contributions from Study 3

DISCUSSION

This paper presents theoretical advancements based on analyses of empirical content from patient and expert reported data about nature-based supportive care opportunities. The variety of patient-nature interchanges, and motivations for these interactions, are captured comprehensively and show the multitude of reasons patients possess to engage with nature.

Patients articulated a range of benefits they derived from these interchanges, which informed five newly formulated concepts: (A) Meaningful connections, (B) Distance from clinical cancer experiences, (C) Meaning-making, (D) Finding comfort and safety, and (E) Vital nurturance.

In terms of positioning the findings into existing health and nature theory, it is possible to trace connections between the findings and AAT, ART and the more natively generated theory related to cancer patient's creative and explorative use of nature in their normalization processes (described in the Results section). Broadly speaking, the findings lend support for the diversely theorized human responses to nature. No individual theory model arises with singular relevance to explain the findings; rather, they seem to link with different delivery pathways and dimensions of patient outcomes. For example, nature's influence on cognitive processes for attention restoration is captured in the framework as concept B (Distance from clinical cancer experiences) and concept D (Finding comfort and safety). Patients' nature experiences helped restoration from mentally and physically exhausting clinical experiences (cognitive pathway, ART). Concept E (Vital nurturance) describes patients finding vital nurturance when engaging with nature. To this end, a connection can be made with a human predisposition to affinity for living and life-affirming environments and a biological readiness to relax in natural environments as proposed by AAT. Patients showed an affinity for living nature materials and preferred these to artificial plant materials (Study 4). While experts recommended caution when using fake plant design materials to avoid tokenism and inauthenticity (Study 5), on the whole, patients did accept fake plants as an alternative in situations where real plant materials are deemed clinically unsafe. However, patients preferred natural settings or nature-inspired spaces such as those provided by adjoining healthcare gardens for retreat and physical activity (physical or aesthetic pathway, AAT). Patients' need to connect (concept A) and construct new meaning (concept C) can be related to nature's theorized role for providing enabling conditions for safe intrapsychic exploration (Study 2). The natively generated theory included in the research program describes how patients use and explore nature in various symbolic and metaphoric ways for reconstructing self-identities that incorporate their cancer experiences (Study 2).

In this regard, our findings may refer to more basic human needs and processes, such as those of adjustment and identity-construction, which unfold more centrally in cancer patients' greater life contexts rather than in specific nature experiences *only*. The

intrapyschic importance of constructively dealing with cancer's impact is shown by P. Baker et al. [34] and integrates with aspects of our findings. A study of 28 adult cancer patients with breast, prostate or lung cancer revealed existential needs regarding experiences of identity continuity and discontinuity in the context of cancer [34]. The study showed how existential meaning-making experiences play out in the curative setting, which have been previously studied in the palliative care setting [35, 36]. The core finding in our research explains a process of "getting back to normal" for which we theorize an internal space in which the patient finds safety in order to construct and normalize a shifting identity. Patients in Study 1 and Study 2 reported on accessing nature as a familiar context in which to address the immediate and deeper tasks associated with cancer diagnosis and personal identity. Some patients used nature as additional support in the interval between initial diagnosis and acceptable integration of the cancer experience.

Conducive environments, experiences, and atmospheres can be curated using nature-based or other materials. It is not unfathomable that patients use their physical environments for accomplishing creative and adaptive enterprises. This has been substantiated in research investigating the role of the physical oncology environment in cancer care processes [37]. However, several challenging questions arise in the context of nature's unique role in these scenarios: To what degree, if any, is nature contributing to the outcome? And, can patient needs be equally addressed with non-nature-based responses? Research investigating the effectiveness of nature-based distraction therapy during clinical procedures cannot explain nature *per se* to be causing successful outcomes [38-40]. One study using a simulated hospital experience assessed nature's influence on levels of stress in a controlled experiment that aimed to control for nature as an independent variable. Mediation analyses showed that the lower stress levels when viewing indoor plants as compared to the control condition were mediated by "perceived attractiveness of the room" [41]. It is reasonable to consider that non-nature-based strategies in such interventions could produce a similar, or even better, response. The nature-based intervention reported in Study 4 [27] lends another good example. The strongest positive response (81% agreed or strongly agreed) to the oncology room nature-based design intervention was given the statement, "The greenery brightens the waiting room" [27]. Similarly, a randomized, controlled trial of 90 patients recovering from surgery reported multiple outcomes related to viewing real plants in the hospital room, including that the plants "brightened up the room environment" [42]. The positive responses in both studies may be explained by an increased attractiveness related to enriched

environments. Considering alternative explanations, such as enhanced attractiveness of the environment, opens the field for exploration of other, perhaps more effective, design approaches (or themes) with which to address patient needs.

The exposition of nature's relevance, particularly in the context of healthcare intervention, requires further research to better understand its dimensions and contribution. Currently, artificial plant representations, such as nature art [43], nature sounds [44], and nature screens [42] are permissible as nature-based interventions. While research is accumulating to raise and broaden nature's profile in healthcare, greater scrutiny is needed to substantiate causality, and greater discernment is needed to define what nature is, and is not, in the context of health intervention. Clearly defined concepts not only address an interesting philosophical problem, but also ensure our efforts are geared toward effective responses to patient needs.

Notwithstanding the above criticisms, inquiry into this specific aspect of cancer patients' lives, namely how they engage with nature, reached and foregrounded core aspects of patients' ongoing lives, which may be supported and enhanced through access to nature experiences. The framework discerns the human relevance as well as the clinical application of beneficial experiences that correspond with valued aspects of patients' lives and shows that some cancer patients will find nature helpful in this context.

Limitations and future research

One important limitation of this emerging research field is its short track record of scientific investigation, meaning little literature exists to build upon and orientate towards. The limited available literature (Study 1) shows that evidence emanates mostly from qualitative description of cancer patients' nature experiences and leaves questions unexplored about the effectiveness and feasibility of potential nature-based interventions. To advance nature-based cancer experiences research towards more productive inquiry and useful results, robust and collaborative approaches must combine with patient-centric lenses that keep sharp focus on clinically relevant research design and outcomes on par with medical research standards.

A further focus point is the collaborative, multi-stakeholder approach, which is as compelling as it is challenging. The present study points to potential biases that can result from one-sided investigation if, for example, patient and expert views are unequally weighted in the study design and procedures. By way of investigating patient and expert

views separately in Study 3 and 5, it was possible to find overlaps, and importantly, determine points of difference. Individual research projects and researchers need to collaborate with patients, healthcare practitioners and researchers, and their counterparts in the design and planning disciplines, to ensure thorough and complete treatment of pertinent issues. Future research needs to sensitively consider research procedures that foster productive collaboration.

CONCLUSION

Inquiry into patient experience is gaining attention and greater traction in supportive care and healthcare design research. Increasingly, richness of patient experience, values, and needs combine as a productive frame to release a common purpose: to care for and improve lives affected by cancer. Perennial and everyday cancer experiences, including those involving *nature*, can signify unburdened and uninterrupted moments where the patient is helped to negotiate personal challenge. The poignancy of such spaces and their contextual qualities become more acute when the imposing cancer circumstance produces feelings of anxiety and uncertainty and is perceived inescapable. Patients have high stakes in substantive responses that mitigate unnecessary suffering caused by the clinical settings itself. Health systems that sensitively respond to these often neglected human experiences are challenging to author and require deeper levels of inquiry and ingenuity.

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Competing Interest None declared.

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REFERENCES

1. Haluza, D., R. Schonbauer, and R. Cervinka, *Green perspectives for public health: A narrative review on the physiological effects of experiencing outdoor nature*. Int J Environ Res Public Health, 2014. **11**(5): p. 5445-61.
2. Kaplan, S., *The restorative benefits of nature - toward an integrative framework*. Journal of Environmental Psychology, 1995. **15**(3): p. 169-182.

3. Ulrich, R.S., et al., *A review of the research literature on evidence-based healthcare design*. Herd-Health Environments Research & Design Journal, 2008. **1**(3): p. 61-125.
4. Carroll, M., *Earthly paradises: Ancient gardens in history and archaeology*. 2003: Getty Publications.
5. Gelband, H., et al., *Disease Control Priorities: Cancer*. Vol. 3. 2015, Washington, DC: World Bank Publications.
6. Baker, *Crossing the quality chasm: a new health system for the 21st century*. BMJ: British Medical Journal, 2001. **323**(7322): p. 1192.
7. Organization, W.H. *Definition 'Health'*. International Health Conference, World Health Organization [Constitution of the World Health Organization] 1946 [cited 2014 15 September]; Constitution of the World Health Organization]. Available from: <http://www.who.int/about/definition/en/print.html>.
8. Antonovsky, A., *Unraveling the mystery of health: How people manage stress and stay well*. 1987, San Francisco: Jossey-Bass.
9. Ulrich, *Aesthetic and affective response to natural environment*, in *Behavior and the Natural Environment*. 1983, Springer. p. 85-125.
10. Kaplan, S., *The restorative benefits of nature: Toward an integrative framework*. Journal of environmental psychology, 1995. **15**(3): p. 169-182.
11. Wilson, E.O., *Biophilia*. 1984, Cambridge, MA: Oxford University Press.
12. van den Berg, A.E., *Health impacts of healing environments: A review of evidence for benefits of nature, daylight, fresh air, and quiet in healthcare settings*. 2005, Van Eck & Oosterink: Dodewaard (NL).
13. Park, S.-H. and R.H. Mattson, *Ornamental indoor plants in hospital rooms enhanced health outcomes of patients recovering from surgery*. The Journal of Alternative and Complementary Medicine, 2009. **15**(9): p. 975-980.
14. Rappe, E. and L. Lindén. *Plants in health care environments: Experiences of the nursing personnel in homes for people with dementia*. in *XXVI International Horticultural Congress: Expanding Roles for Horticulture in Improving Human Well-Being and Life Quality* 639. 2002.
15. Whitehouse, S., et al., *Evaluating a children's hospital garden environment: Utilization and consumer satisfaction*. Journal of Environmental Psychology, 2001. **21**(3): p. 301-314.
16. Annerstedt, M. and P. Währborg, *Nature-assisted therapy: Systematic review of controlled and observational studies*. Scandinavian Journal of Public Health, 2011(39): p. 371-388.
17. Saadatmand, V., et al., *Effect of nature-based sounds' intervention on agitation, anxiety, and stress in patients under mechanical ventilator support: A randomised controlled trial*. International Journal of Nursing Studies, 2013. **50**(7): p. 895-904.
18. Ulrich, *View through a window may influence recovery*. Science, 1984. **224**(4647): p. 224-225.
19. Gonzalez, M.T., et al., *Therapeutic horticulture in clinical depression: A prospective study of active components*. Journal of Advanced Nursing, 2010. **66**(9): p. 2002-2013.
20. Währborg, P., I.F. Petersson, and P. Grahn, *Nature-assisted rehabilitation for reactions to severe stress and/or depression in a rehabilitation garden: Long-term follow-up including comparisons with a matched population-based reference cohort*. Journal of Rehabilitation Medicine, 2014. **46**(3): p. 271-276.
21. Cimprich, B. and D.L. Ronis, *An environmental intervention to restore attention in women with newly diagnosed breast cancer*. Cancer Nurs, 2003. **26**.
22. Blair, C.K., et al., *Harvest for health gardening intervention feasibility study in cancer survivors*. Acta Oncol, 2013. **52**.
23. Maller, C., et al., *Healthy nature healthy people*. Health Promotion International, 2006. **21**(1): p. 45-54.

24. Blaschke, S., *The role of nature in cancer patients' lives: a systematic review and qualitative meta-synthesis*. BMC Cancer, 2017. **17**(1): p. 370.
25. Blaschke, S., et al., *Cancer patients' experiences with nature: Normalizing dichotomous realities*. Social Science & Medicine, 2017. **172**: p. 107-114.
26. Blaschke, S., C.C. O'Callaghan, and P. Schofield, *Cancer patients' recommendations for nature-based design and engagement in oncology contexts: qualitative research*. HERD: Health Environments Research & Design Journal, 2017: p. accepted.
27. Blaschke, S., C.C. O'Callaghan, and P. Schofield, "Artificial But Better Than Nothing" *The Greening of an Oncology Clinic Waiting Room*. HERD: Health Environments Research & Design Journal, 2017. **10**(3): p. 51-60.
28. Blaschke, S., C.C. O'Callaghan, and P. Schofield, *Nature-based care opportunities and barriers in oncology contexts: A modified international e-Delphi survey*. BMJ Open, 2017.
29. Morse, J.M., *Exploring the theoretical basis of nursing using advanced techniques of concept analysis*. Advances in Nursing Science, 1995. **17**(3): p. 31-46.
30. Walker, L. and K. Avant, *Strategies for Theory Construction in Nursing*. 3rd Ed ed. 1995, London: Appleton Lange.
31. Risjord, M., *Rethinking concept analysis*. Journal of advanced nursing, 2009. **65**(3): p. 684-691.
32. Duncan, C., J. Duff Cloutier, and P. Bailey, *In response to: Risjord M.(2009) Rethinking concept analysis. Journal of Advanced Nursing 65 (3), 684–691*. Journal of advanced nursing, 2009. **65**(9): p. 1985-1986.
33. Rodgers, B.L., *Concepts, analysis and the development of nursing knowledge: the evolutionary cycle*. Journal of advanced nursing, 1989. **14**(4): p. 330-335.
34. Baker, P., et al., 'Getting back to normal' or 'a new type of normal'? *A qualitative study of patients' responses to the existential threat of cancer*. European journal of cancer care, 2016. **25**(1): p. 180-189.
35. Breitbart, W., et al., *Psychotherapeutic interventions at the end of life: a focus on meaning and spirituality*. The Canadian Journal of Psychiatry, 2004. **49**(6): p. 366-372.
36. LeMay, K. and K.G. Wilson, *Treatment of existential distress in life threatening illness: a review of manualized interventions*. Clinical psychology review, 2008. **28**(3): p. 472-493.
37. Edvardsson, J.D., P.O. Sandman, and B.H. Rasmussen, *Sensing an atmosphere of ease: a tentative theory of supportive care settings*. Scandinavian Journal of Caring Sciences, 2005. **19**(4): p. 344-353.
38. Diette, G.B., et al., *Distraction therapy with nature sights and sounds reduces pain during flexible bronchoscopy: A complementary approach to routine analgesia*. Chest Journal, 2003. **123**(3): p. 941-948.
39. Miller, A., L. Hickman, and G. Lemasters, *A distraction technique for control of burn pain*. Journal of burn care & research, 1992. **13**(5): p. 576-580.
40. Saadatmand, et al., *Effect of nature-based sounds' intervention on agitation, anxiety, and stress in patients under mechanical ventilator support: A randomised controlled trial*. International Journal of Nursing Studies, 2013. **50**.
41. Dijkstra, K., M.E. Pieterse, and A. Pruyn, *Stress-reducing effects of indoor plants in the built healthcare environment: The mediating role of perceived attractiveness*. Preventive medicine, 2008. **47**(3): p. 279-283.
42. Lechtzin, N., et al., *A randomized trial of nature scenery and sounds versus urban scenery and sounds to reduce pain in adults undergoing bone marrow aspirate and biopsy*. The Journal of Alternative and Complementary Medicine, 2010. **16**(9): p. 965-972.

43. Lee, D., et al., *Can visual distraction decrease the dose of patient-controlled sedation required during colonoscopy? A prospective randomized controlled trial.* Endoscopy, 2004. **36**(03): p. 197-201.
44. Rejeh, N., et al., *The impact of listening to pleasant natural sounds on anxiety and physiologic parameters in patients undergoing coronary angiography: A pragmatic quasi-randomized-controlled trial.* Complementary Therapies in Clinical Practice, 2016. **25**: p. 42-51.