THE ROLE OF NATURE IN CANCER PATIENTS’ EXPERIENCES OF HEALTH AND RECOVERY

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This thesis explores the role of nature in cancer patients’ experiences of health and recovery. Using a 2-Phase mixed-method approach, the investigation aimed to generate new theoretical understanding about cancer patients’ use of nature and how they find nature engagement helpful or not when confronting cancer diagnosis. The project’s translational focus was to produce expert recommendations for nature-based care opportunities in oncology contexts based on patient-reported data. First, a systematic literature review and meta-synthesis was conducted to describe the existing qualitative research evidence base relating to nature experiences and nature-based interventions for cancer populations specifically. The aim was to describe current knowledge about the role of nature in cancer patients’ lives. From eleven eligible publications, seven inter-related core themes were identified as follows: connecting with what is valued; being elsewhere, seeing and feeling differently; exploration, inner and outer excursions; home and safe; symbolism, understanding and communicating differently; benefitting from old and new physical activities; and, enriching aesthetic experiences. Next, an in-depth investigation of cancer patients’ own experiences with nature used primary data to develop a new Grounded Theory describing the underlying and intrapsychic mechanisms of cancer patients’ phenomenal nature experiences. Based on qualitative data collected from semi-structured interviews with 20 cancer patients (9 female), the resulting theory model explores the unique role nature plays when diagnosed with cancer. It constitutes a core category and two inter-related themes, which explain a normalization process in which patients moved towards a state of 'new-normal' (Core Category). Nature functioned in this process as a support structure that repositioned patients and nurtured their inner and outer capacities to respond and connect more effectively (Theme A). Once enabled and comforted, participants could engage survival and reconstructive manoeuvres and explore the consequences of cancer in their present lives and possible futures (Theme B). A dynamic relationship was shown between moving away while, simultaneously, advancing towards the cancer reality in order for patients to incorporate their cancer experiences into a shifting normality. From a place of comfort and safety, patients felt supported to deal differently and more creatively with the threat and demands of cancer diagnosis, treatment, and outlook. The descriptively rich interview data provided further insights into patients’ own recommendations for nature engagement in the oncology context, which were extracted from the transcriptions using deductive content analysis and were consolidated into patient recommendations for nature-based care opportunities. These incorporated using nature for vital sensory stimulation and engagement, using nature for personal space and freedom to enable private and social exploration, using views of nature for distraction and comfort, and accessing nature for physical activity and movement. Three critical factors were determined to avoid adverse experiences: determining appropriate health-care expenditure and resourcing on nature-based interventions, selection of appropriate nature-based design materials, and exercising caution around demanding nature engagement and harsh weather conditions. A questionnaire survey study was conducted following an environmental intervention in an oncology waiting room to assess patient, visitor, and staff responses to design changes, which included the addition of artificial plant materials. Based on 143 returned survey
questionnaires consisting of 73 cancer patients, 13 staff, 52 carers, and five ‘other’, it was found that the environmental intervention positively impacted patients, staff, and carers’ perceptions of the oncology waiting room environment. Patients, staff, and carers mostly accepted artificial plants as an alternative design solution to real plants. Comments included positive appraisals and occasional adverse reactions to artificial plants. No significant differences were found between patient, staff, and carer reactions. Insights gleaned from the initial, exploratory phase formed the basis for a second phase investigation comprising an international online Delphi study. The aim was to solicit knowledge from relevant experts drawn from a range of healthcare practitioners, management, designers, and researchers to determine feasible opportunities for, and barriers to, providing helpful nature engagement in oncology settings. Two hundred potential panellists were identified and sent an invitation to participate. Thirty-eight experts were recruited who represented 7 countries: Australia (19), USA (8), UK (3), New Zealand (2), Canada (2), Denmark (3), and Sweden (1). This study followed a structured, iterative feedback process that queried and synthesized expert opinion. Cancer patients’ own recommendations, extracted from phase 1, were used as a starting point for the Delphi panel to brainstorm and develop their own ideas about appropriate nature-based opportunities in oncology settings and the barriers to their provision. In total, 250 separate suggestions for opportunities and 205 suggestions for barriers were collected. Further analysis condensed these into 55 unique items (35 opportunities, 20 barriers). The Delphi panel’s list of recommendations included “Window views from clinical areas onto nature […]” as the highest rated opportunity, and “Building design and site constraints […]” as the highest rated barrier to providing nature-based supports for oncology care. Finally, a synthesis of findings from the overall investigation, which constitutes six publications, is provided to summarize and outline the salient findings and discern the study’s limitations in order to suggest pathways for future research. This synthesis produced a conceptual framework consolidating new theoretical understanding and empirical content from patient- and expert-reported data about nature-based care opportunities in the oncology setting. The thesis findings provide evidence for multiple uses of nature as a supportive aid in the cancer care context. Concrete recommendations have resulted to guide the application of nature-based concepts in future oncology setting design and may be considered when developing additional supportive care services. The findings may assist healthcare practitioners, designers, researchers, and patients themselves to creatively and practically participate in future oncology care practice and design.
Declaration

This is to certify that:
• The thesis comprises only my original work towards the PhD except where indicated in the Preface.
• Due acknowledgement has been made in the text to all other material used.
• The thesis is fewer than 100,000 words in length, exclusive of tables, figures and bibliographies.

Signature: ........................................ 04/03/2018

Sarah Blaschke
Preface

With regards to the included publications as chapters 4 to 8 of this thesis, all requirements specified by the University of Melbourne for the inclusion of published work have been met.

Chapter 4: Systematic Literature Review and Meta-Synthesis
Citation: Blaschke, S. (2017). The role of nature in cancer patients' lives: a systematic review and qualitative meta-synthesis. *BMC Cancer, 17*(1), 370.

Contribution: SB designed the search protocol; retrieved and assessed all included literature; extracted and analysed relevant data and wrote the manuscript.

Chapter 5: Grounded Theory Result: Cancer Patients’ Experiences with Nature

Contributions: SB is the principal investigator who conceived the study and drafted the study protocol and interview schedule. SB approached, recruited, and interviewed all participants. SB transcribed all interviews and coded the transcripts. CCOC functioned as inter-rater and provided feedback and discussion about the analytic work. SB, CCOC and PS (third author) are responsible for the design of the study and CCOC and PS (third author) critically revised the manuscript and related study materials and provided feedback throughout the research process. PS (fourth author) provided critical reflection and input in the analysis phase and assisted in the write-up of findings. PS (fourth author) reviewed the manuscript multiple times and was instrumental in formulating the resulting theoretical findings. All authors read and approved the final manuscript.

Chapter 6: Patient-Reported Recommendations for Nature-Based Care Opportunities in the Oncology Setting

Contributions: SB is the principal investigator who conceived the study, drafted the initial protocol, extracted all relevant data according to the pre-defined categories and conducted the analytical procedures. SB drafted the manuscript. SB, CCOC and PS are responsible for the design of the study and CCOC and PS critically revised the manuscript and related study materials and provided feedback throughout the research process. All authors read and approved the final manuscript.

Chapter 7: Questionnaire Survey Evaluation of a Nature-Based Intervention in the Oncology Setting

Contributions: SB is the principal investigator who conceived the study and drafted the initial
protocol and survey questionnaire. SB entered all data and performed the analysis with assistance from the department’s statistics office. SB drafted the manuscript. SB, CCOC and PS are responsible for the design of the study and CCOC and PS critically revised the manuscript and related study materials and provided feedback throughout the research process. All authors read and approved the final manuscript.

Chapter 8: Expert-Developed Recommendations for Nature-Based Care Opportunities in the Oncology Setting
Contributions: SB is the principal investigator who conceived the study and drafted the initial protocol manuscript. SB, CCOC and PS are responsible for the design of the study and CCOC and PS critically revised the manuscript and related study materials. All authors read and approved the final manuscript.

Contributions: SB is the principal investigator who conceived the study and drafted the initial protocol and questionnaires. SB approached experts and corresponded with those who accepted participation. SB administered and coordinated the multi-step questionnaire process, entered the data and performed the analysis in each of the four rounds. CCOC functioned as inter-rater in the first step that included qualitatively developing and categorizing data. SB drafted the manuscript. SB, CCOC and PS are responsible for the design of the study and CCOC and PS critically revised the manuscript and related study materials and provided feedback throughout the research process. All authors read and approved the final manuscript.
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AAT  Aesthetic Affective Theory
ART  Attention Restoration Theory
GT   Grounded Theory
HN   Health and Nature
MRC  Medical Research Council
RCT  Randomized Controlled Trial
CHAPTER 1 Introduction

Health and Nature (HN) is an emerging and expanding field of research, which explores nature’s impact on human health and wellbeing. Interest in the topic is gaining scientific attention across different healthcare (Haluza, Schonbauer, & Cervinka, 2014), social science (S. Kaplan, 1995), and planning and design disciplines (Ulrich et al., 2008). 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 (Carroll, 2003; Jencks & Heathcote, 2010; Nightingale, 1969; Rawcliffe, 2008).

HN research today links with a global need to investigate and innovate effective solutions to modern healthcare challenges, such as the rapidly rising incidence of cancer diagnosis (Gelband, Jha, Sankaranarayanan, & Horton, 2015). Cancer patients have to deal with health challenges resulting from their exposure to cancer treatment toxicity, co-morbid health conditions and late and long-term effects (Stein, Syrjala, & Andrykowski, 2008). Reducing the multiple burdens of cancer by supporting those affected by the disease has become a healthcare priority. In response, supportive care and health promoting interventions are being developed and investigated. Such interventions are aligned with the World Health Organization’s broad definition of health, where health is not only related to the absence of disease but to a state of complete physical, mental, and social wellbeing (World Health Organization, 1946). This holistic understanding of what constitutes an acceptable state of health and wellbeing must consider multiple dimensions of patient needs. Furthermore, the patient role in healthcare is being redefined and increasingly prioritizes person-centred concepts and emphasizes the healthcare “consumer” experience (A. Baker, 2001; Bate & Robert, 2007). The modern healthcare consumer is viewed as better informed about diagnostic and medical processes and therefore more demanding of healthcare delivery systems (Rasmussen & Volqvartz, 2005). As a result, health systems confront unique pressures to deliver holistic, high-quality oncology treatment and supportive care services, which not only cure but also promote care that ensures a high-quality of life for as long as possible.

Given cancer’s potential challenges to physical and psychosocial functioning, and the adverse effects on wellbeing and quality of life (Gelband et al., 2015), the beneficial effects of patient-nature interchanges may have particular relevance for this growing population affected by cancer. Such health strategies connect with salutogenic approaches to healthcare solutions, which utilize and centre on patients’ own life contexts and resources for regaining and maintaining health even when subjected to pathogenic biological or psychosocial stressors (Antonovsky, 1987; Van den Berg, Hartig, & Staats, 2007). Understanding how patients deal with their cancer within their own life contexts, and how they appraise nature’s role in these processes, requires qualitative research and a social science lens. Social science research can achieve coherent and organized understanding about experiences and events related to social reality (Neuman, 2014). Rigorous qualitative research is needed to comprehend cancer patients’ nature experiences with the aim to open the field for exploration.
and create new solutions.

This thesis was undertaken in recognition of the issues outlined above and was designed to carefully interrogate, from a social science perspective, how nature experiences factor into patients’ health behaviours in personal and clinical circumstances. Based on acquiring this knowledge, the study set out to determine the usefulness and feasibility of support strategies, which incorporate nature-based aspects. The research aimed to generate key recommendations based on patient perspectives and healthcare, and design expert input. The objective was to provide a guiding framework to effectively steer the incorporation of nature-based resources into existing and new support strategies, which may enhance this potentially beneficial aspect of cancer patients’ lives and improve cancer outcomes.

1.1 What is “Nature” in this Study?

Clear definitions of concepts are essential for conducting impactful research and advancing knowledge (Neuman, 2014). Despite the fact that nature has been considered part of the human experience throughout history, the concept has not been discussed in very precise terms in healthcare literature (R. Kaplan & Kaplan, 1989). Thus far, nature has been conceptualized through different disciplinary lenses and may not always be understood as merely biophysical matter or experiences of bodily immersion into nature. Definitions of what nature is, and is not, differ according to the discipline investigating the issue.

Environmental psychologists Rachel Kaplan and Stephen Kaplan (1989) consider nature an umbrella term encompassing a broad range of natural elements including:

- parks and open spaces, meadows and abandoned fields, street trees and backyard gardens. We are referring to places near and far, common and unusual, managed and unkempt, big, small, and in-between, where plants grow by human design or even despite it …. Nature includes plants and various forms of vegetation …. It also includes settings or landscapes or places with plants (pp. 2-3).

This elaboration expands simpler dictionary definitions1 of nature and includes human-made environments. It allows isolated and man-made elements to be categorically considered a type of nature. In healthcare contexts, this notion takes on a special relevance given it accounts for curated creations containing and representing nature, which can be engaged with. Maller, Townsend, Pryor, Brown, and St Leger (2006) have taken a broader perspective and elevated nature as a public health resource consisting of:

- an organic environment where the majority of ecosystem processes are present (e.g. birth, death, reproduction, relationships between species). [sic] This includes the spectrum of habitats from wilderness areas to farms and gardens. Nature also refers to any single element of the natural environment (such as plants, animals, soil, water or air), and includes domestic and companion animals as well as cultivated pot plants (p. 46).

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1 The Oxford Dictionary defines nature as: “the phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, as opposed to humans or human creations” (Nature (n.d.)).
In the field of cancer care research, the restorative potential of gardens was investigated using the following definition of the garden: “yard or enclosure that denotes ways of organizing earth, water, plants and people, animals and art” (Butterfield, 2014, p. 24).

All three definitions lend useful material for constructing a suitable working definition of nature for this research program; the requirement being a pragmatic conceptual boundary grounded in existing literature that uses language amenable to social science healthcare research. The following working definition is adopted, which fulfils criteria for the theoretical and pragmatic aims of this thesis:

Nature is 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.

1.2 Outline of Chapters
Chapter 1 identifies the increasing pressure on the health system to respond effectively to a globally growing population affected by cancer. The urge to provide holistic support is related to increased focus on person-centred care models. Beneficial patient-nature interchanges are identified as potential support strategies to improve cancer outcomes. Recognition of these issues provides a background for the main thesis objective, which is to advance knowledge about nature’s relevance in cancer patients’ lives and, based thereon, develop recommendations for nature-based supports. The second part of this chapter considers the importance of clearly defining concepts in the endeavor of advancing knowledge. To this end, a working definition is constructed by drawing from pre-existing conceptualizations and considering the present research requirements.

Chapter 2 delimits areas of relevant discourse to position the research topic into a bounded context. Historical, theoretical, and disciplinary influences are examined to define the scope of the question under investigation. Ideas about nature’s impact on health and healing are traced along their line of medico-cultural development. Next, existing theory discourse is drawn upon to illustrate early and current theorizing on the human relationship with nature. Nature’s role in human evolutionary adaptive behaviour, cognition restoration, affect regulation, and human bonding are explored. HN research literature is divided into three components and examples given to show the different contexts (setting), processes (intervention), and outcome domains under investigation in this field. Lastly, the disease and treatment of cancer is briefly described and the thesis placed into context with person-centred cancer care models.

Chapter 3 articulates the philosophical framework and the fundamental assumptions informing the investigation. The blending of realist ontology and constructivist epistemology is described, and the adoption of a critical realist paradigm is elaborated as a useful and pragmatic approach for addressing the research problem. The overarching research aims are
outlined and the two-phase exploratory mixed-method research design explained. The phasing and methodologies of five sequential studies are outlined.

The next five chapters serve to report the results of the five individual studies. Chapter 4 begins by reviewing the available qualitative literature on cancer patients’ subjective nature experiences and meta-synthesizes extracted empirical data. Descriptive themes capture the breadth of patients’ nature experiences, patients’ motivations to seek nature experiences, and the range of outcomes patients report when engaging with nature, as contained in the available literature.

Chapter 5 reports on the major theoretical component of the research program, which explores the processes unfolding in cancer patients’ restorative nature experiences by gathering and interpreting qualitative first-person data. Interviews with cancer patients produced rich data in response to the first section of a semi-structured interview schedule, which invited a broad exploration of patients’ understanding and use of nature. Twenty patients freely described their own definition of nature followed by reports about their use of nature before and after diagnosis. Subsequent questions were asked about specific nature experiences at the time of receiving a cancer diagnosis, and about how patients engaged with nature during hospital visits and when receiving cancer treatment. Grounded Theory (GT) is used to inform an analysis aimed at advancing understanding about nature’s role in the essential unfolding processes when dealing with a cancer diagnosis. The resulting theory model describes a normalization process linking patients’ existential needs with nature experiences.

Chapter 6 begins the practical component and presents a study designed to determine key patient recommendations for nature-based opportunities in the oncology setting. The second part of the semi-structured interview schedule constituted two questions about participants’ nature-based recommendations for other cancer patients, and their recommendations and cautionary advice for nature-based opportunities in the oncology setting. Deductive content analysis methodology is performed on this data set using two predefined categories to guide extraction of relevant data. Key patient-reported opportunities for, and barriers to, the incorporation of nature-based opportunities in the oncology setting are reported.

Chapter 7 applies and tests emerging insights and reports findings from a questionnaire survey study, which assessed patient, staff, and carer responses to a nature-based design intervention in the oncology setting. Following the implementation of nature-based design changes to the specialist clinic waiting room, a purpose-built questionnaire was administered to evaluate its impact. Descriptive statistics were performed on data from 143 completed questionnaires showing mostly positive responses to the intervention, including some critical feedback about preferences related to artificial versus live plant materials.

Chapter 8 presents the final stage of recommendation development. A systematic consensus building process is used to determine key patient-informed expert recommendations for nature-based opportunities in the oncology setting. The chapter begins by describing the
development of a research methodology tailored to address the specific aims of this investigation. The protocol for a four-round e-Delphi is presented and discussed. A panel of international healthcare and design experts (n=38) firstly considered patient perspectives (Chapter 6) and, subsequently, expanded the data by contributing their own ideas. The result reports systematically developed items ranked by highest relative importance, which constitute expert-developed lists of opportunity and cautionary factors for designing and implementing nature-based supports.

Chapter 9 is the final chapter and concludes the thesis with a comprehensive synthesis and discussion of results from the overall investigation. Firstly, an overview of the research program is provided, which leads into an explanation of the concept analysis methodology used to consolidate phase 1 and 2 findings. The resulting conceptual framework is presented, which distinguishes shared patient and expert recommendations for nature-based opportunities in the oncology context. The findings are integrated with prior research and brought into connection with theory discourse. The last section states the research limitations and challenges encountered and discusses implications for future research. The chapter completes the thesis with a statement of final conclusions.

Contribution
This thesis resulted in a conceptual framework consolidating new theoretical understanding and empirical content from patient- and expert-reported data about nature-based care opportunities in the oncology setting. The findings may guide healthcare practitioners, designers, researchers, and patients themselves to creatively and practically participate in future oncology care practice and design.
CHAPTER 2 Positioning the Thesis

2.1 Overview
The previous chapter identified the need for effective solutions to meet the needs of a growing population affected by cancer, which provided background for the thesis’ objective to investigate and develop nature-based support strategies. This chapter contextualizes the research topic in relevant discourse by tracing its origin and development back to its starting point. Next, the prominent theory domains are examined, which have contributed to discourse about the relationship between humans and nature. Evolutionary adaptation behaviour, cognitive and affective responses, and Attachment theory are discussed. The next section introduces research investigating HN applications in healthcare contexts. Three central intervention components subdivide the presentation, namely context, process, and outcome. The final section introduces this research topic to the sector of cancer treatment and care.

2.2 Health and Nature in Historical Context
When justifying the historical review of research on motor skills, Adams (1987) asked: “Why bother with the panorama?” (p. 41). In response to his own question, he explained that a sense of history gives an investigator the chance to detect important and persisting themes and steer clear from “fads and fashions” (Adams, 1987, p. 41). History-informed research can meaningfully contribute to science rather than merely “brighten an inconsequential corner” (Adams, 1987, p. 41). Knowing the pedigree of an idea puts one’s own idea into perspective. The ancient idea that nature influences human health and healing has existed in many cultures throughout history. Poetry, philosophy, visual arts, and music have captured the links between nature’s cycles and the very human processes related to living and ultimately dying (Gerlach-Spriggs, Kaufman, & Warner Jr, 2004).

2.2.1 Ancient East and West
Some of the earliest writings describing the restorative garden originate from the ancient Middle East. As early as 2500 BC, Sumerian texts described a great appreciation for gardens and recognized their role in human wellbeing and as places to find “eternal and everlasting beauty, sustenance, and pleasure …. hope, survival, and benefit” (Beckwith & Gilster, 1997, p. 45). The Islamic paradise garden tradition (chahar-bagh) incorporated these early ideas about nature, health, and wellbeing, which migrated across North Africa and the Straits of Gibraltar and eventually entered Europe via Spain (Beckwith & Gilster, 1997).

Early societies in Greece and Rome held similar beliefs about beneficial human-nature interactions. Contact with nature was seen to foster wellbeing and help reduce stress (Gerlach-Spriggs et al., 2004). Ancient Greek texts (regimina) describe the use of gardens in medical practice (Carroll, 2003) and make mention of gardens, orchards, and parks in sections describing healthy lifestyle behaviours, such as diet, exercise, and rest (Grmek & Fantini, 1998). Asclepius, the Greek god of medicine and healing was worshiped at healing sites (asclepieia), which were created with special attention to spatial relationships between
building and surrounding landscape, greenery, waterways, and scenic nature because it was believed to influence the healing process.

2.2.2 Medieval Period
In the Medieval Period, disease prevention was critically important to survival. Translations of ancient medical texts made information available about maintaining good health and healthy lifestyle behaviours. An abbreviated handbook (*tacuinum sanitatis*) on health and wellbeing, described the sensory delights of gardens and gave impetus for the Medieval restorative garden (Arano, 1976). Religious and healthcare settings, such as monasteries, cloisters, hospitals, and hospices began adjoining enclosed courtyard gardens (Gerlach-Spriggs et al., 2004). Enclosure was key to the concept of a restorative garden. The Islamic *chahar-bagh*, Roman arcaded courtyards (*hortus conclusus*), Chinese courtyard houses (*siheyuan*) and Japanese dry rock gardens (*karesansui*) were enclosed outdoor spaces created primarily for protection against adverse climate and as safe refuge for vulnerable populations. Their second purpose was to serve contemplative and healing practice as well as religious ceremony (Rawcliffe, 2008). In the European context, Christian organizations took on a primary role in nursing the sick, infirm, and dying (Gerlach-Spriggs et al., 2004).

During this time, German theologian Hildegard von Bingen (1098–1179) became a key proponent of nature-based medical practices. She considered human birth, growth, and healing analogues with plant growth, and introduced the concept of *viriditas* (greenness) denoting the therapeutic transference of nature’s divine power from plant to human (Marcus & Sachs, 2013; Uhlein, 1983).

2.2.3 Renaissance and the Age of Discovery
The European Renaissance and the Age of Discovery brought about urban expansion and social reformation, which heavily impacted economic resources, especially those of religious organizations. Diminishing resources coupled with secularization caused the weakening of religious organization’s role in society. The adjoining courtyard gardens used for theological and healing purposes gave way to an appeal for more secular places for civic activities (Gerlach-Spriggs et al., 2004). Ongoing mass migration demanded an architecture program necessary to support streamlined healthcare that operated efficiently within the scarce resources available. An architecture directed by economic purpose eventually caused the demise of healthcare gardens.

2.2.4 18th and 19th Century
American egalitarianism and the French Revolution prompted the next major shift in healthcare approach and design. Notions of nature’s therapeutic qualities re-entered medical thinking and healing practice. Grounds and gardens were designed for those in ill-health to mix socially and engage in gardening activities. Doctors and nurses began noticing greater recovery success when operating in open tent-like constructions as compared to concealed environments. The better outcomes were attributed to better hygiene, good drainage, airflow and sunlight. It was widely believed that infection would spread through the air and low-rise, pavilion-style architecture promised better airflow and access to the outdoors. Adjoining
gardens, solaria, and terraces enabled patients to recover outdoors again (Gerlach-Spriggs et al., 2004)

English philanthropist and prison reformer John Howard (1726-1790) advocated for open healthcare architecture after returning from extensive travel across Europe to study different healthcare models. He reported on his positive observations of fresh airflow, patient views to nature, and exercise opportunities offered in the gardens (Gerlach-Spriggs et al., 2004). Florence Nightingale (1820–1910) reasserted the need for pavilion-style architecture, which aligned with her nursing ethos for holistic patient care. Nightingale’s work (Nightingale, 1969) revived ancient beliefs about nature’s influence on body and mind and gave firm reasons to promote nature’s presence in the nursing setting, as reflected in her notes:

Second only to fresh air … I should be inclined to rank light in importance for the sick. Direct sunlight, not only daylight, is necessary for speedy recovery. … I mention from experience, as quite perceptible in promoting recovery, the being able to see out of a window, instead of looking against a dead wall; the bright colors of flowers; the being able to read in bed by the light of the window (pp. 69-71).

2.2.5 Modern Era
At the turn of the 20th century, specialized and disease-centric healthcare demanded increasingly controlled environments and caused a proliferation of specialized, space-efficient, high-rise hospital construction. Progress in building technology accommodated increasingly complex medical technology. Principles of holistic care were replaced with the mission to cure making the restorative garden redundant (Ulrich, 1991). Greater demand for compartmentalized, controlled environments acted as a dissolving force of progression. The architectural possibility for creating health promoting environments was gradually lost. Instead, unwittingly, architecture predetermined unnecessary suffering through creating the context for it. Toward the end of the 20th century, healthcare re-focused on the person as the object of care rather than the disease. The hierarchy inverted once again and the system began a corrective process that tugged the patient back toward the centre of care. Investigations became possible, via the scientific method, to substantiate claims made about nature’s influence on health. Growing interest in the topic produced literature to show how features of the physical healthcare setting itself factor into measurable health outcomes (Evans & McCoy, 1998), including those related to nature (Ulrich, 1991). Organizational interest grew as well and, recognizing where the advantages are, prompted another architectural reform. New architecture briefs were piloted, such as the one produced by the founder of a cancer care organization in the United Kingdom. As a landscape architect and cancer patient herself, Maggie Jencks Keswick put forward a design model for cancer care settings that reintroduces and features, centrally, the concept of the restorative garden (Jencks & Heathcote, 2010).

2.3 Health and Nature in Theoretical Context

2.3.1 Overview
A theory is a set of propositions that establishes a logical connection between statements for the purpose of explaining phenomena (Neuman, 2014). In the social sciences, theories are
valuable because they condense and organize knowledge about some aspect of the social world (Neuman, 2014, p. 57). Theories linking health and nature offer plausible explanations about the mechanisms governing healthful human-nature interactions. Bio-psycho-evolutionary and psychoanalytic discourses have contributed to discussions about the human osmotic relationship with nature. To locate the thesis’ theoretical underpinnings these two prominent discourses are explored.

2.3.2 Bio-Psycho-Evolutionary Perspective
Evolutionary theories about human responses to nature spring from the concept that humans are predisposed to genetically adapt and respond to their environment for survival purposes. Such “adaptedness” is thought to act on physiological and psychological systems (Hartig & Evans, 1993, p. 437). This discourse examines an evolutionary drive for certain landscape (or habitat) preferences, which are representative of those environments in which humans are genetically best adapted to survive and thrive (Appleton 1984). Preference patterns are thought to relate to the criteria through which nature supports a person’s ability to apprehend and evaluate information from the immediate environment (Hartig & Evans, 1993).

2.3.2.1 Prospect-Refuge Theory
Prospect-Refuge Theory was developed by British geographer Jay Appleton who devised a preference model that suggests people ought to prefer everyday aesthetics, which signal favourable conditions for survival (Appleton, 1975). Applying a biological and behavioural sciences perspective, Appleton argued that aesthetic preferences correspond with evolutionary adaptive behaviour. His early work borrowed from Philosophy of Aesthetics (for examples see Kant, 1790; Kennedy, 1987; and Dewey, 2005) and considered concepts of “aesthetic value” and “aesthetic judgment” when observing how humans respond to nature. Appleton (Appleton, 1975) discovered a dual basis for landscape preference patterns based on how humans judge their safety within a particular landscape. In simple terms, Appleton proposes that if a landscape exhibits criteria for a person to see (prospect) but not be seen (refuge), then the landscape will be perceived favourable from a survival perspective and evoke positive aesthetic responses (Appleton, 1984).

2.3.2.2 Savannah Hypothesis
The Savannah Hypothesis was developed by American ornithologist and ecologist Gordon Orians who suggested savannah-like landscapes ought to be preferred since they resemble environments from which humans have evolved (Orians, 1980). The main distinction between the Savannah Hypothesis and Prospect-Refuge Theory is the addition of a third criterion, which signals opportunity to thrive and not only survive. Based on evolutionary biology, survive-and-thrive criteria are said to resemble savannah-like landscapes, which include bright green pastoral grasses, edible vegetation, trees with low spreading canopy, water reservoirs, and unobstructed views (Lohr & Pearson-Mims, 2006). These are deemed the characteristics of habitable environments that signal long-term flourishing and therefore cause positive responses in humans (Heerwagen, 1992; Lohr, 2007).

2.3.2.3 The Biophilia Hypothesis
The term *biophilia* was first used by German social psychologist Erich Fromm who detected an innate human affinity for living things as “a passionate love of life and all that is alive” (Fromm, 1973, p. 365). American biologist Edward O. Wilson connected Fromm’s concept with the phenomenon of human bonding with other species (Wilson, 1984). The *Biophilia Hypothesis* resulted in order to explore the “emotional affiliation of human beings to other living organisms” (Kellert & Wilson, 1995, p. 31). Based on this hypothesis, Kellert, Heerwagen, and Mador (2008) propose that architectural design can use nature in such a way as to improve health outcomes. Their concept, called *biophilic design*, is defined as: “[T]he deliberate attempt to translate an understanding of the inherent human affinity to affiliate with natural systems and processes into the built environment” (Kellert, Heerwagen, & Mador, 2011, p. 3). The six proposed design principles for improving outcomes through nature-based design include: natural shapes and forms, light and space, natural patterns and processes, ecosystem relationships, and the human-nature relationships (Kellert et al., 2008).

2.3.3 Cognition and Affect Restoration Models

Today, researchers who build upon the early theory models outlined above focus on the levels of cognition and affect for theorizing human responses to nature. Nature’s impact on attention restoration (R. Kaplan & Kaplan, 1989; S. Kaplan & Talbot, 1983) and positive affect and psychophysiological stress are the two central lines of investigation today (Ulrich et al., 1991).

2.3.3.1 Cognition Restoration Model

Attention Restoration Theory (ART) was developed by R. Kaplan and Kaplan (1989) who explain a relationship between human cognition and the natural world. ART proposes that the type of stimuli provided by nature enables a person to relax and more passively scan the environment as compared to stimuli from more demanding, unfavourable environments, which require a person to intensively process external impressions (Kaplan, 1995). The passive attention system, once activated, is thought to allow focused attention to rest thereby aiding cognitive restoration and mitigating against mental fatigue (S. Kaplan, 2001). The Kaplans describe nature as possessing four unique criteria or qualities, which create optimal conditions for the activation of the cognition restoration mechanism, namely fascination, being away, extent, and compatibility (R. Kaplan & Kaplan, 1989; S. Kaplan & Talbot, 1983).

2.3.3.2 Affect Model

Affective Aesthetic Theory (AAT) proposes that exposure to aesthetic and pleasant stimuli in the natural world evoke positive emotional states and reduce psychophysiological stress (Ulrich, 1986). Positive human-nature interactions are explained based on the following dual mechanism: If the environment is assessed to be safe, one can relax; if the environment is life-affirming and supportive, positive affect may increase (Ulrich, 1983). Ulrich (1983) provides the contrarian argument that human responses to nature are biologically instinctive and therefore essentially automatic and precede cognitive processing. According to AAT, restorative nature experiences emanate from a preconscious level of apprehension, which evoke emotional responses first and foremost (Ulrich, 1983).
2.3.4 Intrapsychic Perspective

According to bio-psycho-evolutionary models, humans continuously perceive, appraise, and evaluate information from their immediate environment in order to make the best decisions about survival. The intrapsychic perspective sees humans as continuously assigning meaning to the world around them to feel connected and situated within it (Hartig et al., 2011). The term “intrapsychic” is used in psychoanalytic literature to denote “the structuring or patterning of internal psychic experience or organization” (Aron, 2013, p. 17). The dictionary definition provides the following simpler explanation: “states arising, occurring, or situated within the mind” (Ayd, 2000, p. 531). Drawing on Attachment theory, this section explores interpersonal and place-person bonding behaviour in the context of human-nature interactions.

Bonding is central to the human experience (Bowlby, 2012). Relationships are formed with people, objects, and places throughout life. These bonds secure a person in their social and physical environments. Connections with biological family, social networks, and place of origin are usually maintained throughout life (Low & Altman, 1992). Attachment theory explains person-to-person bonding as an innate psychological regulatory system to which the “attachment figure” is central (Ainsworth, 1979). According to Ainsworth (Ainsworth, 1979), the attachment figure (often the primary caregiver) provides a “secure base” (Bowlby, 1988) from which the child, while remaining securely attached to the caregiver, can venture out ever further to explore safely a world beyond. Bowlby (Bowlby, 1982) further describes such exploratory behaviour to be regulated by the degree of security afforded the child, which creates opportunities for growth and development through important interactions with social and physical environments.

People also bond with places (Low & Altman, 1992). Place attachment research transposes concepts of interpersonal bonding and exploratory behaviour into the domain of person-place bonding (Korpela, Hartig, Kaiser, & Fuhrer, 2001; Scannell & Gifford, 2010). Interrelated processes are thought to unfold in reciprocity between interpersonal attachments and place attachment (Morgan, 2010). Rich and stimulating environments are seen to activate the exploratory system and thereby increase positive affect and, in turn, strengthen place-person bonds (Morgan, 2010). Places of personal significance are thought to function as a “surrogate” attachment figure providing the individual security who relies on outside support when risking exploratory behaviour (Scannell & Gifford, 2010). This phenomenon was explored in a qualitative study of 55 children (aged 8 to 13 years old) showing that more than half of the children retreated to their “favourite” places for cognitive restoration and one-third used their favourite places for emotional self-regulation (Korpela, Kyttä, & Hartig, 2002, p. 387). Two exploratory behaviours have been observed in relation to human responses to their environment. Specific exploration is described as information seeking behaviour that aids detection of danger (threat) and mitigation of negative arousal (stress). Diversive exploration is behaviour that seeks stimuli for favourable degrees of uncertainty (novelty) and positive arousal (aesthetic experience) (Berlyne, 1960).
Place attachment theory uses familiar phenomena in an unfamiliar explanatory framework. A fuller exposition of place bonding phenomena in this relatively young field of research promises rich explanatory possibility to better understand the human relationship with nature. The juncture of interpersonal and place-person bonding will be further explored in chapters 5 and 9.

2.4 Health and Nature Research

2.4.1 Overview
HN research is broad and spans diverse disciplines (for examples see Bowler, Buyung-Ali, Knight, & Pullin, 2010; Bratman, Hamilton, & Daily, 2012; Drahota et al., 2012; and Frumkin, 2001). In a review of 57 studies investigating the benefits of interacting with nature (Keniger, Gaston, Irvine, & Fuller, 2013), HN research was found to be strongly biased toward the social sciences and mainly conducted in the North American and European context. Despite being inclusive of a wide range of settings and outcomes, a stronger focus on psychological outcomes was reported (Keniger et al., 2013). To present an overview of this diverse and multidisciplinary literature, three following literature components are used to subdivide the next section: setting type (context), application type (process), and outcome domains.

2.4.1.1 Rationale for how the literature is subdivided
For a nature-derived benefit to occur, a human-nature interaction needs to take place. This interaction requires context and process, and to produce an outcome. In the healthcare setting, people may experience nature in different settings (contexts), through different types of engagement (process), and to different effects (outcomes). These basic components serve as a logical structure for organizing the breadth of HN literature. Of note are also the numerous terms in existence for describing what is essentially an intervention that uses some form of nature interaction with underlying therapeutic or restorative intent. Terms include: nature-based, nature-assisted, nature-derived, nature-related or simply nature interventions. Likewise, terms used to describe HN applications are diverse and include, for example, intervention, therapy, program, practice, or simply opportunity. To support clarity of presentation, the umbrella term “HN intervention” is devised, which is to include the manifold articulations of what are essentially restorative nature experiences in healthcare contexts.

2.4.2 Setting (Context)
No formal categorization exists to delineate different settings in which HN interventions are offered and studied. One scheme deployed in the literature (Keniger et al., 2013) describes three broad setting categories in which human-nature interactions are being investigated (Keniger et al., 2013). This scheme is adopted below with relevant adjustments to reflect categories more suited to healthcare contexts. They include: healthcare indoor settings, organized outdoor settings, and wilderness or production landscapes. Examples are provided in Table 1.
Table 1

Examples of three setting types in which HN interventions have been investigated

<table>
<thead>
<tr>
<th>Setting Description</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Indoor settings: inside hospitals, clinical centres or other environments where the patient receives care | • hospitals (Diette, Lechtzin, Haponik, Devrotes, & Rubin, 2003; Lee et al., 2004; S. H. Park & Mattson, 2009; Ulrich, 1984)  
• medical day centres (Lembo et al., 1998)  
• special care units (Miller, Hickman, & Lemasters, 1992)  
• dementia care settings (Rappe & Lindén, 2002)  
• palliative care settings (Rowlands & Noble, 2008)  
• surgery clinics (Katcher, Segal, & Beck, 1984; Saadatmand et al., 2013) |
| Organized outdoor settings: outdoor settings and landscapes that, in most cases, have been designed or are used for therapeutic purposes | • gardens in long-term care facilities (Barnicle & Midden, 2003)  
• horticultural therapy gardens in day centres (Jarrott, Kwack, & Relf, 2002)  
• patients’ own home environment or nearby nature (Blair, Madan-Swain, Locher, Desmond, de Los Santos, et al., 2013; Cimprich & Ronis, 2003)  
• rehabilitation and research gardens adjoining universities (Pálsdóttir, Persson, Persson, & Grahn, 2014)  
• horticultural therapy greenhouses at prevention and rehabilitation centres (Wichrowski, Whiteson, Haas, Mola, & Rey, 2005) |
| Wilderness or production landscapes: areas remote from urban environments with low human influence | • health farms (Gonzalez, Hartig, Patil, Martinsen, & Kirkevold, 2010)  
• forest settings (shinrin-yoku) (B. J. Park, Tsunetsugu, Kasetani, Kagawa, & Miyazaki, 2010)  
• wilderness settings (therapeutic wilderness group experiences) (Pearson, 1989) |

2.4.3 Application (Process)

HN interventions have found multiple applications in the healthcare setting ranging from passive and indirect engagement, such as nature views from the hospital bed (Ulrich, 1984) to more immersive applications, such as horticultural therapy (Blair, Madan-Swain, Locher, Desmond, Los, et al., 2013). No standardized application exists; rather, HN interventions utilize unique combinations and intensities of nature contexts and intervention process. Six broad categories of HN interventions are reported in the literature (Devlin & Andrade, 2017), which include: nature views, restorative gardens, live indoor plants, nature-based art, nature-based sound, and therapeutic activities in nature such as horticultural therapy (gardening). Following are illustrative examples:

1. Views to the outside from within the healthcare setting can include views of various natural elements, including gardens, tree foliage, water, wildlife, or simply the night sky. In a study of 278 coronary and pulmonary patients, the effect of a window view to nature versus non-nature were examined. Female patients’ physical health was negatively influenced when views to nature were obstructed, whereas male patients’ mental health was negatively impacted when given non-nature views. Pulmonary patients with a nature view showed greater improvement in mental health than coronary patients with such a view. Views to nature support improvement of physical
and mental health in the rehabilitation setting, however, degree of changes may vary
according to gender and diagnosis (Raanaas, Patil, & Hartig, 2012).

2. Restorative gardens can include courtyards or other outdoor environments in
healthcare settings that are designed with therapeutic and restorative intent. One
example of this setting type is reported in a post-occupancy evaluation of outdoor
spaces of two special care units in assisted living facilities for people with dementia,
showing that the gardens positively impacted the quality of life for residents, staff and
family members (Hernandez, 2007).

3. Live plant materials used in healthcare settings can include elements such as pot
plants in patient rooms and terrariums in waiting rooms. A study undertaken with 90
patients recovering from a haemorrhoidectomy showed multiple health benefits when
viewing live plants in the hospital room. Patients randomly assigned to rooms with
live plants reported significantly lower systolic blood pressure, lower ratings of pain,
anxiety, and fatigue as compared to patients in rooms without live plants. Patients
reported that the plants “brightened up the room environment, reduced stress, and also
conveyed positive impressions of hospital employees caring for patients” (S. H. Park

4. Nature art and visual displays that represent images of nature and nature scenes can
include, for example, sculptures, paintings, pictures, TV screen displays, and virtual
reality scenarios using nature environments. In a randomized, controlled trial of
patients undergoing bone marrow aspiration and biopsy (BMAB), it was found that
patients viewing nature scenes with accompanying nature sounds reported
significantly less pain as compared to patients viewing city scenes with city sounds, or
standard care (Lechtzin et al., 2010).

5. Nature-based sound applications can include live recordings of nature sounds or more
artistic, musical compositions using nature-based sounds such as birdsong, rain, wind,
and rushing water. In a study of 120 coronary artery bypass graft patients undergoing
weaning from mechanical ventilation who listened to nature-based sounds showed
significantly lower anxiety and agitation levels as compared to the control group
(Aghaie et al., 2014).

6. Nature-based therapies include various activities that use nature for therapeutic
purposes. Modalities can include therapeutic use and care of plants, working with
nature and natural materials, group activities in outdoor environments such as social
and therapeutic horticulture and horticultural therapy. A review of a horticultural
program for patients rehabilitating from brain injury reported the program included
components such as imagining nature, viewing nature, visiting a hospital healing
garden as well as actual gardening. It was found that this horticultural therapy
program may impact on emotional state, cognitive and/or sensory motor function, and
may increase social participation, health, wellbeing, and life satisfaction (Söderback,
Söderström, & Schälander, 2004).

2.4.4 Outcomes
HN research in healthcare contexts reports various outcomes. Without clear conceptualization
of what HN interventions exactly ought to involve, there is a multitude of outcome domains
to potentially measure. Numerous and varied combinations and intensities of intervention components (context and process) are being created and it follows that numerous outcomes are being reported. HN research typically measures an aspect of a person’s medical condition or the quality and satisfaction with healthcare services received. Measures include observable clinical indicators such as blood pressure (Vincent, Battisto, Grimes, & McCubbin, 2010), level of pain medication (Ulrich, 1984), patient and staff self-reported outcomes such as anxiety (S. H. Park & Mattson, 2009) and pain (Lechtzin et al., 2010); and economic measures, such as reduction in healthcare usage (Währborg, Petersson, & Grahn, 2014). The broad domains include: physical, psychological, emotional, social, existential, health behaviour, healthcare service satisfaction, and healthcare cost. Fewer studies (Ahmadi & Ahmadi, 2015; Nakau et al., 2013) have looked at domains related to spirituality, religiousness, or existential concerns in the context of HN interventions. This literature is challenging to interpret; the main issue being conflation of concepts. Similar challenges have been encountered in psycho-oncology research, which has described the conflation of spiritual, religious, and existential domains as ontologically mystifying (Salander, 2006).

The following example helps to illustrate the issue. A qualitative study of 42 participants dealing with stressful life situations (n=38 living with chronic illness, n=4 dealing with the death of a spouse) investigated the role of spirituality in relation to participants’ spiritual, sacred, and religious views of their gardening practice (Unruh & Hutchinson, 2011). The study defined spirituality as “a process of working out a conceptual framework of purpose and meaning in life through a search for answers to fundamental life questions” (Unruh & Hutchinson, 2011, p. 567). The authors consider this framework to be either “secular” or “sacred”, the latter is meant to include “a belief in God, spiritual being, higher power, a reality greater than the self” (Unruh & Hutchinson, 2011, p. 567). Finally, spirituality is also taken to include “values, beliefs and commitments that shape self identity” (Unruh & Hutchinson, 2011, p. 567). It is unclear how spirituality, religiousness, secularity, and sacredness are distinguished in this research. Arguments exist to treat spirituality and religiousness as separate constructs (Zinnbauer et al., 1997). Furthermore, some psycho-oncology researchers consider processes of meaning-making and self-identity formation to be “existential” concerns (Henoch & Danielson, 2009). According to the pragmatic purposes in this section, the overarching “existential” domain is to include “spiritual/religious” concerns. Examples of outcome domains studied in HN research are abbreviated below, and Table 2 outlines further outcome examples according to type of HN application:

1. Physical outcomes include, for example, decrease in physical discomfort during clinical procedures when using various forms of distraction therapy involving nature imagery with/without nature-based sounds (Diette et al., 2003; Katcher et al., 1984; Lembo et al., 1998; Miller et al., 1992), need for milder pain medication when gaining window views of nature from the hospital bed or through using audio-visual nature displays (Lee et al., 2004; Ulrich, 1984), and lowering patient blood pressure when under mechanical ventilation through nature-based multi-media distraction therapy (Saadatmand et al., 2013).
2. Psychological outcomes include, for example, improved psychological wellbeing for clinically depressed patients when participating in horticultural therapy (Gonzalez et al., 2010), improved psychological wellbeing for nurses in dementia nursing homes when introducing live plants into the setting (Rappe & Lindén, 2002), reduced stress for older people when able to access gardens in residential home (Rodiek, 2002), and greater capacity to restore attention for breast cancer patients participating in a weekly nature-based support program (Cimprich & Ronis, 2003).

3. Research investigating the emotional impacts have shown higher levels of positive affect for persons with dementia when participating in horticultural therapy programs (Gigliotti & Jarrott, 2005), increased self-esteem and self-efficacy when participating in supportive outdoor camping program for adolescents living with chronic disease (Török, Kőkönyei, Károlyi, Ittzés, & Tomcsányi, 2006), and improved quality of life when having access to gardens and nature views in the palliative cancer care setting (Rowlands & Noble, 2008).

4. Opportunities for sharing and bonding have resulted from gardening with peer cancer survivors (Unruh, 2002) and social interactions have increased amongst those visiting healing gardens at a paediatric cancer centre (Sherman, Varni, Ulrich, & Malcarne, 2005).

5. Increased fruit and vegetable consumption and increased physical activity are healthy lifestyle changes observed in cancer patients participating in horticultural therapy (Blair, Madan-Swain et al. 2013).

6. An increase in healthcare service satisfaction is reported when assessing responses related to uses of various healthcare gardens (Marcus & Barnes, 1999; Whitehouse et al., 2001).

7. In regards to healthcare cost, a reduction in healthcare usage is shown for patients rehabilitating from severe stress and depressive syndrome when participating in nature-assisted therapy programs (Währborg et al., 2014), and length of hospital stay was reduced for patients recovering from surgery when viewing live plants in the hospital room (S. H. Park & Mattson, 2009).

8. HN research investigating the impacts of gardening practices on existential domains has reported implications for meaning-focused coping strategies for reappraising one’s life situation in order to sustain hope and optimism when dealing with stressful life situations (Unruh & Hutchinson, 2011). Improvements in cancer patients’ spiritual wellbeing is shown when participating in “integrated medicine” programs inclusive of nature components (Nakau et al., 2013, p. 87).

### Table 2

<table>
<thead>
<tr>
<th>HN Intervention</th>
<th>Example Outcomes: population, study focus</th>
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| Views of Nature | • effect on physical and mental health, subjective wellbeing, and emotional states: coronary and pulmonary patients, hospital room with a panoramic view vs. a view obstructed by other buildings (Raanaas et al., 2012)  
  • effect on alertness and acute stress: nurses in hospital setting, nature view |
vs. non-nature or no view (Pati, Harvey Jr, & Barach, 2008)

| Therapeutic and Restorative Gardens | • impact on quality of life: dementia residents, therapeutic gardens in special care unit (Hernandez, 2007)  
| | • impact on emotional distress and pain: patients, staff, and visitors, healing garden at paediatric cancer centre (Sherman et al., 2005) |
| Live Plants | • impact on length of hospitalization, analgesics used for postoperative pain control, vital signs, distress, anxiety, and fatigue: patients recovering from appendectomy, foliage and flowering plants placed in the hospital room (S. H. Park & Mattson, 2008)  
| | • impact on health, subjective wellbeing, and emotional state: coronary and pulmonary patients, indoor plant intervention in rehabilitation centre (Raanaas, Patil, & Hartig, 2010) |
| Art and Nature Displays | • effect on anxiety and level of pain medication: open-heart surgery patients, nature images vs. abstract art, a blank panel, or no panel (Ulrich, Lundén, & Eltinge, 1993)  
| | • effect on pain: patients undergoing bone marrow aspiration and biopsy, viewing nature scenes and listening to nature sounds during clinical procedure (Lechtzin et al., 2010) |
| Music and Nature-Based Sound | • impact on agitation and anxiety: coronary bypass surgery patients weaning from mechanical ventilation, nature-based sound therapy (Aghaie et al., 2014)  
| | • impact on anxiety and physiological parameters: coronary angiography patients undergoing clinical procedures, listening to natural sounds (Rejeh et al., 2016) |
| Nature-Based Therapy | • impact on rehabilitation from brain injury: brain injury patients, horticultural therapy (Söderback et al., 2004)  
| | • impact on psychosocial wellbeing: cancer patients, horticultural therapy (Fried & Wichrowski, 2008) |

### 2.5 The Cancer Context

Worldwide, 14.1 million new cancer cases were recorded in 2012 making cancer one of the most common diseases and one of the three leading causes of death, globally (Ferlay et al., 2015). It is estimated that 32.6 million people are living with a cancer diagnosis today; the three most common diagnoses being lung (13 %), breast (11.9 %), and colorectal cancers (9.7 %) (Bray, Ren, Masuyer, & Ferlay, 2013; Ferlay et al., 2015). It is predicted that by the year 2030 cancer incidence will increase by 53%, therefore, health systems need to prepare for a projected number of 21.6 million new cancer cases over the next thirteen years (Gelband et al., 2015). It is recognized that approximately 30% of all cancers are preventable if risk factors are attended to. Health behaviour interventions targeting key lifestyle factors are regarded the most effective healthcare response and prevention strategy, which include cigarette smoking cessation, reduction in alcohol consumption and obesity, and increase of levels of physical activity (Gelband et al., 2015).

Cancer is a collection of diseases with more than a hundred types of cancers known today. Commonly they are named according to the organs or sites affected (Galsky, 2010). Cancer is characterized by abnormal cell growth, or uncontrollable cell division, which can occur anywhere in the body and spread to surrounding tissue (Galsky, 2010). These abnormal
growths are called malignant tumours from which cells can break off and travel via circulatory systems (blood flow or the lymph system) to other areas in the body forming further cancerous growths called metastasis. Haematological malignancies such as leukemia affect the blood or lymph systems and do not form solid tumours. Cancer can be an inherited condition or have several other causes, including genetic changes to how cells grow and divide, errors in cell behaviour, or DNA damage through environmental exposures and lifestyle factors such as sun exposure and cigarette smoking (Galsky, 2010).

2.5.1 Treatment
Several types of cancer treatments exist, including surgery, chemotherapy, radiation therapy, immunotherapy, targeted therapy, and hormone therapy (American Cancer Society, 2016). Treatments are often combined depending on the type and stage of cancer diagnosis and aim to remove all traces of the cancer, prolong survival, and provide the highest possible quality of life (Alberts, Lluria-Prevatt, Kha, & Weihs, 2016). Common side effects associated with cancer treatment vary from being acute and short-lived to being chronic and persistent (Alberts et al., 2016). The side effects can include bone density loss (osteoporosis and osteopenia), cardiotoxicity (heart damage), cognitive deficits, emotional distress, fatigue, fear of cancer recurrence, infertility, lymphedema, pain, pulmonary dysfunction, and sexual dysfunction (American Cancer Society, 2016). Long-term and late effects can relate to all domains of health and may persist long after treatment is completed (Stein et al., 2008).

2.5.2 Palliative and Supportive Care
Palliative care incorporates the concepts of supportive and psychosocial care and is designed to treat cancer associated symptoms and provide lasting physical and emotional wellbeing for patients and their families at all stages of the disease trajectory from diagnosis to survivorship (Alberts et al., 2016; Stein et al., 2008). With this definition in mind, the terms palliative care and supportive care are used interchangeably in the thesis.

With increasing cancer survival and the myriad of challenging symptoms and side effects, there is a greater need for palliative care (Alberts et al., 2016). A person may have increased levels of distress and support needs from the moment of diagnosis and often lasting into survivorship (Bennett, Hume, & Telford, 2013; Health, 2014). Early discussion about incorporating palliative care into active treatment planning is recommended for minimizing the physical and psychosocial impacts of cancer (Alberts et al., 2016). A recent meta-analysis of 198 randomized controlled trials (RCTs) involving 22,238 cancer patients and survivors showed that targeted support interventions can reduce emotional distress and improve quality of life (Faller et al., 2013). The review examined a range of interventions, including psychological techniques, education, coping skills training, psychotherapy, and relaxation (Faller et al., 2013).

Cancer impacts not only on the person diagnosed but can cause lifestyle and role changes for family and friends (Alberts et al., 2016). It is estimated that 1.8 million Australians have a personal experience of cancer through a close relative diagnosed with cancer (Burton, 2002). A review of five meta-analyses indicated that stress in caregivers can lead to psychological
changes, sleep disturbances, and changes in physical health, immune function, and financial wellbeing (Northouse, Williams, Given, & McCorkle, 2012). Supporting families and caregivers must be considered an important component of cancer care (Alberts et al., 2016; Andrykowski & Manne, 2006).

Physical and psychosocial wellbeing of patient, family, and carers is gaining greater recognition as an important cancer outcome. This indicates the need for cancer care strategies that base on person-centredness (Alberts et al., 2016).

2.5.3 Person-Centred Paradigm
Patient- or person-centredness is a key dimension of high-quality healthcare (A. Baker, 2001). The shift from a biomedical healthcare model to a more holistic approach introduces concepts of patient-driven treatment and care planning. Berwick (2009) notes that “patient-centred” care should include the experience of family and can be defined as the “experience (to the extent the informed, individual patient desires it) of transparency, individualization, recognition, respect, dignity, and choice in all matters, without exception, related to one’s person, circumstances, and relationships in health care” (p. 560).

American psychiatrist George Libman Engel (1989) instigated a contrarian movement toward “biopsychosocial” models of healthcare (p. 37). In his view, the dominant reductionist biomedical model did not account for “social, psychological, and behavioural dimensions of illness” (Engel, 1989, p. 37). He effectively called for negotiating a new centre point between cure and care. With broad focus on interjecting the predominant disease-centric model, the Institute of Medicine submitted aims for restructuring care delivery, which include “care that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions” (A. Baker, 2001, p. 3).

Multidisciplinary models of cancer care are an example of healthcare development in recent decades that promotes care collaboration and coordination with the aim to optimally address treatment planning and psychosocial care. These can include, for example, psychologists, psychiatrists, social workers, and allied health practitioners. Multidisciplinary care is defined as an approach to treatment and supportive care planning that focuses on continuity and streamlining of care throughout the treatment pathway, including timely referrals (Bennett et al., 2013; Church, Kerr, & Kerr, 2016).

2.6 Summary
This chapter prefaced the thesis with a historical and medico-cultural perspective on the idea that nature influences health outcomes. Three relevant domains of theoretical discourse were discussed to explore the human responses to nature. Three components of current HN research were summarized, namely setting types, intervention types, and outcome domains. Finally, the disease and treatment of cancer were briefly explained and current cancer care models outlined. The next chapter presents the philosophical framework and research design adopted in this thesis.
CHAPTER 3 Research Framework and Design

3.1 Overview
The previous chapter situated the study in relevant historical, theoretical, literature, and healthcare contexts. This chapter addresses the research framework in which the study was conceived, designed, and carried out. The first section describes the particular ontology and epistemology informing the thesis and the inherent philosophical assumptions are presented. Part two outlines the overarching and specific research aims and describes the two-phase exploratory mixed-method sequential research design. The phasing and methodologies of five sequential studies are introduced and illustrated.

3.2 Research Framework

3.2.1 Philosophical Assumptions
An assumption is an “untested starting point or belief in theory” that is needed in order to progress theory development (Neuman, 2014, p. 61). A researcher’s philosophical orientation includes a certain interpretation about reality (ontology) and how reality can be known and understood (epistemology). Research takes place within, and is shaped by, a framework of ontological and epistemological assumptions (Neuman, 2014). This section describes my own philosophy and formulates the assumptions on which the thesis rests.

Firstly, my philosophy assumes that entities (phenomena) exist independent of our perceptions and theories about them. This assumption regards reality as that which causes phenomena to exist, which essentially denotes realist ontology (Maxwell, 2012). However, my worldview considers ideas about this world to be our own constructions and perspectives on reality. Through this lens, consequently, I see events to be experienced and understood through a person’s own meaning-making. By learning about (making explicit) experiences and interpretations, I believe one comes closer to understanding the basic, independently existing phenomena. My philosophy assumes that knowledge is never absolute nor certain, that knowledge is always inclusive of the holder’s perspectives, that personal experiences and background cannot be separated from the research process, and that personal history and intellectual culture ultimately affect interpretation of data. These assumptions essentially correspond with constructivist epistemology (Maxwell, 2012). The last assumption relevant to this thesis relates to how I see the role of theories in research. My view is that theories cannot represent reality in its entirety but are valuable in that they possess explanatory power to say something essential about the nature of things as they appear to unfold. This set of assumptions pervades my worldview and therefore influence my research practice.

3.2.2 Paradigm Adopted for this Thesis
A paradigm describes a basic orientation to theory and research (Neuman, 2014). Research design makes more sense when the paradigm on which it builds is disclosed. My philosophy constitutes two apparently contrasting worldviews: realism (positivism) and constructivism
(interpretivism). In social science, the relevant distinction is that realism assumes facts are neutral and that all rational people agree on them, while constructivism sees the social world as made up of socially constructed reality shaped by peoples’ ongoing meaning-making (Neuman, 2014). From a practical perspective, realists see data collection as a means to collect knowledge, while constructivists conceive data gathering as an act performed by both researcher and participant who, together, construct knowledge (Charmaz, 2014). The compromise is described by Maxwell (Maxwell, 2012) as a critical realist stance, which is also known as a critical social science paradigm (Neuman, 2014). This paradigm holds onto realist ontology (committed to a real world) and accepts that human knowledge is also constructed (epistemological constructivism) (Maxwell, 2012). The critical realist approach to research is inherently realist but also considers the constructivist intuition that knowledge is to a large extent a product of human meaning-making. This framework can resolve the inherent conflict and offers a pragmatic approach for productive inquiry (Maxwell, 2012; Neuman, 2014). It allows a certain methodological mobility advantageous for the question of understanding human problems. With these discussions in mind, I have adopted a critical realist paradigm for my approach in this thesis, which aligns with my personal philosophy and provides me with a pragmatic frame for selecting methods that work best for addressing the set of problems at hand.

3.3 Research Design

3.3.1 Research Aims
Research design and method are influenced by the research paradigm but are also determined by research aims. This study aims firstly to explore cancer patients’ subjective nature experiences and generate new understandings about the usefulness of nature-based supports. The second overarching aim is to develop expert recommendations that are anchored in patient perspectives in order to guide the incorporation of nature-based supports for improving cancer outcomes.

Specifically, the thesis sets out to address the following five aims:

1. Develop detailed description of cancer patients’ nature experiences.
2. Explore what is essential and ongoing in cancer patients’ nature experiences.
3. Understand preferences and uses of nature (strategies and their own recommendations).
4. Identify variables (items) based on patient-reported recommendations.
5. Develop expert recommendations for the application of restorative nature-based opportunities in oncology contexts based on patient-reported data.

3.3.2 Mixed-Method
Mixing qualitative and quantitative approaches is widely advocated in healthcare and social science research (McEvoy & Richards, 2006). According to Creswell, mixed-method research stems from a pragmatic orientation and applies methods that practically work best to
answer a research problem (Creswell, 2012). The best-suited and most straightforward approach to addressing the five thesis aims is to adopt a mixed-method design.

Mixing different methods means incorporating qualitative and quantitative approaches within a research design. There are several important differences in how the two approaches are actioned and what they can achieve.

Qualitative research uses an inductive process to create new concepts and uses concurrent data gathering and analysis procedures, which are mutually dependent. Measurements connect perceptions about the social world with phenomena unfolding in it, which can include nonstandard representations of information, such as words (written or audio-recorded), physical objects, and visual images. Empirical data is often descriptively rich but imprecise and not always reducible to uniform, exact variables (Neuman, 2014).

Quantitative research, on the other hand, seeks to measure precisely and numerically aspects of phenomena by using validated instruments and techniques. It requires variables (or concepts) to be clear and specific before collecting or analysing data. Data comprises of standardized numbers representing the value of variables, which empirically describe abstract ideas (Neuman, 2014).

Importantly, qualitative inquiry seeks to develop concepts (or variables) during data collection and responds to newly emerging insights and questions. It can achieve new, deep, and nuanced understandings about an unexplored area, and it can be used to crystalize a problem and guide suitable approaches to addressing it. Quantitative research, on the other hand, requires a priori development of concepts, which then determine best measurement techniques for measuring their properties (Neuman, 2014). It can achieve conclusive results by quantifying a problem and determining its prevalence through statistical approaches. Both types of research are instrumental for addressing the aims of this project.

### 3.3.3 Two-Phase Exploratory Mixed-Method Sequence

The thesis is planned to progress through two phases, using qualitative approaches in the first phase and a mix of qualitative and quantitative approaches in the second phase. This design is known as multi-phase exploratory sequential design and is recommended for a number of scenarios, including when

- the researcher and the research question are more qualitatively oriented,
- the phenomenon under study requires in-depth exploration and the impact of its dimensions require measuring,
- aspects of an emergent theory need validating,
- variables need to be identified and prepared for quantitative testing,
- no relevant instruments are available, or
- exploratory results need generalizing to larger populations or settings (Creswell & Clark, 2007).
Sequential designs are differentiated by how qualitative and quantitative strands are weighted and intermixed within the sequence (Creswell & Clark, 2007). The particular variant suitable for meeting the study objective is called a theory-building sequence. It prioritizes an initial, qualitative phase, which informs and drives a second, quantitative phase (Creswell & Clark, 2007). Phase 2 in this study is designed to include a mix of approaches rather than a purely quantitative approach.

3.3.3.1 Phase 1 Qualitative Inquiry

The investigation is based on acquiring deeper understanding about the processes involved in cancer patients’ nature experiences. Examination of existing qualitative literature is the first step in gaining preliminary insight into the topic and to elicit important issues for further investigation. The theoretical aim, additionally, demands deeper exploration of subjective, first-person-reported qualitative data. Following are the three research methods adopted in Phase 1, which will be explained in detail in subsequent chapters when reporting the individual studies.

Meta-synthesis
Meta-synthesis is the examination, critical comparison, and synthesis of published qualitative literature (Hammell, 2007; Thorne, Jensen, Kearney, Noblit, & Sandelowski, 2004). Meta-synthesis is recommended when new theoretical understandings of an existing body of knowledge are needed (Thorne et al., 2004). The method aims to develop a fuller knowing of phenomena than would be achieved in a single, isolated study (Jensen & Allen, 1996). It is a validated multi-stage research process, which results in new conceptual representations of information (Sandelowski & Barroso, 2006). Synthesized understandings can make disparate findings across a literature more accessible for supplementing and informing subsequent investigations.

Grounded Theory
Qualitative interviewing is recommended if the aim is to gain the fullest description possible of a phenomenon “from the subjects’ own perspective” (Kvale & Brinkmann, 2009, p. 31). Interviews can produce nuanced and varied descriptions of phenomena as it is experienced by the interviewee (Kvale & Brinkmann, 2009, p. 33). GT is a systematic approach to utilizing qualitative data, including interview data, for examining phenomena and producing in-depth understanding about process (Creswell, 2012).

Deductive Content analysis
Qualitative findings can prepare research for quantitative inquiry by developing variables and informing relevant research questions. The final stage of phase 1 translates qualitative findings into key variables (items) to be taken forward into phase 2. Patient recommendations can be recorded in reports about patient needs and their own nature-based strategies to address these needs. Recommendations can also be deduced from hearing participants’ advice for nature-based engagement for others, or by directly asking them to make recommendations. This material is best collected using semi-structured interviewing techniques that allow for probing and clarification to ensure the greatest breadth of data is collected. Predefining categories of interest, as instructed by deductive content analysis
protocols, can focus data analysis to extract relevant information to answer the research question (Elo & Kyngäs, 2008).

In summary, phase 1 reviews and meta-synthesizes the available qualitative literature reporting cancer patients’ subjective nature experiences. GT methodology is used to deepen understanding and glean new insights about elemental processes occurring in restorative nature experiences. Lastly, salient issues are identified and variables developed to drive the recommendation development in phase 2. Figure 1 illustrates the phase 1 study flow.

**3.3.3.2 Phase 2 Mixed-Method Inquiry**

Phase 2 of the investigation progresses from the initial, qualitative work and applies a practical lens to addressing the second overarching aim in this study, which is to develop recommendations for incorporating nature-based supports in the oncology setting. Developing recommendations requires greater insight into practical issues as well as relevant expert input to guide discussion about feasibility and practical constraints. To this end, phase 2 comprises field-testing of a nature-based intervention in the oncology setting and participation of experts in a consensus building process to systematically develop recommendations. The below research methods will be explained in further detail chapters 7, 8, and 9.

*Figure 1. Illustration of the phase 1 study flow.*
Survey Research
Testing ideas in the real setting can provide valuable, practical insight and check whether emerging insights hold when set against reality. Undetected issues can be teased out and evidence produced to corroborate theoretical findings. Moreover, important new questions can be formulated and unfounded existing ones discarded. Survey research is inherently statistical (quantitative) in nature and is useful for exploring, describing, or explaining the experiences of a certain sample of responders or experiencers (Neuman, 2014). A survey study can include self-reported data about respondents’ beliefs and behaviour and describe their experience of an event or intervention. Survey questions can be drafted to explore the appropriateness and acceptability of various intervention components, such as preferences for specific design materials or certain types of nature engagement.

Consensus Building Research
Developing healthcare recommendations includes concept development and expert opinion census building based on input from the group whom the recommendations concern. One method for systematically collecting diverse disciplinary viewpoints and progressing toward opinion consensus is the Delphi method. Delphi studies are growing in popularity in healthcare and nursing research (Khodyakov et al., 2017; Roth, Brewer, & Wieck, 2017). Successful examples exist in palliative cancer care research (Hui et al., 2016) and in cancer survivorship research (Breen et al., 2017). Delphi methodology offers key advantages relevant to the needs and constraints of this thesis, including the structuring of a rigorous and rapid feedback-based (online) communication process (Linstone & Turoff, 1975), freeing communication from logistical challenges, peer pressure and “group-think” scenarios (Hasson & Keeney, 2011), and cross-pollinating multidisciplinary expertise to achieve a broader understanding than would be reached from a single discipline alone (Okoli & Pawlowski, 2004).

Synthesis
The overall investigation consisting of five individual studies will produce a mix of interrelated qualitative and quantitative findings. Further analysis is required to reach a final, synthesized result that consolidates the findings. Phase 2 concludes the thesis by using concept analysis methodology to produce a sum result of findings from the overall investigation with the aim to elucidate the most salient insights gained.

In summary, phase 2 turns to practical matters by firstly field-testing and subsequently evaluating responses to a nature-based intervention. Next, expert nature-based recommendations are developed and, finally, findings are consolidated. Figure 2 illustrates the phase 2 study.
3.3.4 Research Setting

The phase 1 investigation was carried out at Peter MacCallum Cancer Centre in East Melbourne, Australia. Research conducted in phase 2 began at the East Melbourne site and was completed at Peter MacCallum Cancer Centre’s relocation site in Parkville, Melbourne. The Peter MacCallum Cancer Centre is a tertiary, specialist cancer care centre.

3.3.5 Ethical Considerations

Project protocols for phases 1 and 2 were submitted to the Human Research Ethics Committee at Peter MacCallum Cancer Centre for ethical review. The phase 1 protocol titled ‘The Relevance of Nature in the Lives of People Affected by Cancer’ (Appendix 1) was approved February 2015 (Approval for Project Number 14/14L, Appendix 2). The phase 2 protocol titled ‘Identifying opportunities for nature engagement in cancer care practice and design: a Delphi study’ (Appendix 3) was approved May 2016 (Approval for Project Number 16/46L, Appendix 4). The Sir Peter MacCallum Department of Oncology at the University of Melbourne shares reciprocal rights with Peter MacCallum Cancer Centre for ethics approval, which meant separate approval from the University of Melbourne was not required.

Safeguards were put in place to ensure ethical conduct in all research activities and these are described in detail in the two project protocols, which are provided in Appendix 1 and 3. Procedures to ensure ethical research was conducted with patients included: seeking approval from treating clinicians to approach patients, following an approach script when contacting patients, patient informed consent process, procedures for withdrawing research participation, support for patients should participation cause distress, participant confidentiality and anonymity, assurance of the voluntary nature of participation, de-identification and safe treatment and storage of data. Participants in phases 1 and 2 were sent a Participant Result
Summary Letter (Phase 1 Summary Letter, Appendix 5; Phase 2 Summary Letter, Appendix 6).

3.4 Summary
This chapter presented the research framework, including its philosophical assumptions and the research paradigm. The overarching and specific study aims were stated and the two-phase exploratory mixed-method sequential design explained. Five individual studies were outlined and their respective methodologies briefly described. The research setting was described and the measures to ensure ethical research conduct were considered. The next chapter reviews the available qualitative, peer-reviewed literature on cancer patients’ nature experiences.
CHAPTER 4 Systematic Literature Review and Meta-Synthesis

4.1 Overview
The last chapter explored the study’s research framework and detailed the research design. This chapter begins phase 1 with a review of the available qualitative literature about cancer patients’ nature experiences. Following a systematic search protocol (Appendix 7) all relevant literature was retrieved and the qualitative raw data extracted. Meta-synthesis methodology was used to develop thematic description of the material and produce new concepts grounded in the empirical data. The first section in this chapter states the overall study objective and the research question driving the meta-synthesis. The two study aims follow. The second section in this chapter presents the study results in the form a published paper, which also includes discussion of the study design, methodology, and the research procedures.

4.1.1 Objective
This literature review aims to explore the available qualitative, peer-reviewed literature reporting on the various roles of nature in the lives of cancer patients. The objective is to identify how patients’ nature experiences support or detract from their recovery processes (does it work?), and explore how patients might value these opportunities (should it be used?). The research question driving the investigation is: What does the published qualitative research literature contribute to understanding the role of nature in cancer patients’ lives?

The literature review addressed the following thesis aim:

- Develop detailed descriptions of cancer patients’ nature experience.
The role of nature in cancer patients' lives: a systematic review and qualitative meta-synthesis

Sarah Blaschke

Abstract

Background: A systematic review and meta-synthesis was conducted to identify, compare and synthesize the published qualitative literature contributing to our understanding of the role of nature in cancer patients' lives.

Method: An electronic search of Medline, CINAHL, PsycINFO and Cochrane Databases was conducted to identify qualitative studies focused on cancer patients' nature experiences published between January 1985 and May 2015. Records were assessed according to pre-defined inclusion criteria. Data were extracted on study characteristics and evaluated using the COREQ guidelines for comprehensive quality reporting. Qualitative data from 'results' and 'findings' sections were entered into data management software NVivo in order to identify recurring themes and facilitate interpretation across studies.

Results: From 11 eligible publications, seven inter-related core themes with descriptive themes were identified as follows: connecting with what is valued; being elsewhere, seeing and feeling differently; exploration, inner and outer excursions; home and safe; symbolism, understanding and communicating differently; benefitting from old and new physical activities; and, enriching aesthetic experiences.

Conclusions: Nature provides patients with unburdened physical and psychic space invested with personal significance. Findings propose nature's role as a "secure base" offering patients a familiar and nurturing context from which new perspectives can emerge and caring connections can be made with themselves, others, the past, and the future. As such, nature supported patients to navigate the clinical and personal consequences of cancer. Comprehensive representation of cancer patients' nature experiences identified patient values and care opportunities embedded in clinical and personal environments, which may be considered for future research and care service development.

Keywords: Cancer, Nature, Supportive care, Patient resources, Attachment theory, Meta-synthesis

Background

The global increase of cancer incidence will soon impact at least one in three people, either personally or through a relative or friend [1, 2]. Reducing the burden of cancer and supporting those affected by cancer has become a healthcare priority demanding cost-effective and high quality solutions. These solutions need not only treat cancer, but also provide personalized care, prevent disease and maintain or even improve patients' quality of life for as long as possible. In light of these shifting healthcare demands, research is helping to illuminate aspects of cancer patients' experiences in order to develop improved care services.

Renewed interest in nature's impact on human health and well-being is evident in burgeoning research on the subject across various disciplines such as public health [3], environment and behaviour [4], planning and design, and environmental disciplines [5]. Although the subject is diversely conceived, emerging research shows positive associations between nature–human interactions and health promotion [6], as well as disease prevention [7].

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Preliminary investigations into nature-based interventions across several healthcare contexts suggest their potential to ease illness related strain [8] and to impact positively on patients [9]. Keniger has categorized the broad spectrum of nature experiences into three levels of engagement offering a productive frame for delineating different types of nature-based interventions [10]. They are as follows: 1) indirect engagement, e.g. views to nature and art depicting nature [11]; 2) incidental engagement, e.g. walking and resting outdoors [12]; and 3) intentional engagement, e.g. outdoor adventure therapy [13]. These nature-based interventions are being trialled with mixed clinical populations across three types of settings including: indoor settings, e.g. intensive care units [14]; organized and designed outdoor environments, e.g. rehabilitation gardens [9]; and remote or wilderness sites, e.g. forest settings [15].

As a relatively new field of empirical inquiry, health-nature research has favoured an evidence-based interventionist paradigm with the aim to parallel the judicious procedures of medical research and resemble the system it intends to adopt. Consequently, inquiry has prioritized research instruments, questionnaires, and audits designed a priori by researchers assuming that quality of experience can be measured quantitatively. There is little in the literature to illustrate the role of human-nature interactions in patients’ lived experiences of health and disease and whether or not, from their perspective, nature contributes to recovery, health and well-being. In the cancer setting, various bio-psychosocial challenges have been identified that impact patients’ daily living needs [16, 17]. Research has found unmet supportive care needs related to physical functioning, information, and emotional care for both urban and rural patients [18]. Given the commonplace availability of nature in urban and rural environments, as well as in some clinical settings, numerous opportunities exist for cancer patients to potentially utilize and benefit from contact with nature. To date, only one narrative review of the literature on cancer survivors’ nature-based experiences could be located [19], which demonstrates a need for deeper and broader understanding of nature’s relevance across the cancer journey. To the author’s best knowledge, there is no published meta-synthesis of findings concerning the role of nature in cancer patients’ lives. Two important questions remain open for investigation, which according to Sandelowski are at the heart of practitioners’ and patients’ concerns: “a) Does it work? and b) If it works, should it be used?” [20] (p.1368).

This meta-synthesis underpins a larger investigation, which aims to determine feasible and appropriate solutions to incorporating nature-based care opportunities in cancer care contexts. Its specific aim, and its contribution to this larger body of work, is to explore and identify the various roles of nature in the lives of cancer patients and to explore how these experiences support or detract from their recovery processes (i.e. does it work?). and if patients value and seek these opportunities (i.e. should it be used?). Synthesis of published qualitative research has been described as integrating research evidence to reach new theoretical understandings of a chosen topic [21]. Accordingly, this review aimed to contribute a new conceptual representation of the existing body of knowledge grounded in an interpretative framework [22]. Synthesized understandings can make findings more accessible to key stakeholders such as healthcare leaders and practitioners, policymakers, researchers, and consumers who require translatable knowledge if nature is to be safely and effectively incorporated into supportive care. To assist this process, the following research question was addressed: What does the published qualitative research literature contribute to understanding the role of nature in cancer patients’ lives?

Methods
Meta-synthesis is the examination, critical comparison and synthesis of published qualitative studies that concern a common topic [21–23]. It is a validated research process [24] that aims to gain a fuller knowing of a phenomenon than would be achieved from a single, isolated study [22]. Based on previously published meta-syntheses [23, 25], the present review followed a multi-stage approach comprising: 1) determining the review focus; 2) identification of published and relevant literature; 3) quality appraisal of the included documents; 4) data extraction and identification of key concepts grounded in the raw data contributed by research participants; and 5) development and comparison of core themes across the documents and their synthesis into a new conceptual representation. Each of these stages is detailed below.

Determining the review focus
The review focus was determined by the author’s doctoral thesis topic, which concerns the investigation of nature’s role in cancer patients’ lives and aims to determine nature-based care opportunities in cancer care contexts. The present paper reports research carried out by a sole researcher. The strategies employed to mitigate reporting bias are presented in the Limitations section below. For the purposes of this review, nature was defined as the phenomena of the physical world collectively, including various forms of vegetation and habitat, natural and humanly designed landscapes, natural cycles, processes, 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 [6, 26–28].

The Cochrane Database for Systematic Reviews and the International prospective register of systematic reviews PROSPERO were first searched to ensure no identical or similar review was underway. The review was initially registered with PROSPERO as a systematic review of nature-based intervention research, however the literature searches returned insufficient studies addressing primary outcomes, which is a requirement for PROSPERO registration. Consequently, the review focus shifted in order to address the available qualitative research, rather than intervention research. Registration (CRD42014015291) was withdrawn in February 2016.

Identification of published and relevant literature
A comprehensive systematic search of the published literature was conducted in following electronic database: Medline, CINAHL, PsycINFO and Cochrane Database of Systematic Reviews from January 1985 to March 2015. A research librarian was consulted for developing search strategies for the respective databases, which included combinatorial strings of Subject Headings and text word searches containing terms related to: “cancer” and “nature” (see Additional file 1 Search protocol).

Electronic searches were supplemented by manual search of two relevant journals: AHTA Journal of Therapeutic Horticulture and ACTAHORT. Non-peer-reviewed articles retrieved from the electronic searches were read for the purpose of searching reference lists. The inclusion criteria for publications were: full-text, peer-reviewed journal articles published in English language, which included primary qualitative data of empirical studies conducted with cancer populations.

Initial searches retrieved titles and abstracts only. Duplicates, obviously irrelevant studies, and studies that did not meet the above inclusion criteria were removed. The next stage of the selection process was directed by reading records at full-text level and identifying whether the studies reported the use of qualitative methods to explore the experiences of contact with nature from the perspective of individuals who had experienced cancer. The study’s specific qualitative method employed or the researchers’ philosophical positioning (e.g. phenomenology, grounded theory, ethnography) were not directive because their shared focus is understood to be the elucidation of meaning and processes of a given phenomenon from the perspective of the experiencer through interpretive means [29]. Therefore, studies based on a predominantly quantitative research design with a minor qualitative supplement were not included as their aim precluded relevant data and interpretation to explore participants’ personal experiences.

Studies were eligible if the sample included people who had directly experienced cancer; excluded were studies reporting only from the perspective of caregivers or healthcare professionals. Studies focusing on related topics such as post-occupancy evaluations of hospital gardens [30] and physical exercise research [31], not exploring nature experiences were excluded.

Quality appraisal of the included documents
Research synthesists are responsible for appraising the quality of included studies in order to report transparently on their validity and generalizability. Studies with methodological weakness will negatively impact on the strength of the conclusions in a meta-synthesis. Methodological discussion exists questioning the adoption of prescriptive evaluation protocols based on quantitative ontology and epistemology for evaluating qualitative research [32, 33]. In response, instruments are being developed to better reflect appraisal criteria relevant to qualitative research such as confirmability, dependability, and credibility [34]. Examples are the Joanna Briggs Institute Qualitative Assessment and Review Instrument (JBI-QARI) [35] and the Critical Appraisal Skills Programme (CASP) [36]. However, the use of prescriptive criteria remains controversial [33]. Sandelowski and colleagues recommend not excluding papers based on quality checklists, but to focus instead on topical relevance and to employ broad evaluation criteria for the final quality reporting of included studies [29]. Taking this discussion into account, the present meta-synthesis prioritized the following initial question to gauge topical relevance: Does this publication contribute genuine qualitative data exploring cancer patients’ nature experiences? The Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines [37] were considered an appropriately broad framework for assessing the quality of included studies, and they were also used as a guide for reporting findings in this present meta-synthesis. The strength of the COREQ guidelines lies in outlining three general domains of methodological rigour applicable to various qualitative methods, as demonstrated in one successful example of meta-synthesis by Luker and colleagues [38].

1. Research reflexivity: information on the researchers’ background, biases, and relationship with the participants (confirmability).

2. Study design: appropriate methods for data collection and documentation, information regarding sampling and recruitment, description of study setting and context (dependability).

Data extraction and identifying key concepts
Author SB recorded data on the following characteristics of included studies: reference details (year of publication, author, first author’s country of origin); discipline; sample size; participant characteristics; methodological approach; data collection method; and focus of the study. All data presented as ‘results’ or ‘findings’ were entered into data management software QSR International’s NVivo 10 for Mac [39]. This included primary data (e.g. participant quotes) as well as authors’ interpretations (e.g. thematic description). All unaltered textual material was read in order to gain a general understanding of the material before inductively coding data line-by-line with the aim to glean salient underlying concepts. In this process, for example, the statement ‘escape from the fear and worry associated with cancer, a place that was safe’ [40] was reduced and captured with the descriptive label (code) ‘safe refuge’. Next, codes were grouped into meaningful clusters from which prominent descriptive themes emerged, for example, the codes ‘losing the capacity for gardening is painful’ [41], and ‘losing bond with garden’ [40] were grouped as ‘losing connection’. This interpretive task reflects terminology and descriptions based on the researcher’s own understanding of the material and is presented in Additional file 2 Themes and illustrative quotes, which includes reference to raw data in order to enable the reader’s own appraisal of interpretative and conceptual congruity.

Thematic development and synthesis
Using a constant comparison approach [42], common events and attributes of the studied phenomenon were identified and careful attention was paid to the frequency of recurrence across different studies, which strengthens emerging themes [24]. For example, the descriptive theme ‘connecting with something outside’ arose in nine studies [13, 27, 28, 40, 41, 43–46], while ‘stimulating sensory experiences’ was found in only four [27, 28, 44, 46]. Once the entire dataset was scrutinized (primary data and authors’ interpretations) and no more themes could be teased out, the researcher returned to the included publications for a second narrative reading in order to confirm contextual relationships between the themes. This informed the final theoretical synthesis of findings into overarching, analytical themes, or ‘core themes’ [47]. These core themes were developed in relation to the meta-synthesis’ main objective, which gave rise to a hierarchical pattern of core and descriptive themes organized according to their theoretical depth and relevance.

Results
Identification of published and relevant literature
The systematic search identified 2342 records, 149 of which remained after duplicates and obviously irrelevant records were removed (Fig. 1). A further 77 of these records were eliminated by asking the question: Does this contribute genuine qualitative data exploring cancer patients’ nature experiences? The 68 remaining articles were read in full to determine the sample characteristics, the type of qualitative method, and whether the focus was indeed to explore nature experiences. Seventeen articles were identified as having substantial relevance and were further appraised against COREQ quality criteria. One of these articles was omitted because its study design was primarily quantitative [48]. Four studies lacked sufficient primary data and methodological rigour to produce understandings grounded in participants’ perceptions [49–52]. Finally, one study did not differentiate clearly between the views of cancer patients and health professionals [53]. Overview of reasons for exclusion is provided in Additional file 3 Excluded publications. The 11 remaining documents were accepted for synthesis comprising ten articles (nine separate studies) and one thesis.

Characteristics of included documents
Table 1 summarizes the characteristics of the included documents. Studies were published between 2000 and 2014 with the majority (8/11) published after 2005. Data were contributed by 240 cancer patients across the lifespan with varying diagnoses and included survivors and palliative patients. Sample size ranged from 3 to 88, with seven studies reporting a sample size <16. Studies were conducted in four countries: United States (US) (n = 4), Canada (n = 4), United Kingdom (UK) (n = 2), and Australia (n = 1). Two publications by Unruh [40, 41] reported on different aspects of one data set collected in a single study.

Quality appraisal
The study designs and methodological rigour of the included articles were variable in quality. Notably, all articles omitted information about the researchers’ reflexive practice. As mentioned above, it has been argued that checklists may be an inappropriate instrument for evaluating qualitative research; however, the COREQ guidelines were used in this review as a broad guide for identifying acceptably deficient methodology and provided a structured approach for consistent and fair treatment of dissimilar studies. The governing authority, nonetheless, remained the study’s subject relevance and whether it contributed genuine qualitative data. For example, according to the COREQ 32-item checklist, Rowlands’ [11] study scored only 11/32, yet it was found
to contribute valuable insight about hospitalized cancer patients’ perceptions of connecting with the outside world when viewing nature through a window.

Based on the COREQ appraisal framework, a general comment can be made about the included studies regarding their consistent methodological weakness in the first domain (researcher’s reflexivity). In total, all studies combined scored 25/88 in this domain. Only two studies [41, 44] explained audit trails and strategies for verifying data analysis (participant checking). Overall, studies were rated considerably low in all three domains of the COREQ, and only three [13, 28, 41] scored individually >21 out of 32 appraisal items. Scoring appears in Additional file 4 Quality assessment.

Synthesis

The studies described a spectrum of nature experiences including views to nature from within the hospital [11], contact with therapeutically designed and natural landscapes [28, 54], domestic gardening and structured gardening programs [40, 41, 43, 45, 46], retreats in natural environments [55], dragon-boating [44], and outdoor adventure programs [13]. The initial coding process provided a broad sense of the material and explicated salient concepts. It was notable that individual researchers deployed different interpretative language when dealing with similar ideas and concepts, for example: experiences alluding to relaxation in nature were reported by English and colleagues as, ‘nature appears to inspire feelings of calmness’ [54]; while Unruh and colleagues reported, ‘Worried minds were eased by thinking about the garden’ [46]; and yet another study expressed the concept of relaxation as, ‘providing reprieve from the everyday stresses’ [45]. Consequently, this meta-synthesis prioritised primary data (participants’ own words) where available in order to start from, and remain close to, original formulations during the coding process. However, all extracted findings including individual authors’ interpretations were considered. Grouping of codes into logical clusters generated 22 descriptive themes. The shared and interrelated meanings of these descriptive themes informed the development of seven core themes: connecting with what is valued; being elsewhere; exploration, inner and outer excursions; safe and home; symbolism, understanding and communicating differently; benefitting from old and new physical activities; and, enriching aesthetic experiences. The core themes connecting with what is valued and being elsewhere, seeing and feeling differently pervaded all studies and the remaining five core themes were identified consistently in at least seven documents. Table 2 presents the thematic findings with citation to source documents and is followed by text summarizing each core theme with reference to descriptive themes in italics.

Connecting with what is valued

Every study reported on connections facilitated by nature, which participants valued and, in some instances, had to let go of due to their cancer experience. Participants consistently sought connection with something ‘emotionally uplifting’ [54] and outside their daily experiences of diagnosis and treatment. The ‘importance of contact with the outside world, especially nature’ [11]
<table>
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<tr>
<th>First author (year)</th>
<th>Discipline</th>
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<th>Methodological approach</th>
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<tbody>
<tr>
<td>Butterfield (2014) UK [28]</td>
<td>Doctoral thesis in Arts</td>
<td>88</td>
<td>Mixed diagnosis [not stated]</td>
<td>Ethnography</td>
<td>Interviews (20 min) post photo elicitation, open-ended online survey</td>
<td>To explore experiences of cancer care centres’ gardens and how these support quality of care and a sense of wellbeing.</td>
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<tr>
<td>Ray (2013) Canada [44]</td>
<td>Community health</td>
<td>15</td>
<td>Breast cancer survivors [14 of 15 participants were 50 yrs. or older]</td>
<td>Content analysis</td>
<td>Semi-structured interviews</td>
<td>To explore breast cancer survivors’ lived experience of dragon-boating and how it influences health-related quality of life.</td>
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was noted as supportive in different ways, for example: ‘to transform emotional and psychological health’ [54] and for creating ‘a more optimistic outlook on life in general’ [43].

Patients found nature useful for establishing and maintaining connection with themselves and for reflection ‘on their own state of being’ [28]. One breast cancer survivor succinctly recounted nature as ‘a place where I can get all together to myself’ [44].

Nature functioned as a platform for social connections bringing patients, friends and family together and helped peer bonding amongst cancer survivors who participated in structured nature activities. Gardens in care settings represented ‘somewhere to sit and laugh without disturbing others’ and a place for ‘playing, eating and being together’ [28]. One study found that the hospital garden promoted a ‘sense of belonging, support, and community’, where patients could ‘give and gain support; ‘thrive in relaxed and unscripted conversation’ and engage in social networking’ [45]. Ray and colleagues described how breast cancer survivors gained social support when connecting during a season of dragon-boating: ‘such a challenge provided them strength, promoted togetherness and offered support in facing their own fear of recurrence’ [44]. Similar outcomes were found for adolescent cancer survivors who ventured outdoors together and reported: ‘we became a family, we did things together ... we realized it is easier to work together than work alone’ [13].

Connection with nature itself was valued and could enrich daily routines. Some participants ‘gained new personal perspectives towards nature’ [54], and ‘paid more attention to nature’ [46] after cancer. In this context, Unruh and colleagues found that nature experiences related to some participants’ conceptualizations of a higher power. For example: ‘you become very close to God with the blue sky and the feel of the earth under your feet. And you connect with nature, and your body becomes part of nature’ [41].

Another descriptive theme emerged in six documents (Table 2) showing that nature could connect participants with their personal pasts by evoking childhood memories [28, 45] or reminding of other past experiences such as ‘memories of trips, and places’ and ‘significant people and events’ [41]. This was not always found to be positive. One participant recalled her ‘memory plants’ reminding her of difficult relationships, which prolonged ‘unhappy memories’ [46].

Importantly, the notion of losing connection emerged from eight accounts in three separate studies denoting the experience of loss due to cancer progression and limited mobility or lifespan. Cancer related changes and restrictions could impinge on valued nature activities as illustrated by the following experience: ‘I felt very

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<td>Descriptive themes</td>
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<td>Connecting with something outside</td>
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<td>Connecting with Self</td>
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<td>Connecting with others</td>
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<td>Connecting with nature</td>
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<td>Connecting with the past, reminiscing and remembering</td>
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<td>Losing connection</td>
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<td>Being elsewhere, seeing and feeling differently</td>
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<td>Gaining distance (break) from everyday strain</td>
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<td>Contrasting the clinical experience</td>
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<td>Visual escape, a different way of being elsewhere</td>
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<td>Exploration, inner and outer excursions</td>
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<td>Exploring the distant and extraordinary</td>
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<td>Exploring the caregiver’s role, caring for the garden</td>
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<td>Home and safe</td>
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<td>5</td>
<td>Symbolism, understanding and communicating differently</td>
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<td>Using metaphors found in nature</td>
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<td>Reflecting and mirroring inner and outer life</td>
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<td>6</td>
<td>Benefitting from old and new physical activities</td>
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<td>Enjoying new and old activities in nature</td>
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<td>7</td>
<td>Enriching aesthetic experiences</td>
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<td>Aesthetic enrichment</td>
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comfortable in my garden ... It was almost like a bond here, and it's not there any more’ [40]. Another study found that, for patients who value gardening, losing ‘the capacity to garden can be very painful’ [41].

**Being elsewhere, seeing and feeling differently**

It was evidently important for participants to gain relief from immediate burden and to find different ways of conceptualizing their cancer experiences. Nature was a welcome temporary escape and could distance patients from the strain and, at times, unnecessary discomfort imposed by clinical settings and procedures. Butterfield described the hospital garden as offering ‘respite from the exhaustion of diagnosis, appointments and treatment’ [28].

A subtle distinction was made between gaining crucial distance from daily burden and the need to evoke a different state of mind through ‘physical and emotional contrast’ [28]. The hospital garden actively contrasted the hospital’s anaesthetic qualities and counterbalanced ‘the large scale, highly mechanised, institutional, built environment’ [28].

Rowlands and colleagues demonstrated patients’ use of nature for visual escape from hospitalization when restrictions did not permit direct, embodied contact with nature. In their study with palliative cancer patients, they uncovered the value of connection with the outside world and recommended views from the ward as well as the provision of large windows to allow a view from the bed areas and the ‘use of artwork depicting scenes of nature’ [11].

**Exploration, inner and outer excursions**

Overlapping the previous two themes of connecting and being elsewhere was the notion of exploring scenarios related to patients’ shifting inner and outer lives. It was evident that participants used nature to, individually and together, explore the consequences of their cancer. These explorations expressed the need to not only recover a sense of normality but discover new states, activities and behaviours.

Extraordinary nature experiences and distant locations had the potential to renew vigour and shift patients’ outlook. Two studies investigating experiences of outdoor activities in remote settings [13, 54] showed how play with proportionality provided a context large enough in which to place the extraordinary event of cancer diagnosis and approach new perspectives. These participants reported feeling exhilarated, proud, personally valued, increased self-esteem and self-empowerment, and a sense of succeeding.

The concept of exploration differed from merely getting away and included nuances of searching new ground and contemplating future scenarios. For example, the outdoor adventure study reported how the program could become a future source of ‘wonderful memories’ for participants to draw on when facing ‘any life challenges’ [13]. Nature also invited contemplation about uncertain future scenarios and life’s ending. For example: ‘It’s very possible it’ll [cancer] come back again and it’s possible it won’t ... You put one [plant] in, sometimes she does, sometimes she doesn’t’ [46]. One study reported how a patient with uncertain prognosis used her garden to prepare for a future without her: ‘her garden would nurture others if she was no longer there ... to garden even for a future without her ... for people she loved.’ [41].

New ideas and behaviours could be explored through nature. Participants in a harvesting program were inspired to look for new recipes and try different produce resulting in greater vegetable consumption [45]. Similarly, learning about gardening was a welcome challenge and fostered creativity by ‘viewing the garden imaginatively or by actively gardening’ [46].

Gardening patients claimed a new sense of responsibility when becoming garden caregivers and committed to continued care of the garden after their study participation [45]. One patient explained that her caring for plants became a ‘marker of how far she had come since her diagnosis’ [46].

**Home and safe**

The theme home and safe appeared across eight documents (Table 2) and captured nature’s role as a ‘holding space between the inner more private or personal and the outer more public domain’ [28]. In the clinical setting, nature espoused qualities of safety and protection and provided a ‘secure comforting place,’ a sense of protection, refuge or sanctuary, and a place that was ‘safe and secure and away from all the horrible experiences on the wards’ [28].

Participants articulated that their lives as cancer patients involved feelings of uncertainty, overwhelm, anxiety, and isolation. Interaction with the clinical environment intensified negative states and signified threat to privacy, personal control and, not in the least, life itself. Gardens were associated with privacy, safety and, most notably, a scaling down of the clinical to the domestic [28]. One participant reported remastering a sense of control through gardening: ‘At a time where ... you are losing control over your life, over your future plans, over your bodily function, [gardening’s] something that you can control a little bit’ [46]. Butterfield described this role as a ‘screen or shield’ that protected from the overall harshness of the clinical environment [28]. Participants reported numerous interlinking qualities related to garden spaces within hospitals such as calming, relaxing, reassuring, strengthening, warming,
inviting, containing, peace-giving, and easing (see Additional file 2 Themes and illustrative quotes).

Gardens provided consolation in the clinical setting and conveyed a sense of caring and being cared for. Inspiration and hope were instilled by gardens that were expressively well-maintained and cared for, and which, in turn, conveyed ‘an environment where people are caring’ [28].

Importantly, participants explained that nature could only take on a supportive role if they felt safe and near to clinical support. Participants wanted to feel close to, but not abandoned to natural settings, which was possible when these opportunities were well integrated into the clinical infrastructure. Such safely accessible nature spaces were described as an ‘escape from the hospital ward without going far’ [28], and were cast in phrases such as ‘stepping-stones’, ‘interim spaces’, and ‘buffer zones’ [28].

**Symbolism, understanding and communicating differently**

In seven studies participants repeated statements about using nature symbolism to better understand and communicate how their life situations had been changed by cancer. ‘Experiencing the garden as a living system’ [41] allowed a metaphorical approach to reassembling old and integrating new life components. Nature offered rich metaphors to capture these creative and adaptive processes. For example: ‘participants drew symbolism from the gardens, which they related to their own state of being or more specifically to their experiences of cancer and the so-called ‘cancer journey’ [28]. Solace was found in life’s analogous unfolding with nature’s cycles. Being ‘symbolic of life and renewal in the life cycle’ [46], nature inducted patients to the states of life they were confronting. For example: ‘The garden also provided participants with an opportunity to be involved with the life cycle .... For some participants the garden was central to the struggle for life against cancer’ [54]. Participants consistently used this metaphor to situate their own stories into resonant contexts. In Butterfield’s study one participant noted: ‘It is also nice to look at something living ... when you are trying to focus on surviving’ [28].

In some instances, participants recognized themselves reflected and mirrored in nature. Outer objects could resemble shapes of patients’ shifting inner lives. New meaning was made when recognizing aspects of their lives embodied and externalized in the material world. For example, when observing the ‘gesture of the plant,’ one participant explained its ‘lovely quality of sadness’ and she found ‘it terribly important to have reflection on what’s happening inside’ [28]. Butterfield summarized that the garden could reflect ‘the visitor’s own experience as a cancer patient’ and found that some patients ‘paralleled their own existence, vulnerability, and survival to that of the natural environment’ [28]. Self-mirroring was not always reported as a positive experience. Some patients found it difficult and even unacceptable when nature triggered thoughts about possible futures: ‘I now get depressed when winter approaches ... things dying, and I connect to that, and I’ve got to really fight that one’ [54]. Unruh discovered similar tensions and reported one patient’s challenging nature experience when ‘seeing the fragility of her plants’ lives reminded her of the fragility of her own life’ [46].

**Benefitting from old and new physical activities**

A theme identified in six studies related to the benefits emerging from continuity with pre-cancer physical activities and from adopting new activities. Maintaining enjoyable activities could strengthen ties with normality and sustain positive health behaviour. For example, a seasoned gardener described ‘a life-long appreciation of nature’ and continued gardening after cancer [46]. Similar sentiments were expressed by a patient who identified gardening as an ‘intensely enjoyable and familiar’ part of life [41].

Adopting new activities was helpful when attempting to break away from cancer related experiences. Participants prevented from maintaining their home gardens due to post-treatment fatigue welcomed the opportunity to try community gardening instead [45]. Likewise, novel outdoor adventures provided a myriad of positive experiences [13].

Nature activities including gardening and dragon-boatting resulted in physical benefits such as adopting healthier diets [43, 45], increased physical activity [28, 45], improved fitness, and ‘loosened joints’ [44]. Overall, benefits extended beyond the physical dimension and, in participants’ own words, included: ‘buffer against stress’ [44], ‘the courage to exist and be human’ [13], ‘sense of satisfaction and accomplishment’, ‘energized and renewed’, ‘source of relaxation’ [46], and ‘spiritual and emotional strength’ [40].

**Enriching aesthetic experiences**

It was apparent that for a significant number of participants nature provided enrichment through stimulating and enlivening their physical senses.

Nature’s rich materials offered ‘contrasts of colour, texture, scale, fragrance and season’ and was reported to ‘engage the senses in a different way’ offering soothing, calming, but also lively, contrast to the clinical environment [28]. In particular, water was mentioned for its therapeutic, soothing and calming qualities. Nature tapped the immediacy of the senses and was something tangible to orient towards, an ‘external stimulus ... for restoring a sense of peace and aliveness’ [44]. One participant recollected nature’s quickening qualities during
a cycle of chemotherapy: ‘air was so fresh, everything was so fresh, it was alive’ [46]. Those who identified as gardeners found their practice enriched when creatively playing with landscape features and enjoying their ‘visual and tactile pleasures’ [46]. Interestingly, nature could also provide ‘sensory quietness’ [28] such as softness, gentleness, and shielding from unwanted stimuli. The chance to ‘hear silence ... wordlessness’ [28] was amongst the sensory relief sought in hospital gardens.

Patients who felt aesthetically enriched by nature often reported experiences of appreciating its beauty, peace, tranquillity, and the solitude found in nature (see Additional file 2 Themes and illustrative quotes).

Overview of findings
The present synthesis found that cancer patients valued contact with nature and benefitted from opportunities to connect with nature. Engaging with nature eased the strain related to cancer diagnosis and treatment by taking on several supportive roles: facilitating valued connections, transporting away from the burden and threat of cancer, encouraging inner and outer explorations, offering safe refuge, providing metaphoric material for understanding life changes, motivating physical activity, and enriching cancer patients’ lives aesthetically.

Discussion
The aim in this review was to describe and meaningfully synthesise the range of nature experiences reported from the cancer patient perspective and to discern its relevance in cancer patients’ lives. While exploring vastly different levels of nature engagement, the included studies’ common topic revealed overlapping layers (themes) of the shared human phenomena that occur when a person affected by cancer engages with nature. The findings shed light on the initial questions the study set out to address: how nature supports or detracts from cancer patients’ recovery experiences (does it work?); and if patients value these opportunities (should it be used?). The seven identified themes explored the values held by patients who used nature to address some of their needs. These needs included: maintaining continuity with surroundings and activities, a sense of normality and control over one’s life, social support and integration, community participation, occupational and leisure engagement, access to a familiar support structure, creating meaning and perspective, physical activity, and aesthetic and sensory enrichment. Nature represented an unburdened and uninterrupted space embedded in everyday life from which patients sourced strength and meaning to address these needs. The benefits shown here extend across bio-psychosocial dimensions, which correspond with supportive care needs identified in previous research [17, 18]. These known impacts of cancer reveal patients’ sudden struggle and vulnerability when tasked to navigate the imminent and ambient challenges of daily living.

The present findings contribute to discourse in psycho-oncology investigating patients’ need to respond to cancer’s urgent threat by constructing new ways of handling life and accepting a “new-normal” [56]. Drawing on Attachment theory [57], it is theorized that secure attachment to a supportive structure or “helping system” [58] can support patients’ stepwise process of accepting lives shaped by cancer. It is premised that when attached to a “secure base” [57], patients are enabled to risk exploring various real and imagined future scenarios and approach a shifting normality that now includes their cancer experiences. Salander [59] suggests the application of the Winnicottian “intermediary area” [60] for interpreting cancer patients’ mental coping manoeuvres in this process. From this perspective, the construction of a private place between inner and outer reality unburdens patients from practical demands and immediate here-and-now reality, allowing a more creative approach to dealing with their situations. The present meta-synthesis found that nature could be seen as a potential “secure base” offering patients a familiar and nurturing context from which new perspectives can emerge and caring connections can be made with themselves, others, the past, and the future. The findings show that nature provided patients with unburdened physical and psychic space that was regarded a valued component of everyday life and invested with personal significance. As such, nature supported patients’ inner and outer manoeuvres to navigate the clinical and personal consequences of cancer.

Practical implications
Comprehensive cancer care services need to consider patients’ values and experiences. Qualitative research is designed to generate a deep and broad understanding of human experiences and processes. Meta-synthesis can improve the translation of qualitative research into practice through locating, condensing and appraising relevant findings for the medical readership and healthcare management who govern clinical practice, research, and policy [61].

Patients’ motivations to seek nature, and the effects of these interactions were highly personal. The idiosyncratic associations between type of engagement and outcomes suggest that the benefits derived from engaging with nature cannot be predetermined nor administered. Contrary to what an interventionist approach would suggest [62], there is no indication to utilize nature in a prescriptive manner. However, cancer patients consistently attributed importance to engaging with nature and derived, in various forms, benefit and meaning from
these interactions. The findings give credence to validating and enabling cancer patients’ own resources by appraising aspects of their lives and histories from which they draw meaning, strength, and hope. A range of practical examples from the collected literature suggest pathways for patients to access nature experiences, both in cancer care and home environments. Views to nature and nature art are easily incorporated in the design of clinical settings if put on the agenda, which patients reportedly derive benefit from. Hospital courtyards and home gardens can encourage various degrees of physical activity, motivate fruit and vegetable consumption, and create opportunities for connecting socially. Organized outdoor trips and activities can powerfully connect patients on a peer level and motivate positive lifestyle behaviours. While many examples are unsurprisingly simple and commonplace, further research is required to identify, understand, and safely implement such additional care opportunities for their maximum benefit.

Limitations
The findings relate to cancer patients in westernized countries and cannot be said to transfer to other clinical or geographic populations. Although this review aimed at comprehensive sampling, the dearth of relevant literature resulted in a very small sample size (n = 11 documents), with a correspondingly small combined participant sample (n = 240). Based on Sandelowski’s recommendation that large sample size (exceeding 10 studies) can compromise “deep analysis” and “threaten interpretive validity” in meta-synthesis [29], the found literature was deemed sufficient to proceed with the synthesis.

Many of the included studies have serious methodological limitations, which must be considered when assessing the credibility of this review’s findings. In particular, the absence of audit trails, negative case reporting and researcher reflexivity challenge confirmability and present the possibility of bias in the recruitment and research procedures. To increase the review’s credibility, focus was placed on raw data (participants’ words) in order to keep the interpretations closer to participants’ own experiences.

Lastly, this review lacked an inter-rater process (such as member checking or peer debriefing), which is recommended in qualitative research to aid interpretation bias in work undertaken by sole researchers [42, 63]. While single author quantitative meta-analyses and qualitative meta-syntheses are uncommon, neither are unprecedented, see for example Dijkers [64] and Hammell [23]. Strategies were employed to mitigate this shortcoming and increase credibility. Firstly, it is clearly stated in the Methods section that this study represents a sole researcher study preparing the reader to navigate potential sole author bias. The findings remain traceable to their source materials by providing a considerable amount of primary data (audit trail) for internal validation and to enable the reader’s own audit of interpretations. Furthermore, detailed documentation of the search procedures and quality appraisals is made available to reflect rigour and the inclusion of topically relevant studies.

Conclusions
Awareness of cancer patients’ nature experiences can enrich communication between clinician and patient, broaden recommendations for health behavior, and guide the design of care settings and services. Through hearing the patient’s own voice, supportive cancer care can align with meaningful and relevant aspects of patients’ lives and offer effective care. This meta-synthesis contributes to the larger process of hearing and communicating patient values across sectors. Sensitizing research and practice fields to these issues may inspire different approaches to asking questions, listening carefully, and delivering care.

Additional files

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<td>Additional file 3:</td>
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<tr>
<td>Additional file 4:</td>
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Abbreviations

ACTAHORT: Acta Horticulturae International Society for Horticultural Science; AHTA: American Horticultural Therapy Association; CASP: Critical Appraisal Skills Programme; CINAHL: Cumulative Index to Nursing and Allied Health Literature; COREQ: Consolidated Criteria for Reporting Qualitative Research; JBI-QARI: Joanna Briggs Institute Qualitative Assessment and Review Instrument; UK: United Kingdom; US: United States

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Availability of data and materials

The datasets supporting the conclusions of this article are included within the article and its additional files.

Authors’ contribution

SB designed the search protocol; retrieved and assessed all included literature; extracted and analyzed relevant data and wrote the manuscript. The author has read and approved the final version of this manuscript.
Competing of interest
The author declares she has no competing interests.

Consent for publication
Not applicable.

Ethics approval and consent to participate
Not required for this study.

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References


Additional file 1 Search protocol

EBSCOhost: CINAHL & PsycInfo
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OR
cancer* or neoplasm* or tumo* or carcinoma* or malignanc* or leukemia* or leukaemia* or oncolog* or metastas*
AND
Cluster 2: garden* or horticultur* or wilderness or forest* or woodland *
AND
"natur* based" or "natur* assisted" or "urban green*" or "green care" or “benefit* of natur*” or “natur* setting*” or “natur* environment*”
or “outdoor nature" or “interacting with nature” or “nature experience*” or “experiencing natur*” or “nearby nature” or “environmental intervention” or “physical environment feature” or environment* impact” or healing environment*” or “outdoor* environment*” or “indoor plant*” or “window view*” or “restore attention” or “attention restoration” or “distraction therapy” or “distraction techniques” or “outdoor adventure” or “therapeutic camping” or windowless or “green park*” or “urban park” or “nature based sound"

Ovid: MEDLINE
Cluster 1: Exp Neoplasms/
OR
cancer* or neoplasm* or tumo* or carcinoma* or malignanc* or leukemia* or leukaemia* or oncolog* or metastas*
AND
Cluster 2: garden* or horticultur* or wilderness or forest* or woodland *
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Search Limits: English language and humans and yr="1985 -Current

Cochrane Database of Systematic Reviews
neoplasms
OR
cancer* or neoplasm* or tumo* or carcinoma* or malignanc* or leukemia* or leukaemia* or oncolog* or metastas*
AND
garden* or horticultur* or wilderness or forest* or woodland* or natur* or environment* or park* or "urban green*" or "green care" or "indoor plant*” or window* or "restore attention" or "attention restoration" or "distraction therapy" or "distraction techniques" or outdoor* or "therapeutic camping"

Search Limits: Publication Year from 1985 to 2015 (Word variations have been searched)
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<th>Illustrative quotes: Examples of raw data from primary sources (author / year)</th>
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<td>Connecting with something outside</td>
<td>“I find nature very healing. So, if people need to heal, they need to get out of the city, and get into nature. Nature being water, animals, trees…. But it just makes me feel good. Makes me feel good to be there. (Nancy)” (English 2008); “… it helps you appreciate and take hold of everything every day and you don’t take it for granted anymore. (P11)” (Ray 2013); “… taught me how to grow my own fruits and vegetables and the importance of eating more fruits and vegetables, but also to focus on the circle of life. … a more optimistic outlook on life in general…” (Blair 2013)</td>
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<tr>
<td>Connecting with Self</td>
<td>“... I just find it is a place for me to let go of everything and when on the water I am removed in some way from the land. I just find it is a place where I can get all together to myself. (P04)” (Ray 2013);</td>
</tr>
<tr>
<td>Connecting with others</td>
<td>“… calming, it is beautiful, and it is just really wonderful. Being together is uplifting, it is a sunny, beautiful day, it is warm, it is glorious, you have worked, you are tired, you get out from the water, you are together, you are laughing, you are joking, you are putting out some physical effort and it lifts you up…” (Ray 2013); “… social networking aspect of the garden, from meeting new survivors to conversing with acquaintances and students. … the garden as a meeting place where they could share ideas, give and gain support, and thrive in relaxed and unscripted conversation.” (Spees 2015); “Ensemble … We became a family, we did things together, we played together … (Participant 3, tape 25, p 5).” (Stevens 2004)</td>
</tr>
<tr>
<td>Connecting with nature</td>
<td>“... gained a new personal perspective towards nature after experiencing a breast cancer diagnosis. Four women discussed feeling closer to nature as a result of their experience with breast cancer” (English 2008); “Pay more attention to nature through interaction with plants and animals was sometimes heightened because of the experience of having cancer.” (Unruh 2000); “... feeling connected to their garden in some way. Gardeners spoke about feeling ‘close to nature’ or having a bond between themselves, their garden, and the birds and animals that visited the garden.” (Unruh 2011)</td>
</tr>
<tr>
<td>Connecting with the past, reminiscing and remembering</td>
<td>“… feelings of connectedness with the planet (i.e. earth and soil) and vivid memory recalls of early childhood experiences with gardening and farming.” (Spees 2015); “… “memory plants” because they were gifts from friends or they had belonged to a special person. However, plants that prolong unhappy memories may languish.” (Unruh 2000); “Participants at all case study sites spoke of how certain details or features of the gardens reminded them of other times and places. Their memories would be triggered by something as small as a flower bud or the texture of a leaf. Memories ranged from childhood experiences, holidays abroad or life at home.” (Butterfield 2014)</td>
</tr>
<tr>
<td>Losing connection</td>
<td>“The loss affected him on a deeply emotional, psychological and spiritual level because the garden had been so much a part of his inner being and self-identity. He said: Last year I felt very comfortable in my garden. … I don’t feel that anymore. It was almost like a bond there, and it’s not there any more. ...” (Unruh 2011); “During the last four to five months of her life, Karen took up a new leisure activity – day trips in a mobile home. Karen continued to enjoy looking at her garden, but she seemed increasingly detached from it as her health deteriorated.” (Butterfield 2014)</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Being elsewhere, seeing and feeling differently</th>
<th>Illustrative quotes: Examples of raw data from primary sources (author / year)</th>
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</thead>
<tbody>
<tr>
<td>Gaining distance (break) from everyday strain</td>
<td>“… on days when you’ve had treatment, you may not feel so great ... [but] you can go out there ... and listen to the birds and look at the garden and maybe go into another world a little bit.” (Unruh 2000); “… offered respite from the exhaustion of diagnosis, appointments and treatment.” (Butterfield 2014); “… therapeutic qualities of nature located outside the realm of day-to-day life can positively contribute to psychological well-being. The calming and inspiring characteristics of different aspects of nature seem to contribute to emotionally uplifting experiences.” (English 2008); “For stress levels I think it is great because you get out on the water and you forget. I don’t think of my job, I don’t think of cancer, I don’t think of any problems.” (Ray 2013)</td>
</tr>
<tr>
<td>“... improved their mental and emotional health by providing a reprieve from the everyday stresses of living as a cancer survivor.”</td>
<td></td>
</tr>
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</table>
... garden was frequently perceived as a refuge, an escape from the fear and worry associated with cancer, a place that was safe. (Unruh 2002)

Visual escape: a different way of being somewhere. "I look out in my backyard, that you know, it's a big backyard, it's very treed, it's very calming, and just that vista is something that I remember quite vividly... (Cindy)" (English 2008); "... sit, relax in a bit more comfort (in the day room). Look outside rather than at your wall all the time." (Rowlands 2008); "... to什ewell in access outside found that gardens offered them different and often more soothing experiences of time." (Butterfield 2014)

Contrasting the clinical experience with the garden showed the importance of nature in the hospital. "... the presence and views of plants within the buildings helped people to feel calmer." (Butterfield 2014)

Exploration, making inner and outer excursions. "... extraordinary encounters with nature are also important for healing. Eight women spoke about the importance of nature in distant locations (e.g., cottages, vacation spots) ... Some travel to favourite destinations as a strategy to stay psychologically healthy and to take their minds off of the possibility of cancer recurrence." (English 2008); "... gardening was at times deeply connected to coming to terms with her own mortality." (Unruh 2011)

Exploring inner and outer scenarios. "... gardening was a metaphor for life ... as I watch this garden die, the two things kind of click together – my body and the garden. Because in reality, the garden is a metaphor for life." (Unruh 2011)

Exploring new ideas, behaviors and activities. "... they were exposed to several new vegetables (e.g., purple kohlrabi, rainbow Swiss chard) and enjoyed experimenting with these new foods and recipes." (Spees 2015); "... gardening was a creative outlet that allowed her the role of an artist who plants with a palette." (Unruh 2000); "... a creative outlet that allowed her the role of an artist who plants with a palette!" (Unruh 2000)

Exploring the caregiver’s role, caring for the garden. "... was this little bird and it was really yellow and I had never seen it before and it had landed on my cosmos and my poor cosmos was leaning right over ... I watered it and watched it grow and there was this little bird on this delicate flower." (Unruh 2000); "... I may not always feel up to it, but ... you better believe that I am not going to sit here and let them rot." (from a cancer patient's caregiver)
survivor with multiple comorbidities)" (Blair 2013); “… a strong sense of responsibility and shared commitment to the garden and other survivors to continue harvesting throughout the season.” (Spees 2015); “… gardening is active, interactive, and interconnected. The gardener contributes to the welfare of the garden, and the garden responds in the way it grows and develops.” (Unruh 2011)

4 Home and safe
Domestic scale
“Participants said that the gardens contributed to the sense of containment and privacy. Not in the sense of blocking out or hiding from the outside world … a sense of protection, refuge or sanctuary… gardens helped to screen or shield the harshness of the overall hospital experience.” (Butterfield 2014); “Being enclosed makes you feel at peace and safe, it makes you feel calm and relaxed … you are free like a bird (SRPVF 48, 2010)” (Butterfield 2014)

Caring and being cared for
“… specifically within a healthcare context a garden provides opportunities to emphasise and fine-tune the quality of caretaking within the place. … offers caretaking at a deeper level.” (Butterfield 2014); “… a means by which other people were able to express their love and concern for the participants through giving plants, and by helping with the work of the garden.” (Unruh 2002); “… gardens contribute to feelings of comfort in the sense of making people feel at ease. … also the gardens contributed to the sense that the place was about comfort and help.” (Butterfield 2014)

Supportive infrastructure
“… nature’s so important to me … these trees can survive in all of this … the trees are good for us. … something that we need too for our health. (Rachel)” (English 2008); “… a sense of controllability in life during the illness experience… you are losing control over your life, over your future plans, over your bodily functions, [gardening’s] something that you can control a little bit.” (Unruh 2000); “… gardens made the centres seem warm and inviting. … a good first impression and created a calming atmosphere …” (Butterfield 2014)

5 Symbolism, understanding and communicating differently
Using metaphors found in nature
“… through connecting with nature and viewing themselves in unity with the natural environment, participants also understood the natural environment as a metaphor for emotional insight.” (Pascal 2010); “They were symbolic of life and renewal in the life cycle.” (Unruh 2000); “Specific plants also often become symbols that have particular personal meaning for someone experiencing cancer.” (Unruh 2000); “… feeling connected to a life force and witnessing survival and rebirth in the garden were poignant because as Florence stated, ‘There is a lot of death in a garden’. ” (Unruh 2011); “… they are with us when we are in the ground, when we are out there doing something in the ground. Because that is what we are. We are living beings as they are. And it all sort of meshes together. But we forget that we are just a part of that living thing.” (Unruh 2011); “… winter in the garden was as enjoyable as summer. This was because the “flow” of seasonal change emphasised the passing of time, the transience of all life and reaffirmed a key essence of living – constant change and growth. … the symbolism of certain plants to contemplating the cycle of life and death” (Butterfield 2014); “… understanding cancer; wondering about root causes, health, growth and mutations. Here participants drew on the symbolism of plants and their historical and cultural associations.” (Butterfield 2014)

Reflecting and mirroring inner and outer life
“… they related to their own state of being or more specifically to their experiences of cancer and the so-called ‘cancer journey’. ” (Butterfield 2014); “This has sadness that I love. It’s the gesture of the plant. It’s very beautiful - it have a lovely quality a sadness. … It terribly important to have reflections on what’s happening inside – to have something that is already connecting to our feelings.”(Butterfield 2014); “I now get depressed when winter approaches … slow-down and things dying, and I connect to that, and I’ve got to really fight that one. I almost need to get away and see sun.” (English 2008); “I’m closer to nature than I was before … you’re alive, I’m alive, you know, that kind of closeness, that proximity. (Victoria)” (English 2008);
“… life mirrored in plants given to her during her illness. She kept these plants as a marker of how far she had come since her diagnosis … (Unruh 2000); “… there’s life and death, there’s beauty and there’s patience, being patient because maybe the flowers you put in aren’t going to thrive … You may think you are in control of it (the garden), but you have the control to set the garden …” (Unruh 2000); “… an opportunity to be involved with the life cycle in a way that was intimate and within their control.”
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<tr>
<th>Benefit from old and new physical activities</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoying new and old activities in nature</td>
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</tbody>
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"All of the participants plan to continue gardening and most even planned to expand their garden." (Blair 2013); "Physically, participants spoke of appreciation for the many fitness and health benefits of active participation during the season, and also of the importance of maintaining fitness year-round." (Ray 2013); "I find being on the water is that added benefit and it is very peaceful to be out there and I so look forward to it. It is addicting! ..." (Ray 2013); "... harvesting at the garden encouraged them to engage in more physical activity than they would have otherwise. Many expressed that because they felt more energized after consuming greater amounts of garden produce, they had further incentives to keep engaging in the physical activity required to harvest more produce." (Spees 2015); "The garden and gardening was simply an intensely enjoyable and familiar part of their lives. Much of their day was structured about the garden." (Unruh 2002)

Benefitting from being active in nature

"... gardening experience motivated them to eat a healthier diet overall and to eat more vegetables in particular." (Blair 2013); "... improved cardiovascular endurance, more strength in arms, shoulders, legs and core, and the positive impact of improved fitness levels on daily functioning. (in reference to dragon boating)” (Ray 2013); "... the bounty of fresh produce enhanced their ability to consume a primarily plant-based diet while reducing overall intakes of red meat and highly processed foods.” (Spees 2015); "Survivors reported improvements in both mental and physical health that increased over the course of the harvesting season.” (Spees 2015); "... helped women stay in the ‘here and now’ instead of ruminating about the past or focusing on stressful events. ... finding unison of stroke with team-mates, and enjoying ‘being in the present’ was described as a powerful means of managing stress.” (Ray 2013); "Just getting out there and picking, and even helping others pick, getting your hands dirty, really, mentally helps some of that stress ...” (Spees 2015); "So at this level (in reference to outdoor expedition), yes, it gives them the courage to have the courage to fight, the courage to exist and be human." (Stevens 2004); "... the sense of satisfaction and accomplishment they experienced through their gardening efforts.” (Unruh 2000); "... got rid of a good deal of angst, anger, and frustration by going out and weeding."” (Unruh 2000)

Enriching aesthetic experiences

Stimulating sensory experiences

"... valued the contrasts of colour, texture, scale, fragrance and season within the gardens. They spoke about their enjoyment of the ‘smooth and prickly – the sensory stuff’” (Butterfield 2014); "... importance of fragrant plants for many of the gardens’ users. ... there were no negative comments about smell. Participants talked about the pleasure of sniffing a particular bud, brushing past a herb or simply enjoying the smell of outdoors.” (Butterfield 2014); "I love the fact that the plants are scented. The garden tickles all your senses.” (Butterfield 2014); "... bold colourful planting, which they saw as dynamic and joyful.” (Butterfield 2014); "... sounds specific to the gardens, such as birdsong, insects, rustling grasses or trickling water.” (Butterfield 2014); "... joy of being in nature, the beauty, the smells, the sounds and the feeling of the paddles moving in unison going through the water.” (Ray 2013); "... following her chemotherapy, said, “I loved being outside because the air was so fresh, everything was so fresh, it was alive.”” (Unruh 2000); "... environment is so calming, so therapeutic for me. Sea air, I just, I crave the air, because the smell of it has a great effect. (Victoria)” (English 2008)

Aesthetic enrichment

"... it’s lovely to be able to sit here and look out, enjoy the bird life, the kangaroos, the bugs, the swallows.” (Pascal 2010); “The interaction with nature was expressed as being an external stimulus that was important for restoring a sense of peace and aliveness.” (Ray 2013); “Notably, the beauty of the scenery was continuously described as “amazing” and ”breathtaking.”” (Stevens 2004); “The solitude, tranquillity, and beauty of the surroundings allowed them time to reflect and become more in touch with themselves.” (Stevens 2004)
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<th>Topic</th>
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Note: The table continues with additional excluded publications.
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### Additional file 4 Quality assessment following COREQ guidelines

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CHAPTER 5 Grounded Theory Result: Cancer Patients’ Experiences with Nature

5.1 Overview
The last chapter meta-synthesized the available empirical data describing the different roles of nature in cancer patients’ lives. This chapter continues the theoretical groundwork and reports on a GT study undertaken to explore, in greater depth, the processes unfolding in cancer patients’ restorative nature experiences. First, the research objective and study aims are stated and the rationale for an expanded methods section in this chapter is provided. Part two of this chapter describes the GT informed methodology adopted. Part three presents the theory findings and integrates the theory model with related psycho-oncology literature exploring cancer patients’ existential processes in the context of Attachment theory (Chapter 2). The result is presented as a published paper.

5.1.1 Objective
This study set out to explore cancer patients' subjective nature experiences in order to examine the relevance of incorporating nature-based supports into oncology contexts. An empirical exploration of process related to patient-nature interchanges was undertaken to develop theory and inform phase 2 investigations.

This study was designed to address the following two thesis aims:
- Develop detailed descriptions of cancer patients’ nature experience.
- Explore what is essentially ongoing in cancer patients’ nature experiences.

5.1.2 Rationale for Added Focus on Methodology
Section 5.2 explains the methodology used for theory development in this study. This is the only study in the thesis receiving further and separate methodological attention. The rationale for expanding this section relates to the prioritization of qualitative inquiry in the study design (described in Chapter 2). Emphasizing and frontloading qualitative research within a multi-phase sequence means a research program builds on initial qualitative work. To lay the appropriate groundwork for phase 2 and to increase the credibility of findings, methodological rigour is needed and is argued for next.

5.2 Theory Development Methodology
There are five main approaches to qualitative inquiry and each aims to accomplish different tasks (Creswell, 2012). The approach suited for this study’s objective is called GT, the purpose of which is to “focus data collection to construct theory inductively” by means of rigorously learning about and interpreting participants’ views of their experience (Charmaz, 2014, p. 87).

GT aims to go beyond description of lived experience and instead focuses on generating theory (Corbin & Strauss, 2007). Phase 1 of this investigation constitutes a theoretical exploration of the phenomenal processes involved in experiencing and using nature in the
context of cancer. Process is defined as “the flow of action/interaction/emotions that occurs in response to events, situations, or problems” (Corbin & Strauss, 2007, p. 87). The theory outcome aims to explain how patients experience the process involved in nature experiences in the context of their cancer. It identifies salient steps of the process (how it unfolds) and what it leads to (outcome). A central category is developed drawing together other inductively and theoretically developed categories (or themes) through relational statements that describe the phenomenon (Creswell, 2012, p. 85).

5.2.1 Scope
The level of theory construction achievable in a study is determined by data saturation and can result in formal or substantive-level theory (Strauss & Corbin, 1990). Formal theory deals with universals that are applicable to various contexts and cohorts; substantive-level theory is narrower and relates to observations in fewer contexts, or only in one particular cohort (Strauss & Corbin, 1990, pp. 174-175). This study set out to develop substantive-level theory with the aim to tentatively explain the role of restorative nature experience in cancer patients’ lives.

The GT in this study explores five components of cancer patients’ nature experience as shown in Table 3.

Table 3
Theory model exploratory scope

<table>
<thead>
<tr>
<th></th>
<th>Core phenomenon</th>
<th>Causal conditions</th>
<th>Strategies</th>
<th>Context</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Develop a central category from the data, which identifies the central process involved in nature experience in the cancer context. Serves to organize other categories.</td>
<td>Identify what influences or “causes” restorative nature experiences in the cancer context.</td>
<td>Identify what strategies patients employ during the process, especially those that originated from the central phenomenon.</td>
<td>Describe the narrow and broad conditions that influence the experience and the employed strategies, for example, what types of nature environments create restorative experiences for cancer patients?</td>
<td>Identify what results from cancer patients’ engagement with nature.</td>
</tr>
</tbody>
</table>

5.2.2 Data Collection and Recruitment
The exact number of interviews needed for a GT study is difficult to determine because the “very logic of GT is to follow emergent ideas and directions” (Charmaz, 2014, p. 106). Charmaz suggests as few as 12 interviews are sufficient to establish descriptive themes (Charmaz, 2014, p. 107). Given the above, the study was designed to conduct 20 to 30 interviews while paying attention to emergent findings that can justify scaling this number up or down.
Eligible patients included those with any diagnosis of cancer who were either receiving or had completed treatment, were 18 years of age, able to speak English, fit in body and mind to participate, and able to meet the time requirements to be interviewed. Purposive sampling proceeded to theoretical sampling and included negative case sampling, which aimed to gather the widest descriptive range possible in order to develop and saturate emergent concepts during data analysis. All participants were recruited at Peter Mac (see Approach Script, Appendix 8).

The primary method of data collection was semi-structured interviewing, which used an interview schedule that became increasingly focused as insights emerged (Appendix 9). The interview schedule comprised two parts. Data acquired from part one informed the GT study, which is presented in this chapter, and data acquired from part two informed the study presented in Chapter 6. Further materials from my own reflective practice and analytic memos complemented the dataset for the GT study (Appendix 10).

The data collection phase reflected a back-and-forth interaction between participant selection, data collection, and data analysis. The exact flow of each participant through the study is documented in Appendix 11. The detailed strategies for identifying, recruiting, and interviewing patients, in compliance with ethical and clinical guidelines, are reported in the study protocol in Appendix 1.

5.2.3 Data Analysis
GT analysis is a dynamic process and is both an “art and a science” (Corbin & Strauss, 2007, p. 47). Constructing a coherent model that explains a phenomenon and how it works is the artistic component, while grounding these concepts in empirical data through constant comparison is the validating or scientific aspect of the process (Corbin & Strauss, 2007). One proceeds systematically through the coding process attending to both aspects.

My own approach as a critical realist favoured a stricter analytic framework for the practical analysis activities over the more flexible procedures suggested by constructivists (Creswell, 2012, p. 87). To this end, my approach was governed by the framework presented in The Basics of Qualitative Research (Corbin & Strauss, 2007), which provided a robust and systematic analytic strategy.

In summary my analytic process included:
- reducing textual data to significant statements (codes) using line-by-line coding,
- developing clusters of meaning by combining codes into categories, which describe salient aspects of participants’ experiences,
- sorting additional, relevant data into cogent categories to further develop descriptive breadth,
- combining conceptually similar categories into overarching categories (themes),
- writing composite descriptions that capture the essence of the overarching categories,
and determining a core category, which captures the quintessential experiences described by participants, and

- organizing the remaining categories (themes) into meaningful relationship with the core category thereby connecting the analytic units and producing a coherent narrative.

In addition to the traditional analytic procedures outlined above, I sought to gain deeper understanding of participants’ experiences through creating visual representations of individual participant’s processes as described by them. In this procedure, I extracted all codes and categories generated from individual transcripts and created visual models depicting the relationships between categories. Visual models were created for participants 04, 05, 06, 10, and 19 (Section 5.3), which deepened my understanding about the nature experiences described. An example is provided in Appendix 12.

Analytic memos supplemented the data set. Analytic memoing is considered a research method that provides a “logical, systematic, and coherent resource for carrying out the analysis and synthesis needed to arrive at essential descriptions of experience” (Moustakas, 1994, p. 47). Analytic memos were written alongside, and in response to, transcribing interviews, coding textual data, and recruiting patients. All 108 memos combined represent 70,600 words and are individually titled and listed in chronological order in Appendix 10. One full-text example is given in order to demonstrate my analytic thinking and process, which ultimately influenced the resulting theory model. The limit to presenting this written material relates to the requirement to persevere participant anonymity and confidentiality.

Audio-recorded interviews were transcribed by myself, which allowed closeness and constant return to the raw data while progressing toward greater abstraction of concepts. The final step in a GT project requires the analyst to commit to a core category, which identifies the very essence of what is being described by participants. The core category arises as quintessentially capturing more fully the emerging structure of reported experience as compared to other categories. Traditionally this step is called axial coding and advances the procedure of constant comparison to organizing other categories into meaningful relation with the core category. The core category was determined late in the analysis procedure as documented in Appendix 13. In this stage of analysis, I used a series of “logic diagrams” to assist in organizing the developing categories into meaningful relationship with the core category (Strauss & Corbin, 1990, pp. 219-220). Two examples are provided in Appendix 14. A last return to the raw data “re-asked” the question of how the material informs the interpretations reached and, importantly, if and how the initial study aims were being met (Corbin & Strauss, 2007).

### 5.2.4 Strategies of Validation

Rather than using classic quantitative terms for research validity (internal and external validity, reliability and objectivity), this study uses terms that are more suitable to qualitative research, including credibility, transferability, dependability and confirmability (Lincoln, 1985, p. 300).
Credibility

Member checking is one strategy to address the issue of “constructions” (Lincoln, 1985, p. 314). Constructions are interpretations and conclusions made about the data, including how the information is represented. Member checking traditionally allows members of the study cohort to respond to the interpretations of their material and judge its accuracy and credibility (Lincoln, 1985). The ethics section in the study protocol (Appendix 1) did not permit re-contacting participants after the interview aside from forwarding a summary of results (Appendix 5) at study completion in order to avoid overburdening patients. Given this limitation, the interviews were verbally summarized at completion and participants were given the opportunity to confirm or correct the interviewer’s understanding of their contributions. To further increase credibility of findings and establish trustworthiness, the study used a peer debriefing strategy. Peer debriefing is a research validation process whereby the researcher and an impartial person external to the study who is familiar with the study topic conduct discussion about the research process and findings of an investigation (Creswell & Miller, 2000, p. 129).

In the final stages of analysis, during September and October 2015, I sought appropriate peers who engaged in discussion about my emerging and deepening insights. These included a professional philosopher with training in continental philosophy, and interest in Aesthetics, Philosophy of Distraction, and Garden Philosophy, who provided an existential perspective on the insights about patient-nature interchange. The meeting took place in-person (80 minutes), was audio-recorded and a transcription was returned as a sign of gratitude for the time offered. Next was a discussion with a practicing psychoanalyst who specializes in complex mother-infant trauma and is trained in the Winnicottian tradition. The advice I sought related to my early theory building that began incorporating psychoanalytic theory, and in particular Winnicottian theory (42 minutes, face-to-face, audio-recorded and transcribed verbatim, and transcript again returned to the person). Lastly, a cancer survivor “consumer representative” from Peter Mac volunteered time to discuss the findings in the final stage of analysis in late October 2015. This debrief provided opportunity to check my hypotheses with a person who had a long history of dealing with cancer. Her feedback was invaluable in understanding that every person (cancer patient or not) will desire and require different interventions, and many will require none (face-to-face, 83 minutes, 40 minutes of audio-recording was transcribed and returned). All debriefers volunteered their time and consented to the discussion being audio-recorded. None requested a transcript but gratefully accepted one when offered. The de-identified transcripts are provided in Appendix 15.

Triangulation is another strategy to increase credibility, which involves corroborating evidence from different sources to further increases credibility (Lincoln, 1985). Memos and textual data from the systematic literature review (Chapter 4) were used for ongoing cross-referencing about how the study’s interview data were similar or different as compared to existing literature. In this way, different sources of information mutually informed one another and could confirm conceptual agreement and work towards resolving disagreement.
Transferability
Transferability is related to the concept of external validity and asks whether the findings can be transferred to other contexts or settings (Lincoln, 1985). It considers the specifics of the findings and compares those to specifics of a different situation and judges whether similar results would be found in other contexts (Lincoln, 1985). Thick description enables the reader to evaluate the conclusions and consider “whether a transfer can be contemplated as a possibility” (Lincoln, 1985, p. 316). In qualitative research, “thick description” is defined as an analysis procedure that goes beyond description of social action and begins to interpret and record the “circumstances, meanings, intentions, strategies, motivations” of a particular event (Schwandt, 2007, p. 296). For this strategy to be successful, sufficient information about participants and setting is needed. To this end, the phase 1 qualitative work provides as much description and raw material as reasonable to allow the reader the task of judging transferability. This was accomplished by appending condensed and organized raw data in the publications as reported in Chapter 4 and Chapter 6 as well as in the publication presented in the next section of this chapter.

Negative case analysis is a strategy for refining emerging concepts by considering disconfirming evidence and increasing descriptive range thereby improving transferability to other cohorts or settings (Lincoln, 1985). To this end, participants were recruited who reported not finding nature helpful in their cancer experiences (as reported in the next section). Recruiting these participants was challenging but proved possible.

Dependability and Confirmability
Dependability and confirmability replaces the quantitative concept of objectivity (Lincoln, 1985, p. 318). Generally, both are established through creating an audit trail that tracks the research process. This study charted all research activities and recorded timelines for: raw data coding, data reduction and analysis, data reconstruction and synthesis, analytic memos, new questions arising during the analytic process, and inter-rater reliability procedures. Commonly, the inter-rater person functions as a “devil’s advocate” by questioning the analyst’s meanings and data interpretations (Creswell & Clark, 2007, p. 252). The process is designed to resolve disagreement and create conceptually congruent formulation. The full audit trail is contained in Appendix 11.
Cancer patients' experiences with nature: Normalizing dichotomous realities

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A B S T R A C T

Aims: To explore cancer patients’ subjective experiences with nature in order to examine the relevance of nature-based care opportunities in cancer care contexts. The rationale was to describe the underlying mechanisms of this interaction and produce translatable knowledge.

Methods: Qualitative research design informed by grounded theory. Sampling was initially convenience and then theoretical. Competent adults with any cancer diagnosis were eligible to participate in a semi-structured interview exploring views about the role of nature in their lives. Audio-recorded and transcribed interviews were analyzed using inductive, cyclic, and constant comparative analysis.

Results: Twenty cancer patients (9 female) reported detailed description about their experiences with nature from which a typology of five common nature interactions emerged. A theory model was generated constituting a core category and two inter-related themes explaining a normalization process in which patients negotiate their shifting realities (Core Category). Nature functioned as a support structure and nurtured patients' inner and outer capacities to respond and connect more effectively (Theme A). Once enabled and comforted, patients could engage survival and reconstructive maneuvers and explore the consequences of cancer (Theme B). A dynamic relationship was evident between moving away while, simultaneously, advancing towards the cancer reality in order to accept a shifting normality. From a place of comfort and safety, patients felt supported to deal differently and more creatively with the threat and demands of cancer diagnosis, treatment and outlook.

Conclusions: New understanding about nature's role in cancer patients' lives calls attention to recognizing additional forms of psychosocial care that encourage patients’ own coping and creative processes to deal with their strain and, in some cases, reconstruct everyday lives. Further research is required to determine how nature opportunities can be feasibly delivered in the cancer care setting.

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In recent years there has been a growing interest to study how experiences with nature impact human health and well-being (Hartig et al., 2014). Accordingly, nature’s role in healthcare has become a topic of focus in numerous research fields such as public health (Haluzka et al., 2014) and planning, design and environmental disciplines (Ulrich et al., 2008). Even though it is considered a new field with growing scientific attention, its core issues have a long-standing record of inquiry in healthcare philosophies from ancient times to more recent history (Nightingale, 1969; Rawcliffe, 2008). The study of mental restoration (Kaplan, 1995) and stress reduction (Ulrich, 1983) through contact with nature has produced the most notable findings and discussions in this area today.

Various types of contact with nature have been considered within healthcare interventions including horticultural therapy (Verra et al., 2012), and purely visual or sound-based nature experiences in the hospital room (Diette et al., 2003; Saadatmand et al., 2013). Findings from studies of mixed clinical populations have shown positive associations between nature exposure and...
lowering physical discomfort during surgical procedures (Diette et al., 2003; Saadatmand et al., 2013), reduced length of hospital stay (Ulrich, 1984), reduced strength of pain medication (Lee et al., 2004; Ulrich, 1984), improved psychological wellbeing (Gonzalez et al., 2010), social wellbeing (Um et al., 2002), and improved positive affect and mood (Wichrowski et al., 2005). Furthermore, some literature suggests that nature in healthcare settings may improve healthcare service satisfaction (Whitehouse et al., 2001).

The movement to understand how contact with nature benefits human health and wellbeing could be understood as a response to the changing attitudes and expectations of healthcare ‘consumers’, who are increasingly informed, self-empowered and demand personalized care approaches (MacCormack et al., 2001). In this context, engagement with nature arises as a potential opportunity for widening the horizon of healthcare services and strategies. Little research, however, exists on how patients in cancer care settings might engage with nature and if they value such engagement in their healthcare experiences.

1. The cancer care context

People affected by cancer can experience physical, psychosocial and mobility adjustments impacting their wellbeing and quality of life (Korszun et al., 2014), which may result in patients and carers having unmet needs (Sanson-Fisher et al., 2000). Given these immediate and ongoing challenges, numerous psychosocial care interventions are being created with the aim to alleviate cancer patient and carer strain, which have been broadly categorized as educational techniques, behavioral training, individual psychotherapy, and group interventions (Fawzy et al., 1995). These include, for example, relaxation techniques (Luebert et al., 2001), virtual communities and electronic support groups (Eysenbach et al., 2004), and guided imagery (Roffe et al., 2005).

Given the rapid rise in cancer incidences each year (Stewart and Wild, 2014) and a corresponding demand for new solutions to growing healthcare burden and cost (Rijo and Ross, 2010), first attempts have been made to study the potential of engagement with nature as a supportive aid in cancer care. Although the effectiveness remains critically understudied, preliminary research with cancer populations suggests that nature-based interventions may improve quality of life (Rowlands and Noble, 2008), increase positive health behavior such as physical exercise and fruit and vegetable consumption (Blair et al., 2013), restore attention (Cimprich and Ronis, 2003) and promote social interaction (Sherman et al., 2005). Such studies, however, often reflect outcomes as defined by the measures, audits and questionnaire devised by the researchers. Further understanding of cancer patients’ engagement with nature and its relevance in their experiences of health and recovery is needed.

Nature has been conceptualized through numerous lenses; accordingly, the term’s boundaries vary across the disciplines discussing the issue. The following working definition served as a starting point in this investigation and condenses lengthy definitions from two developmental lines; namely, environmental psychology (Kaplan and Kaplan, 1989) and health & nature studies (Maller et al., 2006):

“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”.

Against this background, the current study explored the subjective experiences of cancer patients in order to examine their engagement with nature and describe the elements patients find beneficial and those they find less helpful. The rationale was to produce relevant, translatable knowledge for nature-based care opportunities in cancer care contexts and to direct future research.

2. Method

2.1. Design and data collection

The qualitative research design used a grounded theory approach following the procedures recommended by Corbin and Strauss (2008) to generate a theoretical outline of the process underlying cancer patients’ use of nature. Data collection comprised semi-structured interviews conducted either face-to-face in the hospital setting or over the phone. The semi-structured interview schedule posed open-ended questions about patients’ own definition of nature, nature preferences, experiences, usages, effects, nature-based recommendations for other cancer patients, and recommendations for nature-based opportunities in the cancer care setting. Sampling proceeded from convenience to theoretical sampling with the aim to collect a rich range of data (maximum variation). Interviews were transcribed verbatim, analyzed and interpreted in a constant comparative manner (Corbin and Strauss, 2008). In this approach, emerging concepts can be explored and hypotheses about participants’ experiences formulated, which inform ongoing data collection alongside analytic memoing and reflexive journaling. Data saturation was reached when interviews ceased to add any new core material and the studied phenomena were sufficiently elucidated. Reporting followed COREQ guidelines (Tong et al., 2007) with the exception of member-checking. COREQ recommends that data analyses be returned for participant confirmation following interviews. In this study participants’ comments were summarized at the conclusion of each interview to verify comprehension of their views. This was deemed appropriate to minimize patient burden and because a number of participants were not expected to live through the study period.

2.2. Participants and ethics approval

Cancer patients were recruited during the data collection period from February 2015 to June 2015 from the inpatient wards and outpatient clinics in an Australian tertiary cancer hospital. Patients were eligible to take part if they were at least 18-years-old with any cancer diagnosis and who spoke sufficient English and were sufficiently well to complete the interview. At first, all patients attending specialist clinics and patients admitted to wards were screened on random weekdays by the first author (SB) with the aim to recruit any patient willing to participate in the study. Treating clinicians and nurse coordinators were consulted to ascertain patients’ fitness to be approached. The first author approached eligible patients face-to-face following an approach script to introduce the study and its aim. Patients could agree to their participation by giving informed, signed consent. At first, patients were invited to take part irrespective of their past experiences with nature and were not asked to explain their relationship with nature during recruitment. As the analysis proceeded and gaps in the data became apparent, the recruitment strategy became more focused and included one negative case [P16] where the aim was to include views of patients who did not value or felt ambivalent about nature in their recovery process. It was further necessary to purposefully approach two patients [P15, P20] based on demographics (sex, age), which provided greater demographic variety to the collected data. Finally, two patients [P19, P21] were recruited after establishing that nature played a part in their recovery experiences and their
views potentiated consolidating the analysis. Ethics for this study was granted from the Peter MacCallum Cancer Center Human Research Ethics Committee.

2.3. Data analysis

Interview data were analyzed using an inductive, comparative method consistent with grounded theory (Corbin and Strauss, 2008) using data management software Atlas.ti Version 1.0.16, 2013 for Mac (Atlas.ti). Initially, line-by-line open coding generated descriptive labels and was followed by grouping of codes into larger descriptive categories (selective coding) after which descriptive categories were grouped into overarching themes. The last step, axial coding, proceeded to determine and develop a core category around which themes were systematically organized and interpreted. All data were collected, transcribed and analyzed by the first author (SB). The inter-rater reliability process included the second author (CO) reading all transcripts and coding sheets. Analysis continued iteratively after analytic interpretations were discussed (SB, CO) until agreement was reached.

The classic purpose of grounded theory is to “focus data collection to construct theory inductively” (Charmaz, 2014) (p. 55). Accordingly, this study aimed to produce a theoretical explanation that meaningfully describes the underlying phenomenon and the contextual relationships between the core category and themes. Maxwell (2012) refers to this analytic step as “connecting strategies” (p.115), which requires another narrative reading of the material that builds upon the initial descriptive analysis. Themes are integrated to reflect what participants essentially described was going on for them in their nature experiences and to serve a more complete understanding grounded in participants’ views and perspectives. The present study generated such a theoretical statement, which is presented in the second section of the Results.

3. Results

3.1. Participant demographics and description of nature interactions

Twenty cancer patients (9 female, mean age = 53 years, SD = 17) with mixed diagnoses participated in a single semi-structured interview (mean duration = 54 min). All were Australian born except two were born in Sri Lanka. Eleven were currently undergoing treatment, 5 were inpatients, 15 were outpatients, 8 underwent face-to-face interviews and 12 underwent phone interviews. One consented participant was withdrawn after attempts failed to make contact for scheduling the interview. Table 1 summarizes participant demographics.

<table>
<thead>
<tr>
<th>ID</th>
<th>Sex</th>
<th>Age</th>
<th>Origin</th>
<th>Cancer Stream</th>
</tr>
</thead>
<tbody>
<tr>
<td>P01</td>
<td>F</td>
<td>71</td>
<td>Australia</td>
<td>Gynecology</td>
</tr>
<tr>
<td>P02</td>
<td>F</td>
<td>24</td>
<td>Australia</td>
<td>Bone &amp; Soft Tissue</td>
</tr>
<tr>
<td>P03</td>
<td>F</td>
<td>29</td>
<td>Australia</td>
<td>Bone &amp; Soft Tissue</td>
</tr>
<tr>
<td>P04</td>
<td>F</td>
<td>31</td>
<td>Australia</td>
<td>Lower GI</td>
</tr>
<tr>
<td>P05</td>
<td>M</td>
<td>70</td>
<td>Australia</td>
<td>Lung</td>
</tr>
<tr>
<td>P06</td>
<td>F</td>
<td>39</td>
<td>Australia</td>
<td>Bone &amp; Soft Tissue</td>
</tr>
<tr>
<td>P07</td>
<td>M</td>
<td>53</td>
<td>Australia</td>
<td>Skin &amp; Melanoma</td>
</tr>
<tr>
<td>P08</td>
<td>F</td>
<td>59</td>
<td>Australia</td>
<td>Bone &amp; Soft Tissue</td>
</tr>
<tr>
<td>P09</td>
<td>F</td>
<td>31</td>
<td>Sri Lanka</td>
<td>Bone &amp; Soft Tissue</td>
</tr>
<tr>
<td>P10</td>
<td>M</td>
<td>67</td>
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<td>Hematology</td>
</tr>
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<td>P11</td>
<td>M</td>
<td>59</td>
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<td>Hematology</td>
</tr>
<tr>
<td>P12</td>
<td>withdrawn</td>
<td></td>
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<td></td>
</tr>
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<td>P13</td>
<td>M</td>
<td>54</td>
<td>Australia</td>
<td>Hematology</td>
</tr>
<tr>
<td>P14</td>
<td>M</td>
<td>60</td>
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</tr>
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<td>F</td>
<td>76</td>
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<td>P16</td>
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<td>71</td>
<td>Australia</td>
<td>Hematology</td>
</tr>
<tr>
<td>P18</td>
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<tr>
<td>P21</td>
<td>F</td>
<td>49</td>
<td>Australia</td>
<td>Breast</td>
</tr>
</tbody>
</table>

3.2. Theoretical analysis

The most salient finding across cancer patients’ diverse perspectives and experiences was that nature provides a safe and comforting context where patients could explore for themselves different ways of conceptualizing and dealing with the abrupt event of cancer diagnosis. Central to this phenomenon was the return to a familiar and nurturing environment, which provisioned the unfolding of an idiosyncratic normalizing process (Core Category). In terms of this central finding, nature engaged cancer patients in two important ways. Firstly, nature emerged as an accessible and hospitable support structure, which contrasted with the more prescriptive healthcare environment and patients’ clinical experiences (Theme A). Secondly, nature facilitated opportunities for physical and psychological maneuvers. In these private explorations, patients could begin to incorporate their cancer experience into their changing life narratives (Theme B). The interrelationship between these two themes and the core category is conceptually represented in Fig. 1.

3.3. Core category. Normalizing

Participants consistently dealt with dichotomous realities in which they confronted the threat of cancer: ‘Am I gonna’ get through treatment? Is this going to kill me? Will my life go back to normal?’ [P02]. A sudden shift of perspective occurred when confronted with diagnosis, which was described as being thrown ‘out into orbit’ [P06] and ‘cracked open’ [P19]. Patients’ thoughts oscillated between various imaginings of what is and what might be. Nature offered a different opportunity (Embodied, Allied and Imaginative) to stay in touch with familiar reality when dealing with the demands and consequences of cancer treatment: ‘even if I’m feeling really sick and really low emotionally, the fact if I sit outside I would feel normal’ [P02]. Thus, patients could engage and hold onto a sense of life unthreatened by cancer: ‘When you get out into nature, you just don’t have to talk, you don’t have to hear about cancer’ [P04] or as another patient put it: ‘it’s just the fact that you are returning to what you would normally do’ [P17]. It was evident that nature represented ‘a vehicle for normalization’ [P06] for returning and sustaining personal selfhood in an extraordinary circumstance.

P10 succinctly defined nature’s unique role in his cancer experience as ‘the ordinary surrounds the intense’ and alluded to the
3.4. Theme A. Accessing a personal support structure

Nature emerged as an immediately accessible support structure; a physically inhabitable construct as well as a psychological place invested with personal significance with the potential to nurture, comfort and meaningfully connect patients with what they valued.

3.4.1. Nurturing context

P06 described nature as a context in which to privately deal with the uncertainties related to cancer: ‘one thing about cancer treatment is the change and the unpredictability;’ is hard. So, having a sort of touchstone to go back to where you feel really, yeah, safe and private and contained’, and further described the hospital garden as a place that is ‘kind of outside the hospital but immediately, immediately accessible’. A different type of support was drawn from nature that could ‘help with normalizing and emotional processing’ and was available ‘regardless of your religious background’ [P06]. For some patients the ‘place of peace’ (formerly called the hospital chapel) was not compatible with their worldview: ‘for the religious that is fine but for everyone else ... not a good feeling. ... it is foreign, it is draining’ [P10]. Patients in this position appreciated access to nature as a temporal setting for consolation and reflection: ‘plants and nature and gardens do address in different ways the needs of that more diverse community’ [P06]. For this purpose, nature became an embedded and relatable resource for addressing psychosocial care needs described as: ‘a quietness and a meditation’ [P14], ‘the half-way house,’ ‘serenity’ [P14], ‘got to cling on to something strong, and was a bit of an experience for us, think it is just a vastness and dryness and again nature’ [P14]. Yes, that you’ve got to really look into it to figure out and you can sort of lose yourself in it … Yes, it’s like you are not controlling this. This is something bigger than us. … It’s a whole new dimension’ [P01].

Table 2

<table>
<thead>
<tr>
<th>Typology of nature experiences.</th>
<th>Codes</th>
<th>Illustrative text</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Embodied.</strong> Experiences promoting bodily sensations, sensory engagement through direct or indirect experiences with nature, active or passive e.g. outdoor activities, scents, textures, window views.</td>
<td>Body relaxes when surrounded by nature ... like a big sigh at the end of the day. It's like you can sort of breathe deeply and, ahm, what else? You can just completely relax your body ... [P04]</td>
<td></td>
</tr>
<tr>
<td><strong>Allied.</strong> Nature’s facilitative qualities promote e.g. social gatherings, change of context, creative outlets. Experiences supported/enhanced by nature’s presence or representations.</td>
<td>Engagement with outside world through moderate (modified) physical activity, gardening</td>
<td>in the garden a lot ... to have that experience to be able to feel relaxed and centered and — ahm, I felt really rejuvenated and connected to the outside world. [P03]</td>
</tr>
<tr>
<td></td>
<td>Prefers going to nature area for stillness and quietness rather than religious chapel or a chapel or it is a meeting room — you tend to be able to go there for the stillness and quietness. And for me, you sort of get to sit down and think and relax, you know ... if that involved nature, nature, water, I would go to those places more so than the chapel [P14]</td>
<td></td>
</tr>
<tr>
<td><strong>Imaginative.</strong> Experiences taking place in the imagination e.g. mental journeys, thinking ahead with nature, nature imagery for altering mind/mood/behavior. Don't require nature’s physical presence.</td>
<td>Uses nature-based phone app to relax and alleviate sleep problems</td>
<td>... to me it’s part of the psychological preparation that you need when you are going on the standard clinical path. Cold, hard, clinical ... show them that 'Look, you are really only this big, your problem is only this big, nature and the rest of the world is this big [makes large gesture with hands], this is all going on, you can still be part of it' [P10]</td>
</tr>
<tr>
<td><strong>Humanized.</strong> Nature takes on a personified role or presence e.g. mentor, mother, destroyer, life-giver, self-mirror.</td>
<td>Nature does not relate to or discriminate life-roles, respite from 'cancer patient' identity</td>
<td>... documentaries that were based in nature ... just looking at different gardens ... where I wanted to visit when I'm well enough and ... so that kept me connected, I guess, in a different way [P03]</td>
</tr>
<tr>
<td></td>
<td>Nature is a presence that is with you and engages the senses</td>
<td>I've got a, an app called ‘calm’ ... it’s called this, though rainy sound, and then, ahm, I think ‘ocean’ and the ‘forest’ ... at home, when I can’t sleep, I put that app and then it makes me relaxed [P09]</td>
</tr>
<tr>
<td><strong>Novel.</strong> Experiences that are rare or extraordinary and trigger heightened states of awareness e.g. awe, joy, terror, connectedness. Punctuates inner and outer day-to-day reality, facilitates new perspectives and expansion.</td>
<td>Seeking extraordinary landscapes to break out of ‘regular’ experience</td>
<td>People are always talking about it and it, sort of can’t really stop that. When you get out into nature, you just don’t have to talk, you don’t have to hear about cancer, you can just relax and enjoy [P04]</td>
</tr>
<tr>
<td></td>
<td>Loosing yourself in nature, letting go of control, entering a whole new dimension</td>
<td>There’s something there with you, it is something with plants, it’s something, it’s, ahm, that environment that plants build up. You know, it’s the aromas, it’s the, ahm, the moisture, ah, the feeling of peace [P10]</td>
</tr>
<tr>
<td></td>
<td>Awe - appreciation of beauty, power and/or grandeur, power of the ocean, majestic trees</td>
<td>It certainly does, it certainly is different to what we do regularly by what we do going up Lake Eildon ... and was a bit of an experience for us, think it is just a vastness and dryness and again nature’ [P14]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes, that you’ve got to really look into it to figure out and you can sort of lose yourself in it …. Yes, it’s like you are not controlling this. This is something bigger than us. … It’s a whole new dimension’ [P01]</td>
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<tr>
<td></td>
<td></td>
<td>‘... you suddenly shrink down like this and understand that nature is the real master. Nature is so grand. You are not thinking about yourself, or worrying about yourself. You are seeing the power and the beauty of it.’ [P10]</td>
</tr>
</tbody>
</table>
helpful, some participants did express concern about certain types of nature engagement such as long park visits (Embodied) that could become overwhelming: ‘it is all a bit too much and you just kind of want to be back in bed’ [P04].

3.4.2. Presence of comfort and safety

Patients who perceived nature as a caring presence suggested the notion of companionship: ‘There’s something there with you’ [P10]. P19 explained how nature took on humanized roles for him when first diagnosed with cancer: ‘a mentor … old wise man … or woman to learn from …. one that watches us run around and just stays and is still’. Endowed with this personal imprint, nature could touch with almost human capacity and benefit patients as described in their own words: ‘mood improves a lot’ [P02], ‘get positive’, ‘get your hopes up’, ‘keeps you up’ [P04], ‘kept me connected’ [P03], ‘peaceful, sort of calming’ [P08], ‘always uplifting’, ‘stop the boredom’, ‘totally liberated’ [P10], ‘gives me pleasure’ [P01] and, ‘makes you feel alive … contented’ [P17].

The presence of nature objects in the hospital room (Allied) encouraged and softened clinician-patient communication and invited a different tone of conversation, as explained by P03: ‘a lovely bunch of flowers, it, it engaged medical practitioners coming in and out of your room all the time in conversation’.

3.4.3. Connecting with what is genuinely valued

Patients recognized nature’s facilitative qualities for sustaining and deepening connections with others, themselves, and nature. Being in less structured and formal environments promoted social interaction (Allied): ‘it is a bit easier to chat to people when it’s in … better areas where you have got a bit of, bit of the outside world’ [P14]. Nature served as a ‘different context for conversations and connections’ [P03].

Several participants pointed out that solitude in nature was very important for maintaining a connection with themselves: ‘just me in nature’ [P05], ‘my out’ [P11], and ‘Freedom and just space … from people and you know just my alone time’ [P04].

For P06, the hospital garden created a vital connection, which she described as ‘a deep experiential connection to something that is alive’. In this way, nature corresponded with patients’ inner affective states and affirmed their resourcefulness to connect despite being in corrosive environments: ‘(dealing with) the non-natural world and the lights and the distraction. So then, the way I cope is I try and find nature … it can be connectedness to any living thing’ [P19]. A broad range of humanized, allied, imaginative and embodied nature interactions were noted to promote patients’ valued connections. More inefable outcomes arose in this context, such as ‘healing on all levels’, ‘overwhelming feeling of joy. … it is physical, it is mental; it fills the whole being’ [P15] and that ‘it does something to your soul. It just sort of helps you through your cancer’ [P04].

3.5. Theme B. Explorations: maneuvers away and towards

Nature was a unique context that could temporarily distance patients from their clinical experiences in order to explore different ways of seeing their situation. Two interrelated and sometimes simultaneously occurring coping maneuvers arose from nature interactions during hospitalization as well as those occurring in personal environments. Firstly, patients engaged in maneuvers to relieve and get away from unnecessary discomfort and suffering. Secondly, their desired return to normality required concurrent movements towards the cancer reality.

3.5.1. Maneuvers away from the cancer experience

Nature was accessed within and outside the hospital to escape the ambient and imminent clinical stressors. Most marked was the need to interact with something outside the cancer experience that offered ‘an environment that is a little bit more stimulating’ [P07], ‘a sense of escape’ [P04], or ‘change of scenery’ [P02]. Patients could temporarily retreat from clinical discipline, which was noted as being ‘all about cancer’, ‘stuck in treatment environment, procedures’ [P04], ‘living through repeated cycles of chemo’, ‘being isolated from everything except the trauma’ and feeling ‘you are not getting anywhere’ [P06]. Patients described different ways of using nature to gain the distance they required. These included sensory enriching experiences for positive distraction and redirecting focus away from cancer related thoughts, which lightened patients’ mental burden and alleviated a tight grip approach to problem solving and crisis management. Patients consistently accessed nature via visual or imaginary pathways when restrictions did not permit leaving the hospital. Such imaginative and embodied nature interactions were regarded entry as to ‘a different world outside of the clinical environment’ [P03], that felt ‘less static’ [P06] and created ‘more natural behavior patterns’ [P11]. Adhering to treatment protocols was described as demanding, yet understood to be crucial. In this respect, nature offered respite as illustrated by following statements: ‘at least some life and some change’ [P06], ‘feeling the sun on your face’ [P07], ‘having some greenery and not four walls’ [P17], ‘when you are in nature and you come back, you feel like you have a little bit more control’ [P04], ‘no stress, no thinking, no telephones’ [P11], ‘Getting out in the fresh air’ [P17] and, ‘take your mind off - away from you and onto things that you find enjoyable’ [P07].

3.5.2. Maneuvers towards the cancer experience

Two behavior patterns emerged from participants’ descriptions about how engaging with nature helped them adjust to their lived cancer experience. First, nature motivated practical agency for recovering or sustaining valued aspects of patients’ pre-cancer lives. Second, nature roused metaphorical thinking, which offered reconstitution and new understanding.

As a practical aid, nature improved recovery, wellbeing and a
sense of day-to-day life (Allied, Embodied and Imaginative). Amongst these experiences were relaxation through nature-based sounds to mitigate sleeplessness [P09], frequent walks outside [P05] and park visits during hospitalization [P03, 17, 20], using nature for distraction and a creative outlet [P03], viewing nature imagery during diagnostic procedures (MRI) [P02], continuing valued recreational activities at home such as gardening [P01, 06, 14, 18], cycling [P13, 17, 18], and yachting [P10]. Modifying the intensity of nature activities made it possible to continue these routine parts of life during and after treatment. For example, P01 down-regulated her gardening practice (Embodied) in order to continue her gardening and retain the physical exercise benefits gained. Similarly, other participants desired getting back into nature to recover physical fitness after treatment: ‘wanted to sort of get my body into shape ... I did try my hardest to, to get out as soon as I could’ [P21] and ‘when you go out in nature you are exercising’ [P17].

At the same time, some patients reported nature to trigger negative feelings such as a ‘tiny tinge of regret’ [P07] over what might be missed when considering a shortened future. Not all participants sought contact with nature when dealing with the practical demands of treatment and reported feeling ambivalent about its provision and application in the care setting [P16]. While no participant reported strong negative associations with nature, P16 contributed that, in his view, priority should be given to primary care rather than additional care elements such as nature-based initiatives.

Another coping behavior identified was using nature as a ‘key metaphor for dealing with cancer’ [P06]. Patients recognized their own inner and outer worlds reflected: ‘there is a metaphor, but it is also more than a metaphor because I am in there, you know, like, I will be dust, I will be bark ... it’s like from where you came’ [P19]. Nature lent symbolic material and ‘facilitated timelessness and perspective’ and helped ‘to see beyond your own limitations’ [P15]. Various novel nature interactions awarded a greater vantage point: ‘we are just part of the world, part of the universe ... everything continues, everything grows, everything keeps going ... this is all going on, you can still be part of it’ [P10]. These moments in nature were steps towards integration as following experiences describe: ‘everything seemed to suddenly fit together’ [P01] and, ‘This is something bigger than us. ... It’s a whole new dimension’ [P10]. In this state of mind, patients could risk exploring different possible and imagined future scenarios: ‘you come into your own mortality — you think of what might happen ... it might go well, it might not. ... become calm and you’re looking at things within the natural world, that are decaying, that are growing’ [P19]. Some patients found it helpful to witness their own life cycle externalized in the material world: ‘that is the core of nature ... the garden’s growing and then it dies. ... I go back into it, when I die I go back into it’ [P15]. P06 explained how nature assisted her ‘to come to terms with things, which is really, really critical part of treatment’. She contemplated causes of her incurable cancer while ‘sitting with plants’ in the hospital garden and observing literal signs of ‘gene mutation and natural selection’. In her words, it helped her ‘pass through a process of accepting what is happening to me and where I fit in the world ... not really normalizing it to the standards of life pre diagnosis but it’s accepting that this now is the new normal. That this is the reality that one lives in’.

3.6. Theory development

The tentative theory put forward in this paper connects the essential elements arising from the analysis and explains a process of idiosyncratic steps taken to maneuver the confronting experiences of a shifting normality (Core Category). Nature functioned as a support structure that repositioned patients and nurtured their inner and outer capacities to respond and connect effectively (Theme A). Once enabled and comforted, patients could engage survival and reconstructive maneuvers and explore the consequences of cancer (Theme B). A dynamic relationship was shown between distancing from the cancer reality and advancing towards it. For some, nature simply returned a practical sense of agency and ordinary day-to-day life, which helped accommodate their cancer experience and move forward. Other patients, who felt more disarranged by their cancer experiences, required greater integration and formed new meaning structures. In some instances, experiences with nature could ease the inherent and profound dichotomy and help model a way forward.

4. Discussion

The wide range of cancer patients’ experiences with nature shown in the five typologies (Table 2) and the theoretical analysis bear some reflection on the richness and subtleties of cancer patients’ inner lives and struggle to maintain or in some cases shift everyday perspectives while also relocating themselves into a newly forming normality, a new-normal. It reflects their challenges to maneuver the unfolding cancer scenarios and move forward in their lives.

Many aspects of participants’ experiences with nature correspond with existing health-nature literature. Physical benefits such as rejuvenation and improved breathing were gained through park visits, walking and gardening (Table 2, Embodied). Physiological effects of experiencing nature have been documented in a review by Haluza et al. (2014) describing its potential for health promotion. Patients in the present study described stress reduction such as being able to relax and feel mentally refreshed, which parallels research on nature’s capacity to mediate mental restoration and restore attention fatigue (Kaplan, 1995). Furthermore, findings indicate that the stark clinical setting could be contrasted with personally meaningful nature objects and views outside the hospital window, which links with evidence for associations between environmental stimuli in healthcare facilities and psychological processes such as reduced patient anxiety (Dijkstra et al., 2016). However, the most striking and salient element in how cancer patients construed nature’s role in their lives emerged in this study as the experience of normalization (see Fig. 1), which corresponds with other research in the field of psycho-oncology suggesting that cancer patients can hold contradictory perspectives and goals as they strive towards a new normality that incorporates their cancer experiences (Baker et al., 2016).

Bowlby’s concept of a “secure base” (Bowlby, 1988) and Winnicott’s “intermediate area” (Winnicott, 1971) provide a framework for interpreting the underlying mechanisms of nature’s role in cancer patients’ normalization processes. While these concepts originate from developmental- and object-relations psychology, they have recently found various applications in the field of psycho-oncology (Baker et al., 2016; Isaksen et al., 2014; Lilliehorn et al., 2010; Salander, 2012). Bowlby poses that attachment to mother or caregiver (secure attachment figure) provides the child with a “secure base” from which it is safe to explore and play more distantly from her (Bowlby, 1977, 1988). Attachment theory observes that people from the “cradle to the grave” need this secure base as it enables mental elaboration when exposed to a personal threat (Bowlby, 1977). This creative elaboration takes place in what Winnicott called the “intermediate area” where inner and outer reality meet and overlap (Winnicott, 1971). It is a place hospitable to physical and psychological maneuvers that momentarily distance from here-and-now reality and uncouple life from demands and practical action. Once securely attached, life can be met with a greater capacity to explore and creatively deal with its challenges.
Lillichorn et al. (2010) describe a relevant and theoretically transferrable attachment scenario in the context of psycho-oncology. In the face of imminent threat to life, they found that cancer patients accessed a “safe haven” when feeling included in (attached to) a “helping plan” facilitated comprehensively through various contact with the healthcare system and through close proximity to healthcare staff (attachment figures) (Lillichorn et al., 2010). In parallel, the present study found that nature functioned likewise as a “facilitating environment” (Bowlby, 1977), which permitted patients’ admission to, and kinship with, an intimately familiar context in which needed comfort and security were found for exploring and normalizing the ongoing cancer experiences. Data presented in the Results section to support this interpretation describe patients’ wish to personify and identify with aspects and objects of nature resulting in a more interpersonal relationship with nature. The following examples help illustrate this proposition: ‘a mentor ... old wise man ... or woman to learn from ... one who watches us run around and just stays and is still’ [P19] and ‘cling on to something strong, and the strongest possible thing that is inside anybody, is nature’ [P14]. It was evident that once reconnected and comforted by nature’s presence, patients could better risk inner and outer explorations and take on the task of recollecting personal pasts, engaging with the present and mentally playing with imagined and possible futures, including their unanticipated endings. In some instances, nature served reconciliation by reframing and placing patients’ existence and personal mortality into nature’s ever-present cycle. In this way, challenging and distant realities had a chance to be incorporated into patients’ shifting normality. Winnicott explains that no human being is ever free from the strain of reality-acceptance, of “keeping inner and outer reality separate yet interrelated” (Winnicott, 1971, 2). This paradox, central to the idea of the “intermediate area”, emerged in the present study as oscillation between escaping the cancer reality and simultaneously moving towards it. Nature as shown in this study provided cancer patients with a secure, empathic base for inner and outer movements motivated by patients’ desire to return to normality.

4.1. Limitations and recommendations

The research findings presented here emerged from qualitative investigation with adult cancer patients; their generalizability to other populations or contexts can only be speculated. An important practical limitation of the study is its focus on understanding the psychological underpinnings of cancer patients’ phenomenal nature experiences, which uncovered their value and meaning for cancer patients. Conducting deeper investigation into how a person’s relationship with nature potentially changes from before to after cancer diagnosis can strengthen our findings. In particular detecting patterns of unconscious transitions can further credit nature’s importance in this context. Given the preliminary evidence for a beneficial nature-patient interplay, this relationship warrants continued exploration in order to meaningfully incorporate its beneficial elements into patients’ healthcare experiences. In particular, its practical applications for different patient groups, and the question of whether purposeful administration of helpful nature experiences is possible at all, should be critically examined.

4.2. Practical implications

The common framework for designing complex psychosocial interventions in cancer care requires an understanding of their individual components, active ingredients and effective doses (Craig et al., 2008) in order to move aspects of patients’ experiences into a more positive direction. While a critically important approach, the present study found a continuum of patient experiences not compatible with this framework. Patients’ important attempts to preserve and return to normality were highly individualized. Preferences and usages of nature were idiosyncratic and unpredictable suggesting that nature’s role in this normalization process cannot be fixed nor administered. Nevertheless, the findings demonstrate that opportunities for engaging with nature have great personal relevance for some cancer patients’ psychological survival process. Thus, it could be interpreted as an opportunity to widen the existing terrain of cancer care and recognize additional forms of psychosocial care offered alongside and in concert with clinical management. It has to be noted that some benefits attributed to nature engagement simply highlight patients’ demands to counterbalance the harsh and unwelcomed aspects of inescapable clinical scenarios, which they are subjected to. This particular need, while prominently arising in the context of experiences with nature, intersects with precepts of patient-centric care approaches that offer various avenues for healthcare response. A poignant example is given by MacCormack et al. (2001) who found that an active ingredient for cancer patients’ perceived benefit of both relaxation therapy and cognitive-behavioral therapy was simply that “someone cared”, and they consequently advocate for “being-with” alongside “doing-oriented” approaches in psychosocial cancer care. Such discoveries can invite cancer patients’ actual and ongoing coping processes into the epicenter of supportive care planning, which should reflect their self-reported ways of dealing with diagnosis, treatment and outlook.

Patients’ evolving healthcare demands and changing values increasingly center on the quality of their life experiences, and the quality of care they receive, within and outside the healthcare setting. In light of these developments, the contextual as well as interpersonal conditions of such healthcare environments gain significance because they shape the type and quality of experiences available to the patient. Embedding safe and appropriate opportunities for accessing those experiences with nature, which patients have good reason to value, can act powerfully on their perceptions of personal health and recovery. Exploring these aspects of cancer patients’ interchanges with nature and healthcare unintendedly reached something remarkably human and ordinary about the cancer experience that is hoped to add value to the daily being and doing activities in cancer care settings.

Conflict of interest

The Authors declare that there is no conflict of interest.

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References

CHAPTER 6 Patient-Reported Recommendations for Nature-Based Care Opportunities in the Oncology Setting

6.1 Overview
The last chapter completed the main theoretical component by describing theory development about cancer patients’ restorative nature experiences. This chapter contributes patient-reported, nature-based recommendations, which are extracted from the qualitative data set. Part two of the semi-structured interview schedule (Appendix 9) constituted two questions about participants’ nature-based recommendations for other cancer patients and their recommendations and cautionary advice for nature-based opportunities in the oncology setting. Two pre-defined categories are used to guide the extraction of relevant data. This chapter begins by stating the objective and overarching and specific study aims. Patient-reported recommendations follow in the form of a published paper, which includes prior sections describing the study design and methodology.

6.1.1 Objective
This study set out to explore cancer patients' recommendations for nature engagement based on their subjective nature experiences in order to gain practical insight for delineating relevant and translatable nature-based care and design opportunities in oncology contexts, and to develop variables to inform phase 2 investigations.

This study contributes to the following two overarching aims:
- Understand preferences and uses of nature (strategies and their own recommendations).
- Identify variables (items) to take into phase 2 based on patient-reported recommendations.

Specifically, this study aimed to:
- explore how patients value and make use of nature opportunities in the care setting,
- examine cancer patients’ recommendations and cautionary advice for beneficial nature-based experiences, and
- generate translatable knowledge for nature-based enhancements of the care setting.
Cancer Patients’ Recommendations for Nature-Based Design and Engagement in Oncology Contexts: Qualitative Research

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Abstract

Objectives: To explore cancer patients’ recommendations for nature engagement based on their subjective nature experiences and observations in the cancer setting. The rationale was to gain practical insight for delineating relevant and translatable nature-based care and design opportunities in oncology contexts. Background: Innovative cancer care services are needed to respond to growing demand and shifting healthcare needs. Engagement with nature has shown multiple health benefits and presents a promising opportunity for application in healthcare to improve outcomes. Method: Qualitative research design using content analysis was used. Eligible adults with any cancer diagnosis participated in semistructured and audio-recorded interviews. Transcribed textual data included responses to two open-ended questions querying about participants’ recommendations related to nature-based opportunities in the cancer setting. Deductive analysis used three pre-determined categories: “recommendation: features,” “recommendation: functions,” and “cautions.” Results: Twenty patients with cancer (nine female) participated. Broad recommendations incorporated (1) using nature for vital sensory stimulation and engagement, (2) using nature for personal space and freedom to enable private and social exploration, (3) using views to nature for distraction and comfort, and (4) accessing nature for physical activity and movement. Three critical factors were determined for avoiding adverse experiences: determining appropriate expenditure and resourcing, selection of appropriate nature-based design materials, and exercising caution around demanding nature engagement and harsh weather conditions. Conclusions: Cancer patients’ recommendations

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reveal the importance of engaging with nature in their experiences of health and recovery. The findings can inform planning appropriate and safe integration of beneficial nature engagement in cancer settings and support services.

Keywords
cancer, oncology, supportive care, nature, environment, design

Background
Cancer will soon impact one in three people either personally or through a relative or friend (New Zealand Ministry of Health, 2014; Stewart & Wild, 2014). The accelerated incidence and related cost require timely and effective health-care response. Innovative strategies are needed to relieve the burden associated with cancer treatment and to support those affected by cancer. Strategies should be patient-centered and focus on establishing and developing patients’ own capacity to manage disease and maintain health and well-being (Antonovsky, 1996).

The movement to integrate nature engagement opportunities into existing healthcare settings and services is gaining attention today. Recent interest in nature’s impact on human health and well-being (Hartig, Mitchell, De Vries, & Frumkin, 2014) has generated investigations across numerous research fields spanning healthcare, environment and behavior, and design (Devlin & Arneill, 2003; Haluza, Schonbauer, & Cervinka, 2014; Ulrich et al., 2008). Despite cursory understanding about the mechanisms at play, preliminary evidence from cancer populations shows various biopsychosocial benefits from contact with nature in oncology contexts. For example, Blair and colleagues (2013) evaluated a 1-year gardening intervention for adult and children cancer survivors (N = 10) showing improvements in strength, agility, and endurance in 90% of participants. Furthermore, 40% of participants showed an increase in weekly physical activity, and more than half of the participants increased their fruit and vegetable consumption (Blair et al., 2013). Research conducted by Cimprich and Ronis (2003) evaluated the efficacy of a nature-based intervention that aimed to restore attention in women with newly diagnosed breast cancer. Following weekly 120-min exposure to natural environments, the intervention group (n = 83) showed greater capacity to direct attention before and after surgery as compared to the nonintervention group (n = 74). A qualitative study with 12 advanced cancer patients investigated how the hospital environment affects patient mood and quality of life during hospital stay (Rowlands & Noble, 2008). Patients reported to value contact with the outside world in particular with nature. Participants mentioned benefiting from time spent in the hospital garden, and more unwell patients who could not go outdoors reported benefiting from viewing artwork showing scenes of nature and from window views to the outside. Provision of such opportunities to visually and physically access nature in the care environment could broaden the scope of affordable supportive care strategies for cancer patients and their families and present design possibilities to improve the oncology environment.

Healthcare environment design is known to require significant capital expense, and responsible investment policy is needed to provide optimal health outcomes and benefits related to setting design. Evidence indicates that well-designed noncancer healthcare settings render hospitals safer and more healing for patients (Ulrich et al., 2008) and can increase consumer satisfaction (Whitehouse et al., 2001). A recent purpose-built cancer research, treatment, care, and education facility in Australia costing AUD 1 billion (State Government of Victoria, 2015) was designed to include three indoor garden rooms and seven landscaped outdoor spaces accounting for 2.3% of its total floor space. It was assumed that these nature-based areas would support patients, families, and staff. Further research is needed to explore how patients value and make use of nature opportunities in
the care setting. Such evidence can ensure that this potentially compelling aspect of patients’ healthcare experiences is appropriately attended to when planning and designing oncology settings and services.

The present study forms part of a broader two-study research project, which investigated patients’ perspectives on nature’s role in their experiences of health and recovery. Study 1, reported elsewhere, used grounded theory informed methods (Corbin & Strauss, 2008) to examine the relevance of nature-based experiences when living with cancer. Findings generated a theory model (see Table 1) explaining the ways in which cancer patients engage with nature (Blaschke, O’Callaghan, Schofield, & Salander, 2017). Study 2, presented here, aimed to examine cancer patients’ recommendations and cautionary advice for beneficial nature-based experiences. The rationale was to generate translatable knowledge for nature-based enhancements of the care setting.

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 features.

**Table 1. Theory Model.**

<table>
<thead>
<tr>
<th>Core category</th>
<th>Nature plays a role in the creation of a “new normality” after cancer diagnosis</th>
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<tbody>
<tr>
<td>Theme A</td>
<td>As a familiar and unthreatening context, nature stimulates patients’ inner and outer capacities to respond and connect effectively with their support structures</td>
</tr>
<tr>
<td>Theme B</td>
<td>Once enabled and comforted through nature, patients are able to engage survival and reconstructive maneuvers and explore the personal consequences of cancer</td>
</tr>
<tr>
<td>Explanation</td>
<td>Nature’s most salient functions in this process include returning a practical sense of agency, anchoring experiences of ordinary day-to-day life, assisting the formation of new meaning structures and a new normality, easing profound tensions inherent in cancer diagnosis, and providing metaphorical material to model a way forward (e.g., compose new future narratives, reprioritize valued experiences, and activities including nature-related ones)</td>
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**Method**

A qualitative design was used to incorporate deductive content analysis (Elo & Kyngäs, 2008) and inductive analysis of unanticipated data.

**Sampling and Data Collection**

Sampling proceeded from convenience to purposive sampling with the intent to obtain rich data (maximum variation) from a diverse sample of male and female in- and outpatients with mixed diagnoses who were either in treatment or who had completed treatment at the time of recruitment. Purposive sampling responded to the ongoing analysis with the aim of finding data considered potentially missing in already collected data. For example, as descriptions of positive nature experiences and recommendations were accumulating, the interviewer (S.B.) sought participants with contrasting views. After examining 18 interviews, data were considered repetitive. Two further interviews were conducted, which confirmed that data were saturated. Semi-structured interviews were conducted either face-to-face ($n = 9$) or over the telephone ($n = 11$). Audio recordings were transcribed verbatim. Open-ended questions sought in-depth description about patients’ processes and experiences related to nature engagement. Section 1 of the interview schedule was designed to invite a broad exploration of patients’ understanding and use of nature. First, participants were asked to freely describe their own definition of nature followed by questions about their use of nature before and
after diagnosis. Subsequent questions asked about specific nature experiences at the time of receiving a cancer diagnosis and about how patients engage with nature during hospital visits and when receiving cancer treatment. The present article reports on Section 2 of the interview schedule, which constituted two questions: (1) participants’ nature-based recommendations for other cancer patients and (2) their recommendations and cautionary advice for nature-based opportunities in the oncology setting. The Consolidated Criteria for Reporting Qualitative Research guidelines (Tong, Sainsbury, & Craig, 2007) were followed. The interviewer was trained to verbally summarize and verify participants’ reports at the end of each interview, which substituted member checking to reduce participant burden.

Participants and Ethics Approval
Recruitment took place from February 2015 to June 2015. Cancer patients were approached in an Australian tertiary cancer hospital’s outpatient clinics and inpatient wards. Eligibility criteria included 18 years of age or older with any cancer diagnosis, sufficient English-language skills, and sufficiently well to complete the interview. Participation was entirely voluntary, and informed signed consent was obtained from those wishing to participate. Ethics for this study was gained from the institution’s Human Research Ethics Committee.

Data Analysis
The deductive content analysis followed Elo and Kyngäs’s (2008) recommended procedure for developing a “categorization matrix” (constrained or unconstrained) before extracting relevant data from a larger data set. In this approach, data are mined for content that corresponds with predefined categories in order to retrieve data of interest and build descriptive breadth. In accordance with the study’s aim to extract data from two specific questions only, it was deemed appropriate to use predefined categories in order to delineate data of interest. An “unconstrained” matrix was chosen because it allows for descriptive expansion based on the data retrieved, which means categories can be further built as data are analyzed. This embedded analysis procedure introduces principles of inductive coding (Corbin & Strauss, 2008) and captures, responsively, unexpected additional content arising from the data.

Figure 1 illustrates the overall research project and explains the nature of the two studies’ respective findings and their points of convergence within a closed loop analysis framework. The research project’s first analytic step (inductive) used data management software ATLAS.ti (Version 1.0.16 2013) for Macintosh (Atlas.ti) to support initial line-by-line coding of the entire data set. In this first step, five category findings emerged from text sections. In Step 2, these categories were condensed into three “major categories” describing participants’ nature-based recommendations. Deductive analysis then proceeded by identifying and sorting relevant text sections into each of the three predefined major categories. In Step 3, the extracted data were reread and additional categories were formulated inductively, which captured unanticipated detail arising from participants’ accounts. Lastly, the material was synthesized into four broad recommendations and three critical points of cautionary advice for nature engagement in oncology contexts. Interrater discussion took place throughout the coding and categorization phase when the two analysts (S.B. and C.O.) discussed the interpretations until cogent conceptualization was reached and agreed upon. The final step imported all categorized data into Microsoft Excel Version 2010 in order to reassemble and refine the categorical organization of the findings and achieve a more serviceable integration based on matured understanding of the material.

Results
Participants
Table 2 presents demographic information of a heterogeneous sample of 20 cancer patient participants (9 female). All were Australian born except two who were born in Sri Lanka. Eleven were currently undergoing treatment, 5 were
inpatients, 15 were outpatients, 8 underwent face-to-face interviews, and 12 underwent phone interviews (mean duration = 54 min).

**Recommendations**

Twelve distinct aspects of advice for nature engagement emerged relating to a range of nature features and functions which patients identified as helpful. Participants described beneficial interchanges when engaging with nature features in the cancer setting including animals, natural design features (other than water), nature art, views to nature, and contact with water specifically. Patients explained that nature takes on several helpful functions when dealing with cancer diagnosis and treatment including accompanying clinical procedures; providing desired levels of engagement (sensory and private), events, entertainment and activities, and healthcare service integration and expansion; and promoting physical activity, helpful mental activities and techniques for distraction, and social opportunities. Three of these distinct subcategories were considered particularly important by more than half of the participants ($n = 20$), namely, views to nature.
Participants described beneficial interchanges when engaging with nature features in the cancer setting including animals, natural design features (other than water), nature art, views to nature, and contact with water specifically.

Participants’ central perceptions included experiencing nature as contrasting with the clinical environment and providing raw material for various forms of engagement including physical activity, sensory stimulation, social interaction, and private (inner) explorations. Specifically, in the context of somatic engagement and social opportunities, it was noted that nature promotes patients to self-determine desired levels of interaction and privacy, thereby increasing a sense of personal control and autonomy. Participants’ detailed descriptions showed that nature affords patients distraction from unpleasant clinical conditions and helps mitigate avoidable suffering in the cancer setting. These elucidatory precepts provide a basis for the formulation of broader recommendations pertinent to care practice and design. Four recommendations centralize the expansive range of possibilities for, and purposes of, nature engagement in oncology contexts:

- Nature can be used in the oncology setting to create sensory stimulating environments, features, and activities, which offer desired levels of engagement for vitalizing patients.
- Access to nature affords patients in deprived environmental conditions, personal space, and freedom for social and private inner exploration.
- Views to nature create critical distraction from unpleasant conditions and provide needed comfort; they connect patients with a more familiar reality beyond (and outside) the setting they are confined to.
- Accessible nature environments and safe nature-based activities offer varied and compatible forms of physical activity and movement.

\( n = 12 \), desired levels of engagement (sensory and private; \( n = 11 \)), and promoting physical activity (\( n = 11 \)).

<table>
<thead>
<tr>
<th>ID</th>
<th>Sex</th>
<th>Age (Years)</th>
<th>Residence</th>
<th>Cancer Stream</th>
<th>Patient</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>P01</td>
<td>F</td>
<td>71</td>
<td>Major city</td>
<td>Gynecology</td>
<td>Inpatient</td>
<td>Receiving</td>
</tr>
<tr>
<td>P02</td>
<td>F</td>
<td>24</td>
<td>Major city</td>
<td>Bone and soft tissue</td>
<td>Outpatient</td>
<td>Completed</td>
</tr>
<tr>
<td>P03</td>
<td>F</td>
<td>29</td>
<td>Inner regional</td>
<td>Bone and soft tissue</td>
<td>Outpatient</td>
<td>Completed</td>
</tr>
<tr>
<td>P04</td>
<td>F</td>
<td>31</td>
<td>Inner regional</td>
<td>Lower GI</td>
<td>Outpatient</td>
<td>Receiving</td>
</tr>
<tr>
<td>P05</td>
<td>M</td>
<td>70</td>
<td>Major city</td>
<td>Lung</td>
<td>Outpatient</td>
<td>Receiving</td>
</tr>
<tr>
<td>P06</td>
<td>F</td>
<td>39</td>
<td>Major city</td>
<td>Bone and soft tissue</td>
<td>Outpatient</td>
<td>Receiving</td>
</tr>
<tr>
<td>P07</td>
<td>F</td>
<td>53</td>
<td>Major city</td>
<td>Skin</td>
<td>Outpatient</td>
<td>Receiving</td>
</tr>
<tr>
<td>P08</td>
<td>F</td>
<td>59</td>
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<td>Bone and soft tissue</td>
<td>Outpatient</td>
<td>Receiving</td>
</tr>
<tr>
<td>P09</td>
<td>M</td>
<td>31</td>
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<td>Bone and soft tissue</td>
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<td>Receiving</td>
</tr>
<tr>
<td>P10</td>
<td>M</td>
<td>67</td>
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<td>Hematology</td>
<td>Outpatient</td>
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</tr>
<tr>
<td>P11</td>
<td>M</td>
<td>59</td>
<td>Outer regional</td>
<td>Hematology</td>
<td>Outpatient</td>
<td>Completed</td>
</tr>
<tr>
<td>P12</td>
<td></td>
<td></td>
<td>Withdrawn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P13</td>
<td>M</td>
<td>54</td>
<td>Inner regional</td>
<td>Hematology</td>
<td>Outpatient</td>
<td>Completed</td>
</tr>
<tr>
<td>P14</td>
<td>M</td>
<td>60</td>
<td>Major city</td>
<td>Hematology</td>
<td>Outpatient</td>
<td>Receiving</td>
</tr>
<tr>
<td>P15</td>
<td>F</td>
<td>76</td>
<td>Major city</td>
<td>Hematology</td>
<td>Outpatient</td>
<td>Completed</td>
</tr>
<tr>
<td>P16</td>
<td>M</td>
<td>74</td>
<td>Major city</td>
<td>Hematology</td>
<td>Outpatient</td>
<td>Completed</td>
</tr>
<tr>
<td>P17</td>
<td>M</td>
<td>71</td>
<td>Major city</td>
<td>Hematology</td>
<td>Outpatient</td>
<td>Completed</td>
</tr>
<tr>
<td>P18</td>
<td>M</td>
<td>62</td>
<td>Major city</td>
<td>Lower GI</td>
<td>Outpatient</td>
<td>Receiving</td>
</tr>
<tr>
<td>P19</td>
<td>M</td>
<td>49</td>
<td>Major city</td>
<td>Hematology</td>
<td>Inpatient</td>
<td>Receiving</td>
</tr>
<tr>
<td>P20</td>
<td>M</td>
<td>27</td>
<td>Major city</td>
<td>Urology</td>
<td>Inpatient</td>
<td>Receiving</td>
</tr>
<tr>
<td>P21</td>
<td>F</td>
<td>49</td>
<td>Major city</td>
<td>Breast</td>
<td>Outpatient</td>
<td>Completed</td>
</tr>
</tbody>
</table>
Specifically, in the context of somatic engagement and social opportunities, it was noted that nature promotes patients to self-determine desired levels of interaction and privacy, thereby increasing a sense of personal control and autonomy.

Cautionary Advice

Participants identified eight aspects related to nature engagement in the cancer setting, which they considered with caution in order to avoid any adverse experiences. These included allergies, appropriateness, healthcare investment, negative trigger, not valued/not interested, overwhelm, safety, and sensory overstimulation. At least a third of the participant sample considered two factors important, namely, appropriateness and safety. Concerns about appropriateness were raised by seven participants and mainly focused on financial spending and suitable design materials. Some patients regarded artificial nature as a suitable and safe design opportunity, while others found its fake qualities entirely inappropriate. Six participants voiced their concerns about safety. Allergic reactions, toxic plant material, and contact with bacteria were among central concerns; however, some patients downscaled the perceived threat when considering their contact with nature in the care setting being no greater risk than their usual everyday exposure to nature. In summary, participants offered following cautionary advice to avoid adverse nature engagement in cancer settings:

- Appropriate healthcare expenditure and resourcing need to recognize staff time investment and allocation of healthcare space for nature environments, features, and activities.
- Avoid undesirable and demanding design materials that can potentially cause strong dislike, overstimulation, or overwhelm.
- Safety is of paramount concern when engaging with nature in the cancer setting; attention must be given to aspects such as allergy inducing and toxic materials, slippery or otherwise challenging surfaces, and exposure to harsh weather conditions.

Table 3 summarizes cancer patients’ salient advice for nature-related engagement. A substantial amount of synthesized raw data is made available to substantiate the main findings and to allow swift access to patients’ key messages and can be found in the Online Supplementary Material.

Discussion

In regard to nature and its integration into oncology contexts, participants described complex interactions of environments, features, and activities that constitute their day-to-day realities and their lived cancer experiences. Interestingly, patients’ nature recommendations strongly resemble common human needs, which appear inadequately attended to when the healthcare environment is perceived unsafe or impoverished. These ordinary concerns cannot be disregarded; they arise with utmost importance to the patient as they frame their inner reality and the outer environment in which care is given and received. The present findings can be formalized by connecting to the theory of infant and childhood development (Baker et al., 2016; Salander, 2012), which provides insight into the intrapsychic underpinnings of the ways cancer patients engage with nature (Blaschke, et al., 2017). To this end, Winnicott (2005) writes about the importance of environmental provision in the caring of children, which parallels Nightingale’s (1992) critical consideration of adequate environmental provision in the nursing care and management of patients. Winnicott (2005) explains that the “environmental function” includes “handling, holding, and object-presenting” by the caregiver who provides the conditions and raw material for the infant’s construction of a “potential space” in which the child is enabled to creatively play and develop. From this place of safety and enrichment, the child can begin to live creatively. Plausibly, comparable experiences may occur for adults when experiencing nature. If caring for the patient includes the responsibility to bring the
patient into contact with environments, elements, and activities that move the patient forward into a more integrated and healthful future, then safe exposure to and engagement with nature may widen the scope of such recovery experiences. The proposed patient-identified nature recommendations and cautionary advice emerged as an interweaving of patient needs and their own innovative responses to them. Their accounts demonstrate that optimal cancer care can benefit from environmental factors, which communicate safety, controllability, and vital sensory nurturance and allow less threatening entry and passage through the healthcare system.

Table 3. Cancer Patients’ Nature-Related Recommendations and Cautionary Advice.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of Informants</th>
<th>Examples Used by Participants (P) Informed by Participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendation features</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animals</td>
<td>5</td>
<td>Bird calls (P01), company and contact (P07)</td>
</tr>
<tr>
<td>Natural design features (other than water)</td>
<td>10</td>
<td>Green walls (P07), nature objects (P03)</td>
</tr>
<tr>
<td>Nature art</td>
<td>3</td>
<td>Paintings of flowers (P03)</td>
</tr>
<tr>
<td>Views to nature</td>
<td>12</td>
<td>View to the outside world (P14)</td>
</tr>
<tr>
<td>Contact with water specifically</td>
<td>9</td>
<td>Water is very relaxing (P08)</td>
</tr>
<tr>
<td>Recommendation functions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accompanying clinical procedures</td>
<td>6</td>
<td>Being wheeled up on beds (into a garden; P10)</td>
</tr>
<tr>
<td>Desired engagement (sensory and private)</td>
<td>13</td>
<td>A living garden, feel the nature, and feel the fresh air (P09)</td>
</tr>
<tr>
<td>Events, entertainment, and activities</td>
<td>7</td>
<td>Elements of real life brought into the hospital</td>
</tr>
<tr>
<td>Healthcare service integration and expansion</td>
<td>2</td>
<td>(Garden) advertised a lot more (P03)</td>
</tr>
<tr>
<td>Helpful mental activities and techniques</td>
<td>6</td>
<td>Admiration and positive thoughts, association with life (P07)</td>
</tr>
<tr>
<td>Physical activity promotion</td>
<td>11</td>
<td>Walking around, seeing what is flowering (P03)</td>
</tr>
<tr>
<td>Social opportunities</td>
<td>6</td>
<td>Different context for conversations and connections (P03)</td>
</tr>
<tr>
<td>Cautions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allergies</td>
<td>4</td>
<td>Pollens or seeding grasses, plantain (P10)</td>
</tr>
<tr>
<td>Appropriateness</td>
<td>7</td>
<td>(Artificial plants) find them deathly, tokenistic (P06)</td>
</tr>
<tr>
<td>Healthcare investment</td>
<td>3</td>
<td>Cost and time, nurses should not be wasted (P05)</td>
</tr>
<tr>
<td>Negative trigger</td>
<td>3</td>
<td>Lying in bed, longing to be part of it (P14)</td>
</tr>
<tr>
<td>Not valued/not interested</td>
<td>1</td>
<td>In a hurry, appointments, and might not relate to nature (P05)</td>
</tr>
<tr>
<td>Overwhelm</td>
<td>3</td>
<td>(Animals) too much for me when I’m sick (P06)</td>
</tr>
<tr>
<td>Safety</td>
<td>6</td>
<td>Cuts and scratches, soil bacteria and molds, and fungi (P06)</td>
</tr>
<tr>
<td>Sensory overstimulation</td>
<td>3</td>
<td>Avoid any overpowering scents (P06)</td>
</tr>
</tbody>
</table>
These opportunities are described as tangible instances, which affirm and enhance a sense of momentary aliveness in the face of despondency.

Interestingly, patients’ nature recommendations strongly resemble common human needs, which appear inadequately attended to when the healthcare environment is perceived unsafe or impoverished.

The findings further suggest a correspondence between benefit and risk. The intensity of engagement and, in particular, patients’ individual relationship with certain forms of nature engagement were associated with the degree to which benefit or risk was conceptualized. For example, participants in this study repeatedly requested nature opportunities already known to benefit cancer patients such as sensory stimulating environments (Andritsch et al., 2013; Pascal, 2010), physical activities (Blair et al., 2013; Ray & Verhoef, 2013; Sherman, Varni, Ulrich, & Malcarne, 2005; Spees, Joseph, Darragh, Lyons, & Wolf, 2015), and creative outlets (Spees et al., 2015; Unruh, Smith, & Scammell, 2000), while, at the same time, warning that such engagement can cause overstimulation and even physically overwhelm when approached too intensively. Similarly, patients reported using nature for positive distraction and relief from negative states such as boredom, strain, and anxiety. Simultaneously, they considered these nature encounters to potentially trigger negative experiences.

Future research is needed to determine the best solutions for translating patients’ nature recommendations into practice and to evaluate the impacts. Cancer patients’ overall care priorities cannot be inferred by the study’s findings nor can their accounts be considered exhaustive or complete. They merely reflect, and contribute to, the common record of cancer experiences, which offer insight into patient needs and suggest innovative responses in relation to integrating nature into the oncology environment. A quantitative survey could potentially follow-up on this study’s findings to check their applicability across different cancer care sites and a greater sample of cancer patients (e.g., rural vs. urban patients).

If caring for the patient includes the responsibility to bring the patient into contact with environments, elements, and activities that move the patient forward into a more integrated and healthful future, then safe exposure to and engagement with nature may widen the scope of such recovery experiences.

Practical Implications

Patients consistently emphasized their highly individualized interchanges with healthcare environments and submitted compelling reason for responsive design that allows for scaling levels of engagement and, importantly, disengagement according to patients’ momentary and shifting needs. Based on these findings, following practical examples were given by participants. Natural materials such as natural timber and wall colors, fish tanks, and nature objects can be added to existing design to “relieve the stark atmosphere (P18).” Purposefully arranging indoor seating and inpatient beds as to utilize available window views can encourage patients and staff to make greater use of these opportunities (P14, P16, and P18). Where appropriate, and with caution, indoor planting can be added with potted plants and green walls (P07, P08, P18, and P21). In areas where live plants are not permissible, high-quality artificial plants can be installed at low cost and with minimal maintenance requirements (P15). Patients recommended collaboration with volunteer services to provide contact with therapy animals and opportunities for assisted walks outside the hospital building and accompanied visits to hospital gardens and courtyards (P02, P07, P10, and P17).

Digital devices with interactive nature displays and sounds including virtual reality headsets can be offered during clinical procedures to distract patients and assist with anxiety (P02, P05). Furthermore, patients reported using technology to listen to nature sounds to ameliorate sleep disturbances (P09, P13). An advantage of such technology-based nature experiences is the ability to appropriately scale visual, sound, and tactile intensities.
Clear signage and staff education about the availability and location of hospital indoor and outdoor nature areas can increase utilization of these spaces and offer an opportunity to promote physical activity and social interaction during hospital visits (P02, P03, P07, P11, and P14).

**Conclusion**

This study addresses an important and timely aspect of healthcare design: It identifies key patient-reported recommendations and cautionary advice to guide the provision of beneficial and safe nature engagement opportunities in oncology practice and design. It shows that appropriate and responsive integration of nature into the care setting can support patients’ efforts to secure a basic and unburdened place to operate from when subjected to, and becoming dependent on, the healthcare environment. From a practical perspective, our results allow access to synthesized and practically useful findings about this specific aspect of cancer experiences that may enrich patients’ daily lives and be taken up by stakeholders in charge of future cancer care design and innovation.

**Implications for Practice**

- Cancer patients report benefiting from various forms of nature engagement in the care setting including window views, nature art, hospital outdoor spaces, artificial plant installations, and technology-based nature experiences.
- Critical health and safety factors include attention to appropriate design materials such as nonslip surfaces, shelter from harsh weather conditions, avoiding exposure to soil bacteria for patients at high risk of infection, sensory overstimulation, and allergy inducing materials.
- Patients emphasize their highly individual interactions with nature and recommend opportunities that allow for varying levels of nature engagement, which are responsive to their shifting needs.
- Healthcare designers aiming to improve existing design and patient experience may consider artificial plant materials as a suitable design alternative where live nature materials are clinically unsafe.
- Our findings may inspire cancer patients themselves to seek and benefit from opportunities to engage with nature in home and clinical environments.

**Authors’ Note**

This study was approved by the institution’s Human Research Ethics Committee.

**Declaration of Conflicting Interests**

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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**Supplemental Material**

Supplementary material for this article is available online.

**References**


<table>
<thead>
<tr>
<th>Type</th>
<th>Informed by</th>
<th>Key terms and phrases used by study participants [P]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommendation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>‘Features’</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animals</td>
<td>01, 04, 07, 08, 15</td>
<td>bird calls [P01]; pets are ... as natural as you can get [P04]; my dog ... level of company and contact [P07]; fish are very peaceful [P08]; watching small animals [P15]</td>
</tr>
<tr>
<td>Natural design features (other than water)</td>
<td>01, 03, 07, 08, 14 – 18, 21</td>
<td>colours ... different greens; opened up; like a glasshouse window [P01]; open windows; an outdoor space inside [P02]; big windows; open view; nature objects [P03]; green walls [P07]; backrest; pot plants; a hospital in the park [P08]; sculpted sort of area [P14]; not so ‘pretty’ but attractive; artificial plants, very good ones [P15]; glass walls; etched scenes; access arrangements for ... various disabilities; open area in close proximity [P16]; more comfortable seating; covering over the top; bit more cheery [P17]; accessible; fake plants ... relieve the stark atmosphere; fish tanks [P18]; greened up [P21]</td>
</tr>
<tr>
<td>Nature art</td>
<td>01, 03, 15</td>
<td>paintings ... with wildlife; not tight scripted [P01]; beautiful big pictures ... paintings of flowers [P03]; posters of different scenes; a tree ... easy to think about; just normal, ordinary, lovely flowers; pictures all over the place. “Take your mind off it mum!” [P15]</td>
</tr>
<tr>
<td>Views to nature</td>
<td>01 – 03, 06 – 08, 10, 11, 14, 16, 17, 19</td>
<td>[nature] better than looking out on buildings [P01]; nice outlook [P03]; blind open 24 hours a day; a real thing; a level that I could handle being ill; views are actually critical [P06]; prefer just to sit and look out of the window [P08]; against the window ... part of therapy [P10]; treetop level [P11]; view on the real world; moonlight [P14]; mind off of what is actually happening; something of interest to look at [P16]; looking at the sky often [P19]</td>
</tr>
<tr>
<td>Contact with water specifically</td>
<td>07 – 10, 13 – 16, 20</td>
<td>peace and tranquillity of sitting by a river [P07]; water is very relaxing [P08]; running water does it [P10]; nice place for me would be water; watch water lapping over; serenity [P14]; lakes and rivers or streams are restorative visual aids [P15]; running water ... gives people a better feel; space with little or no ... work [P16]</td>
</tr>
<tr>
<td><strong>Recommendation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthcare service integration and expansion</td>
<td>01, 02, 05, 10, 16, 18</td>
<td>looked like you had trees over you [during MRI] [P02]; music ... a video or documentary [P05]; being wheeled up on beds ... running water and a light filtering through the trees [P10]; set up so ... look out the window [P16]; look out onto a garden [P18]</td>
</tr>
<tr>
<td>Helpful mental activities, techniques</td>
<td>01, 02, 04, 06 - 10, 14, 16 - 18, 21</td>
<td>contentment; more freedom; [P02]; sort of therapy; consumed by it; in the park ... I'm independent [P04]; a pause in the garden; soothing, nurturing, renewing thing; live and cycle; see the passage of time; touchstone; regardless of your religious background; reconstitute my place in the world; normalizing and emotional processing [P06]; visual impression: texture and touch and smell [P07]; a living garden; feel the nature; feel the fresh air [P09]; peace and surrender; something there with you; on their feet, self-reliant as quickly as possible; breathe in deeper; aroma; everything grows, everything keeps going [P10]; pleasant environment [P16]; fresh air; greenery; a sunny day [P17]; seeing something grow; smell the fresh air [P18]; another living being; plants give off oxygen; invigorated [P21]</td>
</tr>
<tr>
<td>Physical activity promotion</td>
<td>02, 05 – 07, 10, 15, 17</td>
<td>nurses took me out ... favourite times at the hospital [P02]; Videos; DVDs [P05]; gardening magazines; volunteers [P06]; guide dog; butterfly enclosure; elements of real life ... into the hospital [P07]; experiential activity; “Go and do it! Be part of it!” [P10]; time that you got up and out! [P15]; wheel people out [P17]</td>
</tr>
<tr>
<td>Social opportunities</td>
<td>02, 07, 09, 13, 14, 18</td>
<td>switch off and have all the benefits [P02]; visual perception or stimulus; help occupy the mind; admiration and positive thoughts; association with life [P07]; an app... rainy sound ... ‘ocean’ and the ‘forest’ [P09]; app with the rain [P13]; nice to reflect and think; eases your attention [P14]; get some perspective [P18]</td>
</tr>
<tr>
<td>01 – 03, 05, 07, 08, 10, 11, 14, 19, 20</td>
<td>breakfast outside; [when] wasn’t on Chemo ... always go outside; being in nature [P02]; walking around ... seeing what is flowering; picking flowers [P03]; go and sit in the garden [P07]; walk out to the front door [P08]; in hospital for 17 days ... go walking or be in nature. That is all I want to do! [P19]; get up and go for walk [P20]</td>
<td></td>
</tr>
<tr>
<td>03, 06, 10, 11, 14, 16</td>
<td>flowers ... engaged medical practitioners; different context for conversations and connections; space with other patients or professionals [P03]; working together in a garden; having emotional conversation; more private and separate [P06]; activities; get the communication going [P10]; patients and their ... carers have somewhere; have access [P11]; easier to chat; bit of the outside world; talk to people [P14]; own space; things that you want to say between yourselves [privacy] [P16]</td>
<td></td>
</tr>
</tbody>
</table>

### Caution

#### Allergies

#### Appropriateness

#### Healthcare investment

#### Negative trigger
<table>
<thead>
<tr>
<th>Theme</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not valued / not interested</td>
<td>10, 11, 18, 21</td>
</tr>
<tr>
<td></td>
<td>02, 06, 07, 10, 16, 17, 21</td>
</tr>
<tr>
<td>Overwhelm</td>
<td>outside ... medication. ... spills [P02]; [artificial plants] find them deathly ... tokenistic; [gardening] not in the hospital context ... with neutropenia; [modern garden design] doesn’t really fulfil that peaceful respite quality; big show [P06]; [artificial plants] a little bit cheated! [P07]; [artificial plants] defeating the purpose of this being part of nature; wouldn’t have a vastly fake turf [P10]; these places can start to look ... pretty ordinary [P16]; wasn’t very pleasant ... sitting on cold concrete [P17]; don’t feel nice when you’re sitting next to a plastic plants; cost more than real plants [P21]</td>
</tr>
<tr>
<td>Safety</td>
<td>05, 07, 16</td>
</tr>
<tr>
<td>Sensory overstimulation</td>
<td>cost and time; nurses should not be wasted [P05]; just be an adjunct; dollar ... has to be spent, where it is going to help most; can’t lose sight [P07]; maintained in pristine condition; any spare money ... into treatment and cure; availability of space [P16]</td>
</tr>
<tr>
<td></td>
<td>03, 07, 14</td>
</tr>
<tr>
<td></td>
<td>experience across their lifetime; certain plants or flowers ... trigger ... memories for people [P03]; tiny tinge of regret ... those things that you don’t do ... not exposed to anymore [P07]; want to be part of it because you are lying in bed ... longing to be part of it [P14]</td>
</tr>
<tr>
<td></td>
<td>05</td>
</tr>
<tr>
<td></td>
<td>people are in a hurry; get to the appointments; walk past and not even take notice; might not relate to nature [P05]</td>
</tr>
<tr>
<td></td>
<td>04, 06, 17</td>
</tr>
<tr>
<td></td>
<td>time to get back to the hospital; hospital is definitely your safe haven; pain come on, you start to panic [P04]; [animals] too much for me when I’m sick; get some shade ... out of the wind ... just be a bit physically overwhelming [P06]; if you are unwell, stay in bed [P17]</td>
</tr>
<tr>
<td></td>
<td>02, 06 - 10</td>
</tr>
<tr>
<td></td>
<td>slipped on the floor when it was wet; mosquitoes; bees [P02]; cuts and scratches when I’m gardening; soil bacteria and molds and fungi [P06]; reduced immunity [P07]; bacteria ... subjected to that anyway [P08]; snakes; insects; small creatures [P09]; safety would be paramount; lot of them are frail [P10]</td>
</tr>
<tr>
<td></td>
<td>05, 06, 15</td>
</tr>
<tr>
<td></td>
<td>In-your-face; needs to be thought out carefully [P05]; avoid any overpowering scents [P06]; paintings ... complex worlds ... requires a certain level of energy to engage [P06]; don’t want to look at weird things [abstract art] [P15]</td>
</tr>
</tbody>
</table>

P = participant
CHAPTER 7 Questionnaire Survey Evaluation of a Nature-Based Intervention in the Oncology Setting

7.1 Overview
The previous chapter introduced the first practical component and presented cancer patients’ own recommendations for nature-based supports in the oncology setting. This chapter reports on a design intervention that used life-like (artificial) plant material displays and installations with the aim to enhance the atmosphere in an oncology waiting room. A questionnaire survey (Appendix 16) was designed to assess responses to the design intervention. The first part of this chapter introduces the motivation and study objective. Part two presents all components of the study as a published paper, which includes discussion of the study design and methodology as well as reporting and discussion of the findings.

7.1.1 Study Motivation and Objective
This study was motivated by a series of environmental interventions at Peter Mac in 2015, which aimed at improving patient experience. The “Green Features Intervention” was actioned as part of this PhD project and aimed to transform the oncology specialist clinic waiting room by introducing artificial plant features and installations, and to put theoretical ideas to a practical test. An anonymous self-administered questionnaire investigated patient, staff, and visitor responses to the intervention and evaluated its impact on waiting experience and the work environment.

The overarching aim was to supplement emerging insights from phase 1 by field-testing a nature-based intervention in the oncology setting. Practical testing and observation promised to contribute to the thesis by providing additional quantitative data in order to understand preferences and uses of nature (strategies and their own recommendations, and to identify variables [items] to take into phase 2 based on patient-reported recommendations.

Specifically, the study aimed to:
• understand if and how patients, staff, and visitors value the availability of these types of green features in the oncology care setting,
• gain insight into patient use of nature and their nature preferences (real versus artificial),
• assess the effectiveness and appropriateness of green feature interventions in the oncology setting, and
• generate further understanding to supplement the preceding theoretical insights and inform phase 2 of the research project.
Abstract

Objective: To investigate patient, staff, and carer responses to an environmental intervention in an oncology clinic waiting room and evaluate the acceptability of artificial plant materials. Design: Postintervention: Cross-sectional survey study. Setting: Oncology outpatient clinic waiting room located in a metropolitan comprehensive cancer center in Australia. Main Outcome Measure: Observer ratings of perceived qualities and effects of lifelike (fake) plants while spending time in the waiting room. Participants: Convenience sample (N = 143) consisted of 73 cancer patients, 13 staff, 52 carers, and 5 “others” aged between 24 and 89 years (M = 56, SD = 14.5). Intervention: Artificial plant arrangements, hanging installations, two movable green walls, and one rock garden on wheels placed throughout the outpatients’ clinic waiting room. Results: Eighty-one percent (115/142) of respondents noticed the green features when first entering the waiting room and 67% (90/134) noticed they were artificial. Eighty-one percent (115/142) indicated “like/like a lot” when reporting their first reaction to the green features. Forty-eight percent (68/143) were positively affected and 23% (33/143) were very positively affected. Eighty-one percent (110/135) agreed/strongly agreed that “The greenery brightens the waiting room,” 62% (80/130) agreed/strongly agreed that they “prefer living plants,” and 76% (101/133) agreed/strongly agreed that “lifelike’ plants are better than no plants.” Comments included mostly positive appraisals and occasional adverse reactions to artificial plants. No significant differences were found between patients’, staff, and carers’ reactions. Conclusions: The environmental intervention positively impacted patients’, staff, and carers’ perceptions of the oncology waiting room environment. Patients, staff, and carers mostly accepted artificial plants as an alternative design solution to real plants.

Keywords
oncology waiting room, supportive care, environmental design, questionnaire

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Demand for new cancer care facilities and improving old ones requires attention to shifting patient values that increasingly prioritize patient experience and quality of life. Today, designers must consider how the built environment affects users’ well-being and the quality of care provided in and through these environments (Andritsch et al., 2013). Architects and allied designers, however, are not the single determinants of the care setting’s qualities and atmosphere. Its various inhabitants including administration staff, nurses, and volunteers are well positioned to pay attention to ambient and contextual characteristics of their workplace and create enhancements by implementing small design gestures at minimal cost. One controllable element, which is gaining scientific interest as well as common popularity, relates to the opportunities and enabling factors for nature contact within day-to-day physical environments (Maller, Townsend, Pryor, Brown, & St Leger, 2006). This aspect of human health has been studied in numerous contexts and has produced a body of literature pointing to a range of health benefits resulting from nature contact (Bowler, Buyung-Ali, Knight, & Pullin, 2010; Bratman, Hamilton, & Daily, 2012; Drahota et al., 2012; Frumkin, 2001; Haluza, Schonbauer, & Cervinka, 2014). The discourse outlines a range of opportunities for beneficial engagement with nature including, for example, nature contact in the workplace (Largo-Wight, Chen, Dodd, & Weiler, 2011), nature views in aged care facilities (Rowlands & Noble, 2008), exposure to real and artificial nature in radiology waiting rooms (Beukeboom, Langeveld, & Tanja-Dijkstra, 2012), and access to green space for urbanites (van den Berg, Maas, Verheij, & Groenewegen, 2010). While some examples extend to nonhealthcare contexts, the findings bear relevance on the considerations for supportive and health promoting exchanges with the built healthcare environment, especially in regard to those settings patients, staff, and carers need to regularly interact. Edvardsson, Sandman, and Rasmussen (2006) provide insight into the transactional relationship between occupant and environment when reporting on environmental aspects of the care experiences of 17 cancer patients, their significant others, and staff. They found that the physical oncology environment itself can influence experiences of care positively or negatively and suggest not confining nursing care to “nurse–patient relationships, but of using the therapeutic potential of the total environment in nursing care” (Edvardsson, Sandman, & Rasmussen, 2006, p. 188). In this context, Nightingale’s instructions to those in charge of the health of others bespeak of this important interchange between nursing and the care environment: “What nursing has to do . . . is to put the patient in the best condition for nature to act upon him” (1992, p. 133).

Aspects of Nightingale’s nursing ethos are being rediscovered in healthcare design literature today confirming a beneficial interplay between healthcare environments and health outcomes. The literature reports on design characteristics that enable patient safety, clear wayfinding, privacy, social engagement, and sensory enrichment among others (Devlin & Arneill, 2003; Dijkstra, Pieterse, & Pruyn, 2006; Drahota et al., 2012; Ulrich et al., 2008; van den Berg, 2005). In regard to health outcomes from nature exposure, studies of mixed patient populations have shown shortened inpatient stays (Ulrich, 1984); reduced blood pressure, heart rate (Park & Mattson, 2009), anxiety (Katcher, Segal, & Beck, 1984); and pain during medical procedures (Diette, Lechtzin, Haponik, Devrotes, & Rubin, 2003). Attempts have been made to deconstruct and define the beneficial elements of nature contact (Dijkstra, Pieterse, & Pruyn, 2008) and to categorize different forms of engagement with nature more generally (Keniger, Gaston, Irvine, & Fuller, 2013). However, without deeper knowledge of the underlying mechanisms, it remains unclear how much or what type of nature contact produces best outcomes. In particular, limited research is available on the effects of different plant feature materials specifically used in oncology waiting rooms. Preliminary investigations into this topic show positive health outcomes from exposure to both real and artificial nature in a radiology waiting room, showing that patients exposed to both conditions reported lower stress levels compared to a control condition (Beukeboom et al., 2012). Relatedly, a workplace study suggests that the type of nature contact (real vs. artificial) does matter by finding a greater association between employee
stress reduction and direct nature contact (outdoors) in the workplace as compared to exposure to nature photography or nature sounds in the workplace (Largo-Wight et al., 2011).

Drawing on theory from evolutionary biology (Wilson, 1984), some researchers hypothesize that humans have a biological readiness to quickly recover from stress when viewing nature (Frumkin, 2001; Saadatmand et al., 2013; Ulrich, 1993; Ulrich, Lundén, & Eltinge, 1993). Exposure to nature is thought to enable relaxation and deactivate flight–fight–freeze responses, thereby promoting activation of the parasympathetic nervous system (Orians & Heerwagen, 1992; Ulrich et al., 1991). This might have particular relevance for reducing stress burden in oncology waiting rooms where patients and carers often spend long periods of time, sometimes anxiously awaiting results. Patients and carers can experience symptoms of stress (Edwards & Clarke, 2004) and may have unmet care needs when confronting life challenges related to diagnosis and treatment (Sanson-Fisher et al., 2000). Even though direct nature contact is preferable to reduce stress as shown by Largo-Wight, Chen, Dodd, and Weiler (2011), real plants with soil are costly to maintain and can be problematic in healthcare settings because of associated bacterial transmission to immune-compromised patients (Sydnor & Perl, 2011). Therefore, it is important to gain a better understanding of the effects and acceptability of artificial nature materials as a safe alternative for beneficial nature contact in oncology settings.

The present study reports on patient, staff, and carer responses to a nature-based intervention in a metropolitan comprehensive cancer center in Australia. A design initiative was launched to enhance the specialist clinic waiting room with the use of artificial “green features.” The purpose of the intervention was to imbue the oncology waiting room with nature-like qualities and provide an element of sensory enrichment to promote calmness and positive distraction.

**Method**

**Setting**

The waiting room is located on ground floor of a comprehensive cancer center and serves the daytime specialist clinic staffed Monday to Friday, 9:00 a.m. to 5:00 p.m. The four clinics (A–D) are separated from their respective waiting room spaces by receptionist desks. The entire waiting room seats approximately 130 adults and is an interactive open-plan space and includes a children’s play area (see Figure 1). Patients are divided into eight tumor streams, which alternate in morning and afternoon clinics. On average, 1,000 cancer outpatients are examined and treated in the clinics weekly.

![Figure 1. Layout and configuration of the outpatient clinic waiting room.](image-url)
**Intervention**

The intervention comprised two movable green walls covered in plants (2 m high × 1.2 m wide and 2 m high × 1.5 m wide, double sided), six hanging plant displays, one movable rock garden, and 12 tabletop plant arrangements. They were composed of mostly green foliage and few colored flowers, as displayed in Figure 2.

**Measures, Data Collection, and Analysis**

The authors developed a purpose-built questionnaire to gain insight into waiting room occupants’ perceptions and experiences immediately following the environmental changes. Demographic information was collected and included age, patient or caring role status, place of residence, and frequency of outpatient visits. Two closed-ended questions (yes/no) asked (a) if respondents noticed the green features when first arriving and (b) if they noticed that they were artificial plants. A 5-point Likert-type scale assessment was included to evaluate initial reactions when first encountering the changed waiting room, the effect the intervention had on occupants while waiting, and respondents’ personal nature preferences. Occupants’ perceptions of the waiting room atmosphere and the added green features were measured using a 6-item bipolar adjective scale, which asked respondents to rate the green features 1–10 on paired descriptors using a visual analogue scale (100 mm), for example, unattractive–attractive. The questionnaire concluded with an open-ended question to invite further comments.

The questionnaire was first piloted with five patients in the waiting room using a think aloud process to evaluate comprehension, retrieval, judgment, and response to the questions (Collins, 2003). Following this cognitive testing procedure, small modifications were made to improve clarity of layout and language before placing the questionnaire in the waiting room between May 3 and July 2, 2015, next to a visibly marked return box. Participation was voluntary, and completed questionnaires were collected weekly by “SB” (first author).

Data were tabulated using Microsoft Office Excel 2010 for Mac and analyses conducted using IBM SPSS.23 for Mac (IBM, 2013). All relevant variables were screened for normality. Descriptive statistics were conducted on demographic variables, material preferences (real and artificial nature); noticeability of the intervention upon arrival; and its impact, effects, and respondents’ descriptions of the green features. Results are expressed as frequencies and percentages of responses to each question; means and standard deviations were calculated where appropriate. Open-ended comments were grouped into salient categories and subjected to content analysis.

Figure 2. Green Wall 1 (top left), rock garden on wheels (top right), tabletop arrangements (center), Green Wall 2 front (bottom left), and back (bottom right).
Results

Participants

One hundred and forty-four questionnaires were returned between May 3 and July 2, 2015. One questionnaire completed by a patient and carer together was excluded. Respondents (n = 143) included 73 patients, 13 staff, 52 carers, and 5 identified as “other.” Ninety-seven (68%) respondents were female, 45 (32%) male, and 1 chose not to report gender. Ages ranged between 24 and 89 years (M = 56, SD = 14). Eighty-four were from inner-city areas, 17 inner regional, and 13 outer regional. One hundred and twelve respondents had visited the hospital more than once, and for 15 respondents, it was the first visit. Demographics are presented in Table 1.

Assessment of First Reaction to the Green Features and the Effects on Waiting Room Users

Eighty-one percent (115/142) of respondents noticed the green features when first arriving to the waiting room and 19% (27/142) did not notice them. Sixty-seven percent (90/134) noticed the plants were artificial and 33% (44/134) believed they were real. Table 2 presents a listing of 10 items rated on a 5-point Likert-type scale relating to nature preferences and perceived effects of the green features. Eighty-one percent (115/142) reported their first reaction to the green features was to like/like them a lot. Forty-eight percent (68/143) were positively affected and 23% (33/143) were very positively affected. The statement “The greenery brightens the waiting room” produced the strongest positive response with 81% (110/135) either agreeing or strongly agreeing. “The greenery makes me feel more normal” elicited the most ambivalent response with 35% (46/130) neither agreeing nor disagreeing. Strong agreement was found about the greenery having a relaxing effect with 64% (84/132) agreeing/strongly agreeing to this statement; however, 28% (38/132) indicated neither agreement nor disagreement about the greenery having a relaxing effect on them. Sixty-two percent (80/130) agreed/strongly agreed that they prefer living plants; however, 76% (101/133) agreed/strongly agreed with the statement, “Lifelike (not real) plants are better than no plants.”

Assessment of Green Feature Qualities

The highest scoring negative descriptor of the green features was found between “busy and relaxing.” Although the scale was positively weighted toward a stronger “relaxing” effect, the word “busy” received the highest scoring among the negative descriptors (M = 7.11, SD = 2.81). The highest scoring positive descriptor was “peaceful” in the pairing “irritating–peaceful” (M = 7.52, SD = 2.662). The most varied responses were given “beautiful–ugly” (M = 4.15, SD = 3.19). Further details are shown in Table 3.

Qualitative Reactions

Thirty-seven of the 54 (69%) open-ended comment responses received (not left blank) described positive experiences in response to the green features and some comments expressed gratitude for the efforts made to improve the waiting experience. Thirteen of these explained what was liked about the intervention, for example, “The greenery softens the waiting room” (57 years old, male patient) and “Room feels overall less threatening” (36 years old, female patient). The waiting room was further described as less

<table>
<thead>
<tr>
<th>Table 1. Summary of Demographic Characteristics.</th>
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<tbody>
<tr>
<td>Characteristics</td>
</tr>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>Role</td>
</tr>
<tr>
<td>Patient</td>
</tr>
<tr>
<td>Staff</td>
</tr>
<tr>
<td>Family/carer</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Frequency of visits</td>
</tr>
<tr>
<td>First visit</td>
</tr>
<tr>
<td>&gt;1 Visit</td>
</tr>
<tr>
<td>Place of residence</td>
</tr>
<tr>
<td>Major city</td>
</tr>
<tr>
<td>Inner regional</td>
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<tr>
<td>Outer regional</td>
</tr>
</tbody>
</table>
clinical, full of life, and more friendly. Positive effects were stated as normalizing, relaxing, promoting conversation and softer voices, and calming, for example, “noticed a much calmer atmosphere amongst patients” (58 years old, female staff).

The greenery softens the waiting room

Room feels overall less threatening

noticed a much calmer atmosphere amongst patients

Six responses (11%) were negative including one staff member who felt “very negatively” impacted by the green features and stated the waiting room has “decreased in leg space and cleanliness” (60 years old, female). Other negative responses included dislike of artificial plants, perceived messiness, and potential reduced attractiveness, for example, “(I’d) like to see that the plants do not gather the undesired and neglected look” (75 years old, female patient).

“I’d like to see that the plants do not gather the undesired and neglected look”

Textual comments reinforced quantitative findings that artificial plants were more acceptable than no plants at all, for example, “Artificial but better than nothing” (55 years old, female patient) and “Real plants would be much nicer but understand not practical” (52 years old, male patient). The majority of positive responses showed gratitude and appreciation, for example, “Thank you so much for making the efforts!!!” (58-year-old, male carer) and “Thank you for caring enough to make this change” (68 years old, female staff). Eleven comments provided suggestions and words of caution relating to materiality, collection of dust, and one carer

Table 2. Reaction Effects and Green Feature Preferences.

<table>
<thead>
<tr>
<th>First Reaction</th>
<th>N</th>
<th>Like a Lot</th>
<th>Like</th>
<th>Neither</th>
<th>Dislike</th>
<th>Dislike a Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>What was your reaction to the green features when you first saw them?</td>
<td>142</td>
<td>57</td>
<td>58</td>
<td>16</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Effect While Waiting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How do you feel the green features affect you while you are spending time in the waiting room?</td>
<td>143</td>
<td>33</td>
<td>68</td>
<td>36</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3. Green Features Assessment.

<table>
<thead>
<tr>
<th>Descriptors</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dull–engaging</td>
<td>124</td>
<td>7.28</td>
<td>2.178</td>
</tr>
<tr>
<td>Unattractive–attractive</td>
<td>128</td>
<td>7.36</td>
<td>2.595</td>
</tr>
<tr>
<td>Irritating–peaceful</td>
<td>124</td>
<td>7.52</td>
<td>2.662</td>
</tr>
<tr>
<td>Busy–relaxing</td>
<td>127</td>
<td>7.11</td>
<td>2.810</td>
</tr>
<tr>
<td>Depressing–uplifting</td>
<td>123</td>
<td>7.28</td>
<td>2.639</td>
</tr>
<tr>
<td>Ugly–beautiful</td>
<td>126</td>
<td>5.85</td>
<td>3.190</td>
</tr>
</tbody>
</table>
cautioned, “Some people may have allergies” (no age given, female carer).

“Artificial but better than nothing”

“Real plants would be much nicer but understand not practical”

“Thank you so much for making the efforts!!!”

“Thank you for caring enough to make this change”

“Some people may have allergies”

Discussion

To date, one of the most salient and replicated findings in clinical nature-based intervention research is that perceived stress and quality of care can be influenced through various sensory interventions using nature elements or representations thereof (Beukeboom et al., 2012; Drahota et al., 2012; Ulrich et al., 1993). The present evaluation study confirms that nature features, even if artificial, can positively impact patients’, staff, and carers’ experience of the oncology waiting room. This finding contributes to the discussion whether nature-based interventions necessitate the presence of real nature or if similar benefits can be achieved with artificial plants. Although real nature was generally preferred, it was found that artificial nature was acceptable and chosen over having no nature features at all. Beukeboom, Langeveld, and Tanja-Dijkstra showed similar results in their study, in that radiology patients responded positively to both real plants and posters of plants in the hospital waiting room (2012).

The present study found that the display of artificial green feature plants in an oncology waiting area was mostly welcomed by patients, staff, and carers with 71% positively or very positively affected by them. Many felt grateful and some stated that the green features reflected a caring hospital culture. A small minority, 6 of the 54 responders (11%), however, disliked the green features and was concerned that their condition and attractiveness would decline as explained in their open-ended comments. Respondents’ comments attested to perceiving symbols of caring and “uncaring” related to the efforts made and the particular changes to the physical environment. While respondents in the present study agreed that the green features brightened up the waiting room, promoted relaxation, and added a peaceful quality, some negative findings included, that is, fear of the materials fading and looking dull, dislike of artificial plants, and collection of dust. Such perceptions could be experienced as messages of uncaringness, death and dying, and a disregard of personal (negative) feelings about artificial plants. In particular, descriptions such as “messy,” “clutter,” and “looks like a jungle” and the high scoring of the descriptor “busy” suggest that some people can feel overwhelmed by adding such nature features to an oncology waiting room. In this regard, Edvardsson and colleagues suggest viewing the physical environment itself as an agent for care (2006). In their phenomenological study of environmental responses, an analysis of 17 semi-structured interviews with cancer patients, staff, and carers indicated that the physical care environment profoundly impacted participants’ healthcare perceptions. Two of the four key themes discovered by Edvardsson and colleagues compare with findings in the present study: (1) the physical environment can confer symbols of caring and uncaring, life and death, and (2) external objects can help to shift self-directed focus away from “the world of cancer” and open new perspectives, and help to find light in the midst of darkness (2006, p.188).

The green features study substantiates the complexities of oncology healthcare perceptions as presented by Edvardsson and colleagues and contributes a rich variety of responses that require further research to be fully understood.

Limitations and Future Research

The findings relate to a ground floor oncology waiting room setting without natural light and windows to an external environment. The findings are not necessarily generalizable to other healthcare contexts. One serious limitation of this study is the lack of psychometric testing
of the questionnaire, which was not possible to time constraints. The opportunistic nature of the research project also presents a lack of a control condition to assess the relevance of design choices and exact materials used. A before–after study design including validated measures to assess respondent stress, anxiety, and mood would further strengthen the findings and ameliorate the shortcoming of reporting descriptive statistics of respondents’ subjective experiences alone.

Hospital waiting room research should continue to investigate the impact of minimal design interventions on patients’ waiting experiences and the staff work environment. Further research is warranted to study whether a waiting room with windows and views of live plants or other aesthetic features may be preferable to artificial plant features. Clarifying the benefits and potential harm of various design solutions can satisfy clinical infection control requirements that need to ensure the health and safety of immune-compromised patients.

Conclusions

Decisions about oncology waiting room design have to carefully consider their therapeutic and adverse impacts on the various users. This study found that artificial plants successfully improved the oncology waiting room atmosphere and provided an acceptable alternative to real plants. The implications of these findings are that tangible impact can be achieved with little intervention and at little cost to improve patients’, staff, and carers’ experience of the care environment and services.

Implications for Practice

- A beneficial interplay exists between nature exposure and positive health outcomes in clinical populations.
- Fake plants in the oncology waiting room have multiple beneficial effects on patients, carers, and staff.
- Oncology settings wishing to improve the waiting room experience may consider fake plants as an acceptable alternative to real plants.
- Oncology administration and nursing staff are well positioned to promote small but powerful environmental changes to improve oncology the waiting room atmosphere.
- Oncology settings can be improved with small and inexpensive design gestures using artificial plant materials.

Authors’ Note

This study was approved by the institution’s Human Research Ethics Committee.

Acknowledgment

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References


CHAPTER 8 Expert-Developed Recommendations for Nature-Based Care Opportunities in the Oncology Setting

8.1 Overview
The previous chapter reported on patient, staff, and visitor responses to a nature-based design intervention in the oncology setting. This chapter presents the final stage of the project, which involved developing recommendations for nature-based design opportunities in oncology contexts. The study objective and aims are stated before discussing the specific mixed-method, four-round e-Delphi methodology developed for this study, which is discussed in the published protocol paper in section two. The result follows in section three and presents systematically developed items, which were qualitatively developed and subsequently quantitatively assessed using a ranking procedure. The expert recommendations are presented as a ranked list of opportunity and cautionary factors, which can guide the design and implementation of nature-based supports in the oncology setting.

8.1.1 Objective
This study set out to develop expert recommendations for feasible and safe nature-based opportunities in the oncology setting. The study follows from patient-reported perspectives captured in preceding investigations.

Overarching aim:
- Develop expert recommendations for the application of restorative nature-based opportunities in oncology contexts.

Specifically, the study aimed to:
- understand what experts perceive are design elements and healthcare practices, which can promote helpful nature engagement in oncology settings,
- explore what experts perceive are the barriers to providing opportunities for nature engagement in oncology settings, and
- develop preliminary recommendations for future testing in oncology contexts.
ABSTRACT

Introduction: Opportunities to engage with nature have shown relevance in experiences of health and recovery of patients with cancer and are attracting interest in cancer care practice and design. Such healthcare innovations can widen the horizon of possible supportive care solutions but require deliberate and rigorous investigation to ensure responsible action is taken and wastage avoided. This protocol outlines a study designed to solicit knowledge from relevant experts drawn from a range of healthcare practitioners, management representatives, designers and researchers to explore levels of opinion consensus for determining opportunities for, and barriers to, providing helpful nature engagement in cancer care settings.

Methods and analysis: A 4-round modified electronic Delphi methodology will be used to conduct a structured, iterative feedback process for querying and synthesising expert opinion. Round 1 administers an open-ended questionnaire to a panel of selected, relevant experts who will consider the own recommendations of patients with cancer for nature engagement (drawn from a preceding investigation) before contributing salient issues (items) with relevance to the topic. Round 2 circulates anonymised summaries of responses back to the experts who verify and, if they wish, reconsider their own responses. Rounds 3 and 4 determine and rank experts’ top 10 items using a 10-point Likert-type scale. Descriptive statistics (median and mean scores) will be calculated to indicate the items’ relative importance. Levels of consensus will be explored with consensus defined as 75% agreement.

Ethics and dissemination: Ethics approval for this study was obtained from the Institution’s Human Research Ethics Committee (blinded for review). It is anticipated that the results will be published in peer-reviewed journals and presented in a variety of forums.

INTRODUCTION

Background

With the worldwide surge in incidence, cancer will soon impact at least one in three people. Reducing the burden of cancer and supporting those affected by cancer has become a healthcare priority. It is known that a significant amount of this healthcare burden is preventable; one-third of lives lost to cancer are attributable to behavioural and lifestyle choices and 30% of these cancer deaths are preventable by attending to key risk factors. In response, healthcare policy must consider effective clinical care and alleviate the burden associated with cancer treatment and promote positive health behaviour and prevent poor lifestyle choices. Such health-centric strategies focus on patients’ own resources to manage health and disease and aim to strengthen patients’ capacity to maintain or regain good health in the context of pathogenic biological or psychosocial stressors. To this end, exposure to, and
engagement with, nature presents an often underappreciated health resource\(^3\) and could be considered an opportunity to broaden health-centric care strategies: “contact with nature may offer an affordable, accessible and equitable choice on tackling the imminent epidemic, with both preventive and restorative [public] health strategies”\(^4\). In this context, Nightingale’s seminal work on caring for the well and timeless instructions for ‘those who have personal charge of the health of others’ are still relevant for healthcare givers and receivers today: “What nursing has to do ...is to put the patient in the best condition for nature to act upon him”\(^5\) (p. 133). Preliminary empirical evidence from cancer populations show various biopsychosocial benefits from contact with nature in cancer settings, including improved quality of life,\(^6\) increased positive health behaviour such as physical exercise and fruit and vegetable consumption,\(^7\) restored attention\(^8\) and increased social interaction.\(^9\)

**Rationale**

Healthcare setting design represents an expensive intersection of healthcare industry and infrastructure as well as potential opportunities for healthcare improvements\(^10\) and increased consumer satisfaction.\(^11\) Opportunities to connect with nature are attracting interest in healthcare setting and service design. Such healthcare innovations can widen the horizon of possible solutions to growing healthcare burden but require deliberate and rigorous investigation to ensure responsible action is taken and wastage avoided. This complex issue involves multiple governing bodies and stakeholders who have the task of innovating cost-efficient and high-quality healthcare that responds to health and recovery requirements of patients with cancer.

The present study follows from phase 1 qualitative research into use of nature by patients with cancer and its relevance in their experiences of health and recovery, which uncovered their own recommendations for integrating nature engagement opportunities in healthcare. Our preliminary findings report positive health–nature interchanges for patients with cancer and support further investigation to strategically determine the opportunities for, and barriers to, safe delivery of beneficial nature engagement in cancer care contexts. To evaluate the feasibility of integrating nature engagement opportunities into healthcare, a synthesis of opinion from a range of experts is needed. This protocol outlines a study designed to solicit input from relevant experts drawn from a range of professional and academic roles (including cancer-specific experts, where relevant) and explore factors they deem critically important for the provision of nature-based engagement in cancer care settings. To the best of our knowledge, no such collection and synthesis of expert opinion on this topic exists across healthcare and design disciplines.

**Aim**

The primary aim is to solicit knowledge from relevant healthcare and design experts in order to explore levels of opinion consensus about opportunities for, and barriers to, providing nature engagement in cancer care settings.

**METHODS AND DESIGN**

Figure 1 illustrates the study flow according to the modified Delphi methodology adopted in this study, which structures an iterative feedback process using a predetermined number of four questionnaires (rounds) rather than using as many as needed to reach strict consensus. First, an open-ended questionnaire is administered to an ‘expert panel’ with the aim to uncover salient issues (items) with relevance to the topic, which are subsequently verified and finally ranked according to their priority reflecting the relative degree of consensus among the panel. The protocol and related study materials were designed following the SPIRIT 2013 Checklist\(^12\) where appropriate.

**Rounds and timeline**

Following Okoli and Pawlowski’s\(^13\) recommendation, the four-round Delphi will aim to collect rich data, consolidate ranging expert opinion and indicate levels of consensus. Round 1 serves idea generation, round 2 verifies summaries of responses, round 3 short-list items of priority and round 4 ranks prioritised items. The four questionnaires will be electronically administered via email. All rounds are planned to take 4 weeks: 2–3 weeks for panellists to respond (including reminder emails prior to the round closing deadline to maintain a high response rate), and 1 week to analyse response data and, based thereon, draft the next questionnaire.

**Questionnaires**

Delphi is a form of iterative enquiry that builds on ongoing data collection. Its primary research tool is a series of questionnaires built from participants’ stepwise input. Questionnaire 1 will be available for distribution at the start of recruitment and questionnaires 2–4 are subsequently created to reflect content from the ongoing data collection. Questionnaire 1, section A first introduces the recommendations of patients with cancer drawn from our preceding investigation. Section B will query experts’ ideas and perceptions about opportunities for nature engagement in the cancer care setting and ask for factors they perceive as barriers to its provision. Questionnaire 1 (item generation) will take not more than 15 min to complete and questionnaires 2–4 (verification and ranking) will take not more than 10 min to complete unless the panellists wish to elaborate. Questionnaire 1 will be pilot-tested by two to three researchers unfamiliar with the Delphi method who will be asked to provide feedback about their question-and-answer process when completing the
questionnaire. This is to ensure questionnaire 1 is comprehensible to Delphi responders and that the intended scope and quality of response will be achieved.

Anonymity

The level of anonymity and confidentiality appropriate for this study is termed ‘quasi-anonymity’, which denotes that responses will remain anonymised throughout the study and are known only to the researchers. Since the panel constitutes experts from professional and academic backgrounds only, there is no need to adopt the common strictures of anonymity required when involving patients with cancer. Panel members will be blinded to each other’s responses throughout the Delphi process but can be known to each other as panel members. It will be clearly stated that publications will not reference any personally identifiable participant information.
PARTICIPANTS
Selection of experts
National and international experts in academic and professional roles will be selected based on relevant backgrounds who possess both knowledge and experience representative of the capacity to articulate informed opinion and provide relevant input about the given topic. Nature engagement in cancer care is a novel topic and thus requires tapping into related expert groups, which diversely address healthcare architecture and design and supportive cancer care. Relevant professional backgrounds include, for example, oncology and allied healthcare practitioners, management representatives working in healthcare planning and development, and healthcare setting architects and designers. Academics and educators may be included if they have taught participants on health–nature and related healthcare design topics or have published and presented related research articles in academic forums.

The identification process uses two strategies. First, the researchers’ own expert networks will be used and consulted for referrals to potential study participants (snowballing). Second, we will follow Delbecq et al.’s guidelines for identifying experts for nominal group studies, which will increase rigour in recruiting relevant individuals outside the researchers’ own networks. This procedure has shown to be transferable to Delphi studies and includes identifying relevant disciplines, sectors, and organisations and retrieving relevant academic and practitioner literature in order to build an expert list. The following predefined inclusion criteria have been previously adopted in Delphi panel recruitment and will supplement the above selection procedures: (1) capable of contributing relevant input (knowledge and experience); (2) willingness and sufficient time to complete all four rounds; and (3) sufficient English skills to communicate ideas effectively. Please see the Discussion section for the definition of ‘expert’ used in this study.

Sample size
The recruitment target is a minimum of 40 experts accounting for 10 experts per group (healthcare practitioners, management representatives, designers, researchers). This will allow for diversity of views and reveal any divergence of opinion between groups, while maintaining a volume of responses that is manageable to process. The sample target takes into account that not all participants are expected to complete all four rounds (attrition) and that a minimum of seven panellists (for each group) are required for reliable outcomes and comparisons. To achieve the minimum sample size, a maximum of 200 experts will be invited to participate.

Recruitment
Identified experts will receive an email containing an invitation to participate, a participation information sheet and questionnaire 1. Passive consent is given by responding to the email and returning questionnaire 1. Participation is voluntary and can be withdrawn at any stage. Participants can request their demographic information and where possible other contributions to be withdrawn; however, due to the study’s iterative process not all contributions can be withdrawn once included in previous rounds. Reasons for declining will be recorded if provided.

DATA COLLECTION AND ANALYSIS
Procedure
Questionnaires will be electronically administered via email according to Schmidt’s sequence detailed in figure 2 below.

Figure 2 Delphi questionnaire administration process (adapted from Schmidt et al).
Phase 1
The initial phase constitutes creative brainstorming and aims to elicit a maximum variety of items, before quantitatively ranking them.

Questionnaire 1: generation of items
This questionnaire will be sent on the same day the expert accepts participation. Section A constitutes a summary of anonymised recommendations of patients with cancer and cautions related to nature engagement extracted from the preceding qualitative investigation. Section B asks two basic, open-ended questions requesting experts to list at least six items (as recommended by Schmidt19) for questions 1 and 2 followed by brief explanations of their chosen items. These follow:
1. List at least six items relevant to your expertise describing design features, applications, initiatives or care practices related to nature engagement, which healthcare and design practitioners could feasibly implement within the cancer care context. 
   This list seeks to generate a list of design and healthcare opportunities (opportunities list).
2. List at least six important barriers or risk factors that you believe affect the provision of nature opportunities in cancer care contexts. These can include, for example, physical, psychosocial, economic or political factors.
   This question seeks to generate a list of barriers and key risk factors related to the provision of nature opportunities (barriers list).

Additionally, experts will be asked to offer a brief explanation of the importance of their suggested item. Space will be provided below each item for free-text description.

Analysis (questionnaire 1)
All data (items and explanations) will be entered and managed in qualitative data analysis software Nvivo V.10 for MacIntosh (QSR I. NVivo qualitative data analysis software for Macintosh, version 10: QSR International Pty Ltd; 2014 2014). The analysis will first remove identical responses, then collate, synthesise and edit remaining ideas to achieve consistent terminology of items expressing similar ideas and, finally, logically group items into emerging categories. An inter-rater process will assist interpretative congruity as recommended for thematic analysis.20

Questionnaire 2: validation of categorised items
This questionnaire will be designed based on responses from round 1 and aims to strengthen construct validity13 according to the concept of ‘member checking’.20 All items generated thus far will be collated into meaningful categories, as produced by inter-rater agreement, and will be recirculated to all experts. Each item is presented with a one-sentence explanation and non-identifiable background information of the panel member who generated the item (figure 3). A brief summary of the comments from round 1 is provided. Experts will be asked to:
1. Verify correct and fair interpretation of their responses and that items have been placed in an appropriate category;
2. Verify and, if they wish, refine the categorisations and recommend additional items.

Analysis (questionnaire 2)
Based on responses, items will be further refined and again subjected to inter-rater discussion.

Phase 2
In this phase, panellists will state their priorities and lists will be condensed accordingly.

Questionnaire 3: prioritising items
Questionnaire 3 uses a structured format and will list the items generated thus far in random arrangement to minimise response bias. Each panellist will be asked to select 10 items (top 10) from each list (opportunities and barriers), which s/he deems relevant and critical to the consideration of nature opportunities in the cancer care setting. Items 1–10 are selected according to their importance as judged by the expert who is asked to assign ‘1’ to the most important item, ‘2’ to the second ranked item and so on (figure 4).

Analysis (questionnaire 3)
Items selected by the majority of experts will be aggregated representing a majority vote. Lists will be reduced...
according to the importance of items calculated based on the sum of points allocated by each expert to their top 10 items, that is, item ‘1’ indicating highest importance is coded with 10 points, item ‘2’ coded with 9 points and so on. As recommended by Schmidt,19 to avoid burdening panellists with too many items, the target size of total items for the final round will be no more than 20 items for each list (opportunities and barriers).

**Phase 3**
The aim of this phase is to elicit levels of agreement among all experts and detect any diverging opinion between different expert groups.

**Questionnaire 4: ranking items**
Questionnaire 4 is designed to elicit levels of consensus (not achieve consensus) in the ranking of relevant items. This questionnaire includes aggregated statistical group responses generated for each included item thus far: the total sum of points assigned to each item by the entire panel; individual panellists’ own round 3 response and a summary of comments provided thus far (Figure 5). Each panellist will individually submit a rank ordering of the items for each of the condensed list (opportunities and barriers). Each item is presented with a corresponding 10-point Likert-type scale (1=not important at all, 10=very important) and an option to indicate ‘no judgement’ for any given item including space for justification.

**Analysis (questionnaire 4)**
Statistical analyses will be performed using IBM SPSS Statistics V.23 for Macintosh (IBM C. IBM SPSS Statistics for Macintosh, version 23. Armonk, NY: IBM Corp; 2013). Descriptive statistics (median and mean scores) will be calculated to indicate items’ relative importance. Descriptives will be calculated for the full sample and by expert group. The study’s aim is to explore levels of consensus rather than achieve consensus. Consensus will be defined as 75% agreement.21

Finally, if further understanding of qualitative responses is required, a small number of one-on-one follow-up interviews will be conducted with experts to clarify any ambiguity and gain a fuller understanding of final results. Experts will be informed in the participation information sheet that they may be invited to participate in a voluntary follow-up interview at study completion.

**ETHICS**
Ethics for this study was gained from the Institution’s Human Research Ethics Committee (blinded for review). All consented participants will be assigned a unique identification code. Collected demographic information and contact details will include name, contact phone number, email address, description of professional role, years served in field of expertise, country of professional residence/affiliation. Participants’ identifiable information will be matched with their unique identification code in a digital master file only. All data collected will be stored safely and securely in locked filing cabinets and in password-protected folders on a secure drive (electronic data) that can be accessed only by the study investigators. Data will be kept for 5 years as per local guidelines.

**DISCUSSION**
** Appropriateness of method**
The Delphi method is an established research tool for complex problem solving, which solicits expert opinion through a structured, iterative process.19 Its original
purpose was to obtain converging consensus about relative priorities in a given topic through a progression of iterative questionnaires based on controlled feedback until statistical census is reached. Since its inception, the Delphi method evolved to address a variety of research problems such as eliciting degrees of agreement, delineating differing group attitudes and positions, or understanding the rationales of particular judgements and opinions. Delphi variants applied to such explorative enquiry include, for example, modified, exploratory, ranking and policy Delphis, which are particularly well suited for investigating areas where little prior knowledge exists; where empirical data are lacking; and where cursory understanding of group attitudes and priorities is desired. The present study aims to guide concept development and elicit levels of consensus among diverse disciplinary viewpoints in order to generate new care opportunities related to nature engagement in the cancer care setting. The best-suited variant for this purpose is the modified electronic Delphi with a predefined four-round design, which provides the following key advantages: (1) serves the dual purpose of soliciting broad expert opinion followed by priority ranking; (2) can conclude at a predefined number of rounds because strong consensus is not required when degrees of agreement and group attitudes are of interest; (3) structures a rigorous and rapid feedback-based (online) communication process; (4) frees communication from logistical challenges, peer pressure and ‘group-think’ scenarios; and (5) cross-pollinates multidisciplinary expertise achieving broader understanding than would be reached from a single discipline alone. The method’s flexibility and ability to easily assemble and coordinate participants across disciplines and geographical locations partly explain its growing popularity in medical and nursing research. Mullen reports its use in medical, health service and nursing research for “forecasting developments in medicine and health technologies”, and “identifying priorities for nursing research and also priorities for spending and service developments” (p. 49). Relevant to this study are two examples showing its application in the cancer context for gathering international input for developing pain assessment tools for palliative care, and engaging healthcare experts from diverse backgrounds with experience in survivorship care to develop realistic strategies for improving healthcare for cancer survivors.

Definition of an ‘expert’

An important component of the Delphi method is the identification of experts. There are no specific standards for identifying experts and ‘expertness’ is variously defined in different Delphi studies. This presents a major criticism of the Delphi method and there remains little consensus as to what constitutes expertness and how it is operationally defined. The dictionary definition of an expert, “a person who is very knowledgeable about or skillful in a particular area,” has been found insufficiently instructive for assembling a Delphi expert panel. Consequently, studies have employed broader terms to identify and include relevant experts including ‘informed advocates’, ‘specialist in their field’ or persons with ‘knowledge about a specific subject’. Central to these formulations is the description of individuals who possess both knowledge and experience representative of the capacity to articulate informed opinion and provide relevant input about a given topic, which will be this study’s working definition of an expert.

Composing the expert panel

Delphi studies can use homogeneous or heterogeneous expert panels depending on the study aim. A heterogeneous panel of experts can bring a range of disciplinary viewpoints to the surface and articulate greater complexities as well as the boundaries of the topic at hand. In regard to innovation, Mullen cites that “many innovations and real breakthroughs…occur from outside a discipline or specialty” (cited in ref. p. 42) suggesting that cross-pollination of diverse disciplines and backgrounds can produce insightful and fruitful enquiry. Based on these precepts, five groups of diverse yet relevant stakeholders have been identified in the area of cancer care innovation: (1) patients with cancer; (2) healthcare practitioners; (3) healthcare management; (4) healthcare setting designers and (5) researchers. The panel will be composed of healthcare practitioners, management representatives, designers and researchers.

Patients’ recommendations were drawn from the preceding qualitative phase 1 study and are presented to the panel in round 1. The rationale for not recruiting additional patients with cancer is twofold. First, the present study builds on a substantial amount of data already collected from qualitative interviews eliciting patient experiences, suggestions, recommendations and cautions related to nature engagement. Second, of interest, are the responses and perceptions of those who bear on decision-making and healthcare policy development to ascertain the feasibility and realistic limitations of providing opportunities for nature engagement in the cancer care setting. The strategy of using the own nature experiences and recommendations of patients with cancer for opportunities to engage with nature in oncology contexts, to form the basis for this investigation, provides experts with the opportunity of considering the perspectives of patients with cancer when developing their own views about opportunities for; and barriers to, providing helpful nature engagement in cancer care settings. It is possible that their agreement or disagreement with patients’ perspectives may affect the study’s findings and recommendations.

Determining sample size

Delphi studies have been conducted with varying panel sizes ranging from single digits to low hundreds. The
absence of strict guidelines allows individual research projects to determine panel sizes according to their purpose and limitations. However, the most reliable Delphi studies were conducted with fewer than 20 participants. Recommendations suggest populating panels with 10–18 experts for sufficient input to warrant meaningful elicitation of diverse disciplinary viewpoints. Seven is considered an acceptable minimum panel size with accuracy rapidly declining as the number becomes smaller. It is understood that the levels of census among experts are of more interest than the power of frequencies of response, which is often misunderstood when mistaking the Delphi method for a quantitative survey.

Level of anonymity
One of Delphi’s defining features and strengths is the anonymity of responses. Mullen states that preserving anonymity in Delphi “removes effects of status, powerful personalities and group pressure” (p. 46–47). Keeney et al. note that anonymity “facilitates respondents to be open and truthful about their views” (p. 197). Varying degrees of anonymity have been used in Delphi studies. Some studies have adhered to strict criteria such as anonymising responses to researchers themselves and blinding panellists to one another’s identity. There is no agreed level of anonymity or de-identification other than preserving “the anonymity of responses...for at least part of the study” (p. 47). Advantages of panellists knowing each other’s identities include greater motivation to engage because of association with prominent experts, stimulating exploratory thinking and idea generation, and introducing greater accountability for considered personal responses and the overall Delphi study’s outcome. The present study will make use of these advantages and also acknowledge the known fact that complete blinding can be unrealistic because experts might know each other outside the study.

Summary of strengths and limitations
In summary, the key strengths of the Delphi method are its flexibility to modify the study procedures (eg, number of rounds) to suit the study context; the ability to bring together experts from diverse backgrounds and locations; and participant anonymity to stimulate a free flow of ideas. The limitations include reliance on expert participants who may have limited time to contribute; the lack of a common and robust definition of ‘expertness’ in the Delphi literature; and the identification and recruitment of sufficient suitable experts when considering a low response rate in Delphi studies.

DISSEMINATION PLAN
Participants will be sent a summary of results at conclusion of the final phase. Presentation of results will include the total number of items generated in phase 1 and the strength of the items taken into phase 2. Levels of consensus will be tabled and sufficient raw data provided (eg, number of panellists in each round) to support calculation of statistics. A summary of non-identifiable demographics will be presented to validate the participation of relevant and qualified experts. Based on the findings, it will be possible to revise the theoretical understandings and practical patient recommendations formulated in phase 1. Preliminary expert recommendations can be drafted for testing in the cancer care context, and propositions can be generated to inform future research. It is anticipated that the results of this research project will be published in peer-reviewed journals and presented in a variety of forums, and form part of the principal investigator’s dissertation.

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Correction notice This paper has been corrected since it first published online. The first author’s name has been corrected.

Contributors SB is the principal investigator who conceived the study and drafted the initial protocol manuscript. SB, CCOC and PS are responsible for the design of the study and CCOC and PS critically revised the manuscript and related study materials. All authors have read and approved the final manuscript.

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REFERENCES


8.3 Result: Expert-Developed Recommendations for Nature-Based Care Opportunities in the Oncology Setting

**BMJ Open**

Nature-based care opportunities and barriers in oncology contexts: a modified international e-Delphi survey

Sarah Blaschke,¹ ² Clare C O’Callaghan,¹ ³ ⁴ Penelope Schofield¹ ² ⁵

**ABSTRACT**

**Objective** To develop recommendations regarding opportunities and barriers for nature-based care in oncology contexts using a structured knowledge generation process involving relevant healthcare and design experts.

**Design** Four-round modified electronic Delphi study. Oncology patients’ nature-based recommendations, uncovered in preceding qualitative investigation, were included in the first round for the expert participants’ consideration. Key items (opportunities and barriers) were developed using data aggregation and synthesis, followed by item prioritisation and 10-point Likert scale ranking (1=not important, 10=very important). Descriptive statistics were calculated to assess items of highest importance representing expert recommendations.

**Context** Online Delphi process constituting an electronic international survey.

**Participants** A purposive sample of 200 potential panelists (recruitment target n=40) comprising healthcare practitioners, managers, designers, architects and researchers were invited to participate; experts were identified via research networks, snowballing and systematic literature review.

**Results** 38 experts across seven countries (Australia, USA, UK, New Zealand, Canada, Denmark and Sweden) returned questionnaire 1, which determined consent and acceptance for participation. Initial response rate was 19%, and subsequent response rates were 84%, 82% and 84% for rounds 2, 3 and 4, respectively. The Delphi panel developed recommendations consisting of 10 opportunities and 10 barriers. The following opportunities were rated to be of highest importance: window views from clinical areas onto nature; outdoor settings, gardens and courtyards with easy and effortless access; and nature-based physical exercise adapted to patient requirements. Highest-rated barriers for nature-based oncology care included lack of knowledge and awareness about benefits of nature engagement and inaccessibility, not considering access requirements for the very sick and frail.

**Conclusions** Experts suggested and agreed on a set of recommendations, which represent critical considerations for the safe adoption of nature-based oncology opportunities. These findings fill a gap in understanding about helpful nature-based oncology care and may translate into oncology design and innovation.

**INTRODUCTION**

There is growing interest internationally in the potential health benefits of exposure to, and engagement with, nature. Public and academic debate around incorporating nature-based opportunities in healthcare setting and service design is increasing. This is partly due to a growing research evidence base showing beneficial interchanges between health, well-being and nature exposure for the general public¹ ² ⁴ and specific disease populations.⁵ ⁶

Cancer will soon affect at least one in three people either personally or through a relative or friend.⁵ One-third of lives lost to cancer are attributable to behavioural and lifestyle choices, and 30% of these cancer deaths are preventable by attending to key risk factors.⁵ Therefore, access to health-centric care strategies, which promote positive health behaviour and prevent poor lifestyle choices, can alleviate growing healthcare burden and support those affected by cancer. Public health promotion research has identified contact with nature as an underused health resource,⁶ which may translate into new avenues for supportive oncology services and setting design: ‘contact with nature may offer an affordable, accessible and equitable choice on tackling the imminent epidemic, with both preventive and restorative [public] health strategies’.¹
Objective

The objective was to develop recommendations related to opportunities and barriers for nature-based care in oncology contexts using a structured knowledge generation process involving relevant healthcare and design experts.

Study Design

The present study is part of a PhD project and follows from qualitative research into the use of nature of patients with cancer and its relevance in their experiences of health and recovery. From this, patients’ own recommendations were extracted and included in the present investigation for healthcare experts’ consideration when developing their own views about integrating nature into oncology.

The full study protocol has been published elsewhere and describes in detail the Delphi methodology adopted in this research project. The main method modification made to suit the present study was to use a three-phase sequence with the aim to structure an iterative feedback process with a predetermined number of four questionnaires (rounds) rather than following the traditional method of using as many questionnaires as needed to reach strict consensus. Strict consensus was not the aim of this study. Phase 1 comprised two questionnaires. Questionnaire 1 (Q1) served idea generation and aimed to uncover salient issues (items) with relevance to the topic by inviting panellists to brainstorm and open-endedly contribute their ideas. Panellists were provided with patient-reported recommendations and cautions for nature-based care from previous research. Responses were categorically aggregated and recirculated to the panel who were given opportunity in questionnaire 2 (Q2) to verify cogent interpretation of their data. Next, panellists short-listed items of priority, which were subsequently ranked 1 to 10 reflecting the relative degree of consensus among the panel about the items’ importance. Questionnaires were electronically administered via email and were planned to take a minimum of 4 weeks, respectively: 2 to 3 weeks for panellists to respond (including reminder emails prior to round closing deadlines) and 1 week to analyse response data and draft the next questionnaire. Figure 1 summarises and illustrates the study design. The protocol and related study materials were designed following the SPIRIT 2013 Checklist where appropriate.

Definition of ‘expert’

Delphi studies use various definitions to identify and include relevant experts such as ‘informed advocates’, ‘informed individuals’, ‘specialist in their field’ or persons with ‘knowledge about a specific subject’. Central to these formulations is the description of individuals who possess both knowledge and experience, which enables them to articulate informed opinion and provide relevant
**Figure 1** Study flow chart.

**Phase 1**

**Questionnaire 1 (n=38)**
- Experts consider summary of cancer patients’ recommendations
- Experts generated 455 items: 250 Opportunities, 205 Barriers

**Questionnaire 2 designed based on Questionnaire 1 analyses**

**Questionnaire 2 (n=32; response rate 84%)**
- 74 synthesised items recirculated for verification. 10 panellists requested revision of items they contributed to

**3 reminders sent prior to round closing date**
**Questionnaire 3 designed based on Questionnaire 2 analyses**

**Phase 2**

**Questionnaire 3 (n=31; response rate 82%)**
- 2 refined lists (36 Opportunities, 38 Barriers) returned to experts
- Selection of top-ten items, lists reduced to 20 items respectively

**4 reminders sent prior to round closing date**
**Questionnaire 4 designed based on Questionnaire 3 analyses**

**Phase 3**

**Questionnaire 4 (n=32; response rate 84%)**
- Aggregated statistics of 20 shortlisted items returned to experts
- Experts ranked (1-10) the importance of prioritised items

**2 reminders sent prior to round closing date**
**Final analysis: Item priority and level of consensus calculated**
input about a given topic. This definition of an expert was adopted by the present study.

**Composing the Delphi panel**

This study aimed to compose a heterogeneous panel of experts to bring a range of disciplinary viewpoints to the surface and articulate great complexities about the topic. Five groups of diverse yet relevant stakeholders were identified in the area of cancer care innovation: (1) patients with cancer, (2) healthcare practitioners (HPs), (3) healthcare management (HM), (4) healthcare architects and designers (ADs) and (5) and healthcare and design academics. The panel did not include additional patients with cancer. The rationale for this composition was, first, that the present study was built on a substantial amount of data already collected from patients with cancer in the preliminary qualitative study. Second, this current study focused specifically on the views of those who are involved in healthcare development to ascertain feasible nature engagement opportunities in oncology contexts and their realistic limitations.

**Sample size**

Delphi studies use varying panel sizes ranging from single digits to low hundreds. Seven is considered an acceptable minimum panel size with accuracy rapidly declining as the number becomes smaller. It is understood that the levels of census among experts are of more interest than the power of frequencies of response. Two hundred eligible experts were invited with the intention to recruit 10 participants per expert group, and the total target was 40 experts.

**Recruitment procedure**

To collect input from a diverse range of international healthcare and design experts involved in cancer care innovation, three sampling strategies were devised to identify relevant, eligible participants: (1) purposive list building (research networks), (2) snowballing and (3) systematic literature review to identify key authors. The following predefined inclusion criteria previously used in Delphi panel recruitment supplemented the selection procedure: (1) capable of contributing relevant input (knowledge and experience), (2) willingness and sufficient time to complete all four rounds and (3) sufficient English skills to communicate ideas effectively.

Experts were contacted with an introductory email containing Q1 and information about participation to explain the required commitment. Experts accepted study participation and membership to the Delphi panel by completing and returning Q1, which included a demographics section. Ethics approval was gained from the Peter MacCallum Cancer Centre Human Research Ethics Committee (LNR/16/PMCC/65). Experts were assured of confidentiality and that their identities were only known to the research team throughout the study period and that no identifiable information would be presented in final reporting of the study.

**METHODS**

The Delphi method is an established research tool for complex problem solving, which solicits expert opinion through a structured, iterative process. The present study aimed to elicit and synthesise diverse disciplinary viewpoints to guide the development of expert recommendations. The modified electronic Delphi method fits this purpose and provides following key advantages: (1) serves the dual purpose of soliciting broad expert opinion followed by priority ranking; (2) can conclude at a predefined number of rounds because strong consensus is not required when degrees of agreement and group attitudes are of interest; (3) structures a rigorous and rapid feedback-based (online) communication process; (4) frees communication from logistical challenges, peer pressure and ‘group-think’ scenarios and (5) cross-pol-linates multidisciplinary expertise achieving broader understanding than would be reached from a single discipline alone.

**Procedure and data analysis**

Delphi’s primary research tool is a series of iterative questionnaires built from participants’ stepwise input. The research team designed Q1, and Q2–Q4 were subsequently created to reflect content of responses from the ongoing data collection and analysis. Following ethics approval, data were collected from June 2016 to October 2016. As required, up to four email reminders were sent in weekly intervals for Q2, Q3 and Q4. A brief description of each questionnaire follows. Detailed overview and illustrations of the administered questionnaires can be found in the published study protocol.

**Q1: idea generation**

Q1 collected the following demographic information: name, contact details, description of professional role, years served in role of expertise and country of professional residence/affiliation. Two sections then followed. Section A constituted a summary of the anonymised recommendations of patients with cancer, extracted from the preceding qualitative investigation, which expert participants were invited to consider. Section B queried experts’ own recommendations for nature-based care opportunities in the oncology setting and asked for factors they perceived are barriers to their provision. Q1 was pilot tested by two psycho-oncology researchers unfamiliar with the Delphi method, who were asked to provide feedback about their question-and-answer process when completing the questionnaire. This process ensured Q1 was comprehensible to naive Delphi responders and that the intended scope and quality of response were achieved. All data were entered and managed in Microsoft Excel. The analysis first removed identical responses, then the remaining ideas were collated, synthesised and edited to achieve consistent terminology of items expressing similar ideas and, finally, comparable items were grouped into categories. An inter-rater process constituting the three authors (SB, CO and PS)
assisted interpretative congruity as recommended for thematic analysis.²⁸

Q2: validation of categorised items
Q2 was designed based on responses from Q1 and aimed to strengthen construct validity²⁹ according to the concept of ‘member checking’.³⁰ All categorised items were recirculated to all experts for verification. Based on responses, items were further again subjected to inter-rater discussion, refined and finalised when agreement was reached.

Q3: prioritising items
Q3 included a structured format listing all items generated thus far in random arrangement to minimise response bias. Each panellist selected 10 items (top 10) from each list (opportunities and barriers). Items selected by the majority of experts were aggregated representing a majority vote. Lists were reduced according to the importance of items calculated based on the sum of points allocated by each expert to their top 10 items, that is, item ‘1’ indicating highest importance was coded with 10 points, item ‘2’ coded with nine points and so on. To avoid overburdening panellists,³¹ the target size of total items for the final round was no more than 40 items (20 opportunities and 20 barriers).

Q4: ranking items
Q4 was designed to elicit levels of consensus (not achieve consensus) in the ranking of relevant items. This questionnaire included aggregated statistical group responses generated for each included item thus far. Each panellist submitted a rank ordering of the items for each of the condensed lists (opportunities and barriers) using corresponding 10-point Likert-type scales (1=not important at all, 10=very important). Statistical analyses were performed using IBM SPSS V.23 for Macintosh.²⁹ Descriptive statistics (median scores and IQR) were calculated for the entire panel to indicate items’ relative importance. Differences in consensus among subgroups were explored. Dual-role occupants were assigned to both groups they hold expertise in. Consensus was defined as 75% agreement.³⁰

RESULTS
Panellists
Characteristics of Delphi panellists
Two hundred potential panellists were identified and sent an invitation to participate, which included Q1. Thirty-eight questionnaires (19%) were returned. The participant characteristics are shown in table 1. Responders represented seven countries: Australia (19), USA (8), UK (3), New Zealand (2), Canada (2), Denmark (3) and Sweden (1). Twenty-three responders (61%) were designated into one of the four expert groups; 15 (38%) occupied dual roles and were designated into two groups. Overall, participants reported high levels of expertise with an average of 20.5 years (SD 10) of experience in their respective roles. Combined, this expert sample (n=38) represents 780 years of accumulated expertise.

Phase 1: generation and validation of items
Panellists contributed a wealth of descriptively rich data in Q1 (idea generation). In total, they made 250 separate suggestions for opportunity items and 205 suggestions for barrier items. Further analysis identified 55 unique items (35 opportunities, 20 barriers) after removing identical suggestions, which expressed the same ideas in different words. The condensed items were grouped into 19 categories (see box), which emerged during the analytic process. Each item was assigned anonymous identifiers corresponding with panellists who contributed to the item. In Q2 (validation of categorised items), 11 panellists requested revision of their items when asked for verification of the synthesised data. Data interpretation and description were refined based on panel feedback received.

Phase 2: prioritisation of items
Thirty-one panellists (82%) selected their priority items (top 10) in Q3 representing a majority vote of items of highest importance. Forty items achieving the highest rankings were short-listed (20 opportunities and 20 barriers) and included in Q4 for final importance rating (see online supplementary appendix 1 for detailed findings).

Phase 3: ranking of items
Highest-ranked items in Q4 (n=32; 84%)
Not all 32 panellists who returned Q4 completed ratings of all items; some items were missed, and in some instances, two numbers were indicated on the 10-point scale. These were excluded from the analysis. Thirty-two ratings were available for 25 of the Q4 items, 14 items were given a minimum of 30 ratings and only 1 item received 29 ratings from panellists who returned Q4 (n=32). The distribution of scores was negatively skewed, with an average of 82% panellists assigning scores ≥7 Likert scale points. However, the level of consensus (75% agreement) among panellists on whether an item was important (score ≥7) ranged from 48% to 100%.

Thirty of the 40 rated items met the consensus level of receiving a score of ≥7 points from ≥75% of respondents (see online supplementary appendix 1 for details). The 10 highest-rated opportunity items and barrier items and the levels of consensus achieved are presented in table 2. These final items represent the panel’s list of recommendations.

The highest-rated opportunity item was ‘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)’ (median=10; 97% consensus); the highest-rated barrier item was ‘Building design and site constraints, missed opportunities: Layout, building orientation, surrounding views, lack of available...
Table 1  Characteristics of Delphi panellists

<table>
<thead>
<tr>
<th>Expert groups</th>
<th>Expertise, n=38, years combined</th>
<th>Q1, n=38</th>
<th>Q2, n=32</th>
<th>Q3, n=31</th>
<th>Q4, n=32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare practitioner (HP). Fields included specialist nursing, medical oncology, palliative care, clinical psychology, physiotherapy, art therapy and horticultural therapy</td>
<td>134</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Healthcare management (HM)</td>
<td>25</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Healthcare architects and designers (AD)</td>
<td>64</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Academics (A). Fields included occupational therapy, community health, horticultural therapy, medical, psycho-oncology, health psychology, healthcare design, palliative and end-of-life care</td>
<td>253</td>
<td>11</td>
<td>10</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Dual roles</td>
<td>86</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>A, AD</td>
<td>121</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>A, HP</td>
<td>22</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>AD, HP</td>
<td>47</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>HP, HM</td>
<td>28</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Geographic location</td>
<td>19</td>
<td>16</td>
<td>15</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

33/38 (87%) panellists completed questionnaire 2, 31 (82%) completed questionnaire 3 and 32 (84%) returned questionnaire 4. In total, three participants formally withdrew participation; other non-responders did not give reasons for discontinuing participation.

space were not considered in planning and development phase’ (median=9; 91% consensus).

Differences in expert group opinion

Experts’ views about the topic converged rather than diverged as evidenced by the distillation of 455 separate suggestions into 55 key ‘opportunities’ and ‘barriers’. Essentially, similar deep concerns were expressed through experts’ parallel suggestions for opportunities and barriers. This was further shown in the final Likert scale results, which achieved similar high and low appraisals of items across expert groups (see online supplementary appendix I for median scores and IQR by subgroup). The only small variation in ratings was found in how the ‘healthcare management’ group rated the Barrier items, that is, the selection of Barrier items judged to be of highest and lowest importance. In contrast to the other three expert groups, this group appraised the following Barrier items: 7G (median=9.5), 8B (median=9.5) and 10F (median=9.5) to be of highest importance and 1A (median=7) and 4C (median=7) to be of least importance. However, due to the small number of experts in this group (n=4), no meaningful inferences can be made about a general opinion deviation among the expert groups.

DISCUSSION

This modified e-Delphi study involved four groups of international experts involved in cancer care innovation and aimed to systematically identify and articulate realistic opportunities and important barriers most relevant for the provision of nature-based care in oncology contexts. Contributions to item generation in Q1 were extensive and of high quality; an acceptable panel size was achieved, and participant retention was high for all four rounds. Allowing panellists in Q1 to reflect on patients’ own recommendations increases the usefulness of findings and their relevance for patients. An integrated validation process gave panellists opportunity to request revision of their input as required for correctness and strengthened reliability of interpretations and improved the validity of findings.24
Although numerous opportunities for nature exposure and nature engagement were identified, several patient-centric insights arose as central concepts in the panel’s thought process. The panel recognised multiple patient needs and preferences, which could be addressed through nature-based elements in the care setting. Among these were patients’ need for connection with the outside world (1C), accessible retreat from clinical scenarios (2A), physical exercise opportunities (3E), contemplative and solitary experiences (6C) as well as socially engaging and communal experiences (9F) and aesthetically and sensory enriching (10C) yet climatically comfortable and safely manoeuvrable environments (8C and 4B). These findings connect with existing literature confirming a similar broad range of desired patient experiences when dealing with cancer diagnosis; they include, for example, contact with the outside world through window views, social experiences and engaging in peer activities, seeking respite from clinical reality, adopting new physical activities for improving fitness and well-being, stimulating and aesthetic experiences that enliven the physical senses and contemplating and connecting meaningfully with oneself and notions of spirituality.

In related research, it was found that patients in the ICU, in particular long-stay patients, can benefit from nurse-facilitated nature-based interventions to enhance the clinical environment for better patient outcomes and to avoid unnecessary environmental stressors. Examples of recommended nature-based opportunities available in ICU nursing include positioning patient beds to view the outside world, appropriate natural light exposure, taking patients to outside areas when able to mobilise and providing nature-based soundtracks and pictures of nature in the patient room. Our findings further connect with research investigating other vulnerable patient groups such as patients with advanced dementia. Fleming and colleagues confirm the effective role of environmental design in the care of this patient group. Their survey study shows strong agreement among healthcare experts about the importance of certain characteristics of care environments, which include: access to the outdoor and indoor nature (plants, natural light and fresh air), design that promotes sensory and social engagement and opportunities for privacy, safety and security.

Additionally, the panel in the present study raised staff concerns about the importance of designing for staff privacy and workplace exercise opportunities, which confirms related research evaluating outdoor settings in a paediatric cancer centre that included the benefits for staff usage. Importantly, category C (Design) to enable optimal multisensorial connection with nature emerged as a prominent finding, which highlights the central role of architecture and design of cancer care environments and its central role in shaping the breadth and quality of experiences available to the various users. This was also found in research on the effects of environmental features in oncology settings. Further, the findings elucidated experts’ important recommendations to educate healthcare teams about the value, benefit and practical implementation of nature-based opportunities and the importance of professional and properly budgeted maintenance of any integrated nature features. This vital education and funding component relies strongly on available and accessible evidence, which supports the value and usefulness of allocating healthcare resources to nature-based initiatives in healthcare settings.

Factors deemed as barriers to the provision of nature-based elements spanned a wide spectrum of collective concerns among the experts including, for example, building constraints, inauthentic design choices, lack of awareness and ongoing advocacy about the benefits, incompatibility with clinical focus and prioritisation, lack of resources and consideration in early healthcare project phases. A common thread is again evident corresponding similarly with architecture and design issues. This concurs with other findings indicating that poor design decisions and execution and lack of planning may greatly restrict the available scope of positive healthcare experiences. Inappropriate contextual and environmental factors may create adverse reactions and impact negatively on the quality of healthcare experiences. Although experts identified real barriers, they
### Table 2  
**Highest-ranked items in Q4 (n=32; 84%)**

<table>
<thead>
<tr>
<th>Ranking (category, see box)</th>
<th>Item description</th>
<th>Q3, n=31</th>
<th>Q4, n=32</th>
<th>Q4, n=32</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>Median (IQR)</strong></td>
<td><strong>% ≥7</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Opportunities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (C)</td>
<td>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)</td>
<td>140</td>
<td>10 (9–10)</td>
<td>97</td>
</tr>
<tr>
<td>2 (A)</td>
<td>Accessible outdoor settings, gardens and courtyards: easy and effortless access, automatic doors, nearby, some areas with high visibility, close proximity to clinical assistance, remove barriers and thresholds, available for patients, carers and staff</td>
<td>253</td>
<td>10 (9–10)</td>
<td>100</td>
</tr>
<tr>
<td>3 (E)</td>
<td>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</td>
<td>101</td>
<td>9 (7–10)</td>
<td>91</td>
</tr>
<tr>
<td>4 (B)</td>
<td>Appropriate safety measures and surface materials for limited mobility: handrails, smooth paved paths, ramps rather than steps, colour contrasting curbing along pathways</td>
<td>35</td>
<td>9 (7–10)</td>
<td>90</td>
</tr>
<tr>
<td>5 (D)</td>
<td>Educate healthcare team, management, patients, designers, policy and decision makers about value, benefits and appropriate implementation of nature-based opportunities</td>
<td>70</td>
<td>8 (7–10)</td>
<td>94</td>
</tr>
<tr>
<td>6 (C)</td>
<td>Design for privacy: zoning, screening, semiclosed 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)</td>
<td>75</td>
<td>8 (7–9)</td>
<td>88</td>
</tr>
<tr>
<td>7 (G)</td>
<td>Design proposal needs to address repair and maintenance requirements of nature-based features within available maintenance budgets (easy to maintain). Tasks to be carried out by skilled professionals</td>
<td>61</td>
<td>8 (7–9)</td>
<td>84</td>
</tr>
<tr>
<td>8 (C)</td>
<td>Protection from adverse weather conditions (sun, shade, high/low temperatures) and unpleasant stimulation (overpowering scents, noise, loud sounds, toxic plants, clutter)</td>
<td>40</td>
<td>8 (7–9)</td>
<td>84</td>
</tr>
<tr>
<td>9 (F)</td>
<td>Socialising: range of seating options, gathering and communal spaces, BBQ area, children play areas, semiprivate enclosures for personal conversations</td>
<td>65</td>
<td>8 (7–9)</td>
<td>84</td>
</tr>
<tr>
<td>10 (C)</td>
<td>Indoor design to maximise use of biophilic elements: natural materials, natural colours, airflow (including windows that open safely) and natural light</td>
<td>41</td>
<td>8 (7–8)</td>
<td>88</td>
</tr>
<tr>
<td><strong>Barriers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (A)</td>
<td>Building design and site constraints, missed opportunities: layout, building orientation, surrounding views, lack of available space were not considered in planning and development phase</td>
<td>194</td>
<td>9 (8–10)</td>
<td>91</td>
</tr>
<tr>
<td>2 (E)</td>
<td>Decision makers, management and administration often lack knowledge and/or awareness about benefits of nature engagement</td>
<td>175</td>
<td>9 (8–10)</td>
<td>94</td>
</tr>
<tr>
<td>3 (D)</td>
<td>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</td>
<td>141</td>
<td>9 (7–10)</td>
<td>91</td>
</tr>
<tr>
<td>4 (C)</td>
<td>Cost and resource allocation: cost for routine repair and maintenance, staff and volunteer time, acquiring indoor equipment (screens, virtual reality, A/V), lack of funding, often based on fundraising and grants</td>
<td>179</td>
<td>9 (8–10)</td>
<td>91</td>
</tr>
</tbody>
</table>

Continued
Table 2  Continued

<table>
<thead>
<tr>
<th>Ranking (category, see box)</th>
<th>Item description</th>
<th>Q3, n=31</th>
<th>Q4, n=32</th>
<th>Q4, n=32</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Median (IQR)</td>
<td>% ≥7</td>
</tr>
<tr>
<td>5 (F)</td>
<td>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</td>
<td>53</td>
<td>9 (7–10)</td>
<td>91</td>
</tr>
<tr>
<td>6 (K)</td>
<td>Healthcare facilities design often guided by clinical functionality, efficiency, cost restrictions and/or habitual practice, not necessarily the patient perspective/experience</td>
<td>99</td>
<td>8 (7–10)</td>
<td>94</td>
</tr>
<tr>
<td>7 (G)</td>
<td>Mainstream values (decision makers) do not prioritise nature-based opportunities or ‘design thinking’</td>
<td>23</td>
<td>8 (7–9)</td>
<td>91</td>
</tr>
<tr>
<td>8 (B)</td>
<td>Champion (advocate) needed</td>
<td>38</td>
<td>8 (7–9)</td>
<td>81</td>
</tr>
<tr>
<td>9 (E)</td>
<td>Not prioritised in construction and development phase of healthcare projects</td>
<td>26</td>
<td>8 (7–9)</td>
<td>93</td>
</tr>
<tr>
<td>10 (F)</td>
<td>Inauthenticity of nature-based design elements: fake plants, fake scents, tokenistic, corporate design (‘cutting edge’ award-seeking designs)</td>
<td>58</td>
<td>8 (7–10)</td>
<td>81</td>
</tr>
</tbody>
</table>

simultaneously suggested useful response to these challenges. Highlighted, in particular, is the importance of planning in regard to healthcare design and development, healthcare policy and messaging and clinical practice. During early stage planning phases, considerations such as site layout, window views, integrated hospital courtyards and biophilic design elements may be incorporated without great cost burden and can be designed with maintenance budgets in mind. Lack of foresight in healthcare design projects, as detected in the findings, can result in suboptimal design choices and forgo potential user benefits. The findings emphasise need for education and awareness about the essential value, demand and appropriate implementation of nature-based initiatives. The patient perspective (6K) may usefully guide decision making about designing for experiences of value to the end user.42

These findings combined are not surprising and concur with existing health–nature research, which report various biopsychosocial benefits from the interchanges with nature of patients with cancer.11–13 32 43  Psycho-oncology literature further corroborates the psychological importance of oncology environment design.44 45  Such contextual features powerfully communicate symbols of care and caring and may meaningfully affect patients’ lived healthcare experiences and perceptions.39

Limitations
Knowledge generated by a Delphi panel represents input from a select sample of experts at a given time and may differ when involving other experts. To mitigate this limitation, an acceptable panel size was used43 involving a heterogeneous sample of experts with relevant professional and academic backgrounds to collect a diverse range of viewpoints about the topic. Furthermore, there may be variation in levels of experience and knowledge about the specific topic despite panellists reporting an average of 20.5 years of expert experience. The findings represent contributions from a specific expert sample, which may differ when involving other experts. The panel’s exposure to patients’ own recommendations created a common basis for this investigation and helped to define its topical parameters and stimulated their novel thinking on the topic.

The recommendations generated in this study describe experts’ key concerns relating to nature-based care opportunities in oncology contexts; the findings cannot be seen as prescriptive for the design of all cancer care environments and services across different settings and patient groups. Although the panel included experts with varying backgrounds who represented seven different countries, the findings likely express a Westernised perspective and may not apply to other contexts. Furthermore, participants’ geographic locations in regard to their native, natural environments and climatic conditions may have influenced input in this study. It bears mention that more than half of the participants originated from Oceania (Australia (19) and New Zealand (2)), which may have resulted in biased recommendations. The appropriateness and adoption of nature-based care scenarios need to be assessed based on country- and patient-specific standards and guidelines to guarantee safe practices and best outcomes. Lastly, although the study achieved a panel of mixed experts, the sample included a greater number of academics and HPs than HMs and ADs. The type of expert input needs to be considered when appraising the findings. Future research may further investigate reasons for non-participation of certain expert groups and evaluate the significance of their contributions or lack thereof.
Practical implications

The recommendations (table 2) developed in this study reflect key concerns shared across stakeholder groups and can be easily and quickily accessed by relevant parties involved in the design and development of oncology settings and care services. They can be used to:

► guide healthcare designers and architects when planning and designing new cancer care settings and improving existing ones;
► inform and educate healthcare practice about appropriate and safe nature-based care opportunities;
► extend established cancer care services by using embedded or readily available resources (eg, improving access to hospital courtyards, maximizing window views, integrating physical exercise programme in available hospital outdoor settings);
► provide key items as quality markers for establishing and assessing nature-based care opportunities in oncology contexts.

CONCLUSION

To our best knowledge, this study represents the first international and cross-disciplinary effort to generate expert recommendations related to the integration of nature-based care opportunities in oncology contexts. These recommendations elucidate as yet unexplored healthcare responses that use the care setting itself, its context and ambient features to improve patient outcomes. Reflecting patient and expert perspectives, these nature-based care recommendations have particular relevance for healthcare, but importantly, they advocate for often unvoiced healthcare needs and human experiences, which can add great value to oncology patient experiences. The findings provide insight into a new sphere of design and intervention for humanising oncology environments and improving daily healthcare experiences of people affected by cancer and those working in the cancer care setting.

Contributors SB, CCC and PS conceived the study and collaborated on the initial protocol and study materials. SB analysed and interpreted the data followed by revised the manuscript. SB is the guarantor of the study.

Funding SB was supported by an Australian Government Research Training Program Scholarship throughout the study period.

Competing interests None declared.

Ethics approval Peter MacCallum Human Research Ethics Committee.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

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REFERENCES


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<th>Q4_AD</th>
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<td><strong>Opportunities</strong></td>
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</tr>
<tr>
<td>A</td>
<td>Accessible outdoor settings, gardens and courtyards: Easy and effortless access, automatized doors, nearby, some areas with high visibility, close proximity to clinical assistance, remove barriers and thresholds, available for patients, carers and staff</td>
<td>253</td>
<td>10 (9.2)</td>
<td>100 (31)</td>
<td>9.5 (8.8)</td>
<td>10 (9.3)</td>
<td>10* (9.7)</td>
<td>10* (9.7)</td>
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<td>C</td>
<td>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)</td>
<td>140</td>
<td>10* (9.4)</td>
<td>10* (9.4)</td>
<td>97 (32)</td>
<td>9.5 (9.3)</td>
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<tr>
<td>E</td>
<td>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</td>
<td>101</td>
<td>9 (8.5)</td>
<td>91 (32)</td>
<td>8.5 (8.5)</td>
<td>9 (8.7)</td>
<td>9 (8.7)</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Nature-based programs: Gardening indoors and outdoors, interactive group activities, horticultural therapy, social and therapeutic horticulture, vegetable gardening for older patients, psychosocial interventions in natural settings (mindfulness)</td>
<td>90</td>
<td>8 (7.4)</td>
<td>78 (32)</td>
<td>7.7 (7.7)</td>
<td>6.8 (7.6)</td>
<td>10 (8.1)</td>
<td>10 (8.1)</td>
</tr>
<tr>
<td>B</td>
<td>Accessible, clinically appropriate indoor nature features and settings: Conservatories, atria, balconies, green walls, vertical gardens, water walls, various nature-based art and displays</td>
<td>88</td>
<td>8 (7.6)</td>
<td>93 (30)</td>
<td>8 (7.4)</td>
<td>8 (8.4)</td>
<td>8 (8.4)</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Incorporate varying levels of sensory enrichment according to patient needs and limitations: balance of scented/unscented, coloured and edible flowering and foliage plants, textural and tactile materials (feet in grass, sand), seasonal change, running water, warming fire, breeze (smell, feel), oxygen rich, sunlight, fragrant nature objects (pine, eucalyptus)</td>
<td>88</td>
<td>8 (7.7)</td>
<td>78 (32)</td>
<td>7.5 (7.5)</td>
<td>6.5 (6.5)</td>
<td>9 (8.4)</td>
<td>9 (8.4)</td>
</tr>
<tr>
<td>D</td>
<td>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)</td>
<td>75</td>
<td>8 (8.1)</td>
<td>88 (32)</td>
<td>8 (8.3)</td>
<td>8.5 (8.5)</td>
<td>9 (8.7)</td>
<td>9 (8.7)</td>
</tr>
<tr>
<td>D</td>
<td>Educate healthcare team, management, patients, designers, policy- and decision makers about value, benefits, and appropriate implementation of nature-based opportunities</td>
<td>70</td>
<td>8 (8.3)</td>
<td>94 (32)</td>
<td>9 (8.7)</td>
<td>8 (7.8)</td>
<td>8 (8.4)</td>
<td>8 (8.4)</td>
</tr>
<tr>
<td>F</td>
<td>Socializing: Range of seating options, gathering and communal spaces, BBQ area, children play areas, semi-private enclosures for personal conversations</td>
<td>65</td>
<td>8 (8)</td>
<td>84 (32)</td>
<td>8 (8)</td>
<td>8 (8.5)</td>
<td>8 (8.1)</td>
<td>8 (8.1)</td>
</tr>
<tr>
<td>F</td>
<td>Interaction with animals: integration of bird feeders and fish tanks into the overall design (not just add-ons), contact with patients’ own pets, native wildlife, fishpond, attract native birds and butterflies, therapy dogs</td>
<td>61</td>
<td>8 (6.8)</td>
<td>79 (29)</td>
<td>8 (7.9)</td>
<td>9 (7)</td>
<td>6 (5.1)</td>
<td>6 (5.1)</td>
</tr>
<tr>
<td>G</td>
<td>Design proposal needs to address repair and maintenance requirements of nature-based features within available maintenance budgets (easy to maintain). Tasks to be carried out by skilled professionals</td>
<td>61</td>
<td>8 (8.1)</td>
<td>84 (32)</td>
<td>8.5 (8.4)</td>
<td>6.5 (6.8)</td>
<td>8 (8.1)</td>
<td>8 (8.1)</td>
</tr>
<tr>
<td>C</td>
<td>Design for flexibility (engagement and disengagement): Adjustable seating arrangements (solitary, small groups, large groups), choice of walking paths, light and shade conditions</td>
<td>49</td>
<td>8 (7.4)</td>
<td>81 (32)</td>
<td>7.2 (7.2)</td>
<td>9.5 (8.8)</td>
<td>8 (7.6)</td>
<td>8 (7.6)</td>
</tr>
<tr>
<td>A</td>
<td>Design and configuration of seating arrangements: Ergonomic, safe, movable (light but sturdy), if possible, all seating with back and arm rests, cushions where possible, options to rest and lie down (e.g., chaise longues)</td>
<td>47</td>
<td>7.5 (7.3)</td>
<td>72 (32)</td>
<td>7.5 (7.4)</td>
<td>8 (7.5)</td>
<td>8 (7.9)</td>
<td>8 (7.9)</td>
</tr>
<tr>
<td>C</td>
<td>Nature-based art and visual elements in clinical spaces: Artwork, posters, mobiles, screen images, sculpture, decal, ornamental, features, displays, nature colours and warm tones (walls)</td>
<td>42</td>
<td>7 (7.1)</td>
<td>69 (31)</td>
<td>8 (7.9)</td>
<td>7 (6)</td>
<td>7^ (6.4)</td>
<td>7^ (6.4)</td>
</tr>
<tr>
<td>C</td>
<td>Indoor design to maximize use of biophilic elements: Natural materials, natural colours, air flow (including windows that open safely), and natural light</td>
<td>41</td>
<td>8 (7.8)</td>
<td>88 (32)</td>
<td>8 (8.1)</td>
<td>8.5 (8.8)</td>
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<td>2020</td>
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<tr>
<td>A</td>
<td><strong>Barriers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Building design and site constraints, missed opportunities: Layout, building orientation, surrounding views, lack of available space were not considered in planning and development phase</td>
<td>194</td>
<td>9 (8.9)</td>
<td>9 (8.9)</td>
<td>9 (8.7)</td>
<td>7 (7.5)</td>
<td>10* (9.7)</td>
<td>10* (9.7)</td>
</tr>
<tr>
<td>B</td>
<td>Appropriate safety measures and surface materials for limited mobility: Handrails, smooth paved paths, ramps rather than steps, colour contrasting curbing along pathways</td>
<td>35</td>
<td>9 (8.1)</td>
<td>90 (31)</td>
<td>9 (8.8)</td>
<td>8 (6.5)</td>
<td>9 (8.1)</td>
<td>9 (8.1)</td>
</tr>
<tr>
<td>C</td>
<td>Cost and resource allocation: cost for routine repair and maintenance, staff and volunteer time, acquiring indoor equipment (screens, virtual reality, A/V), lack of funding, often based on fundraising and grants</td>
<td>179</td>
<td>9 (8.5)</td>
<td>9 (8.3)</td>
<td>7 (7.5)</td>
<td>9 (8.9)</td>
<td>9 (8.9)</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>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</td>
<td>141</td>
<td>9 (8.7)</td>
<td>9 (8.7)</td>
<td>9.5 (8.7)</td>
<td>8 (7.8)</td>
<td>10 (9.1)</td>
<td>10 (9.1)</td>
</tr>
<tr>
<td>E</td>
<td>Decision makers, management and administration often lack knowledge and/or awareness about benefits of nature engagement</td>
<td>175</td>
<td>9 (8.7)</td>
<td>94 (32)</td>
<td>9* (8.8)</td>
<td>8 (8)</td>
<td>9 (9)</td>
<td>9 (9)</td>
</tr>
<tr>
<td>F</td>
<td>Inauthenticity of nature-based design elements: fake plants, fake scents, tokenistic, corporate design (“cutting edge” award seeking designs)</td>
<td>58</td>
<td>8 (7.7)</td>
<td>81 (31)</td>
<td>7.5 (6.7)</td>
<td>9.5 (7.5)</td>
<td>8 (8)</td>
<td>8 (8)</td>
</tr>
<tr>
<td>F</td>
<td>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</td>
<td>53</td>
<td>9 (8.4)</td>
<td>91 (32)</td>
<td>9 (8.3)</td>
<td>8.5 (8.5)</td>
<td>9 (8.4)</td>
<td>9 (8.4)</td>
</tr>
<tr>
<td>E</td>
<td>Lack of access and/or acceptance of existing evidence (across healthcare and design disciplines)</td>
<td>50</td>
<td>8 (7.6)</td>
<td>84 (31)</td>
<td>8 (8)</td>
<td>8.5 (6.8)</td>
<td>7 (7.3)</td>
<td>7 (7.3)</td>
</tr>
<tr>
<td>E</td>
<td>Designers: Lack of training to deliver effective and appropriate design solutions</td>
<td>47</td>
<td>8 (7.4)</td>
<td>77 (31)</td>
<td>7.5 (6.9)</td>
<td>6 (6)</td>
<td>8 (8)</td>
<td>8 (8)</td>
</tr>
<tr>
<td>D</td>
<td>Poorly located and difficult to find outdoor spaces, no clear wayfinding and signage for outdoor spaces</td>
<td>42</td>
<td>8 (7.8)</td>
<td>72 (32)</td>
<td>9 (8)</td>
<td>8 (7.8)</td>
<td>9 (8.3)</td>
<td>9 (8.3)</td>
</tr>
<tr>
<td>A</td>
<td>Refurbishments constraints: Existing facilities can present limited options for adaptations and design solutions</td>
<td>41</td>
<td>8 (7.2)</td>
<td>80 (30)</td>
<td>8 (7.4)</td>
<td>8 (7.8)</td>
<td>8 (7.4)</td>
<td>8 (7.4)</td>
</tr>
<tr>
<td>E</td>
<td>Prevailing healthcare model requires more evidence (convincing economic justification) to warrant inclusion of nature-based opportunities (only 'soft' evidence available)</td>
<td>39</td>
<td>8 (7.4)</td>
<td>81 (31)</td>
<td>8 (7.8)</td>
<td>4* (4.5)</td>
<td>7 (7.6)</td>
<td>7 (7.6)</td>
</tr>
<tr>
<td>H</td>
<td>Different aesthetic sensibilities: cultural, age, gender, socioeconomic, personal preferences, some people don't value nature as much</td>
<td>39</td>
<td>6* (6)</td>
<td>48 (31)</td>
<td>6* (5.7)</td>
<td>5.5 (5)</td>
<td>6* (6)</td>
<td>6* (6)</td>
</tr>
<tr>
<td></td>
<td>Adverse reactions and increased sensitivity due to treatment: Skin sensitivity, chemical sensitivity (artificial fragrances), photosensitivity, smell (strong flower fragrance), noise</td>
<td></td>
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<tr>
<td>L</td>
<td>39</td>
<td>7 (6.7)</td>
<td>69 (32)</td>
<td>7 (6.3)</td>
<td>5.5 (5)</td>
<td>8 (7.8)</td>
<td>8 (7.8)</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Champion (advocate) needed</td>
<td>38</td>
<td>8 (7.8)</td>
<td>81 (32)</td>
<td>9 (8)</td>
<td>9.5* (9.3)</td>
<td>8 (7.8)</td>
<td>8 (7.8)</td>
</tr>
<tr>
<td>A</td>
<td>Limited availability of outdoor spaces (dense urban areas)</td>
<td>29</td>
<td>7.5 (7)</td>
<td>71 (31)</td>
<td>7.5 (6.9)</td>
<td>8 (6.5)</td>
<td>8 (8)</td>
<td>8 (8)</td>
</tr>
<tr>
<td>E</td>
<td>Not prioritized in construction and development phase of healthcare projects</td>
<td>26</td>
<td>8 (7.8)</td>
<td>93 (30)</td>
<td>8.5 (7.9)</td>
<td>7.5 (8)</td>
<td>9 (8.3)</td>
<td>9 (8.3)</td>
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<tr>
<td>G1</td>
<td>Mainstream values (decision makers) don't prioritize nature-based opportunities or “design thinking”</td>
<td>23</td>
<td>8 (8.3)</td>
<td>91 (32)</td>
<td>9 (8.4)</td>
<td>9.5* (9.3)</td>
<td>8 (8.2)</td>
<td>8 (8.2)</td>
</tr>
</tbody>
</table>

*highest rated items; ^lowest rated items
CHAPTER 9 Synthesis and Discussion

9.1 Overview
The previous chapter presented expert-developed nature-based recommendations. This chapter concludes the thesis by synthesizing findings from this program of research. The first section details an overview of the five individual studies undertaken in phases 1 and 2. Next, concept analysis methodology is described and the synthesis results presented in the form of a consolidated, conceptual framework. Finally, Section 9.3 discusses the findings and outlines the limitations and challenges encountered in the thesis. Future research recommendations are given and the final conclusions stated.

9.2 Research Summary and Synthesis

9.2.1 Outline of the Thesis Program
The thesis produced six publications of which five are relevant to the final synthesis (Table 4). The paper not included in Table 4 (Blaschke, O'Callaghan, & Schofield, 2017) reports on the e-Delphi methodology development and as such does not contribute to the conceptual framework that follows. Each of the five studies investigated issues concerning nature engagement in oncology contexts and reports on primary data and new understandings based on existing evidence relevant to the topic. The following sections refer to the included studies as numbered in Table 4, or by their respective chapter numbers.

Table 4
Overview of studies included in phases 1 and 2 of the thesis

<table>
<thead>
<tr>
<th>Focus</th>
<th>Participants</th>
<th>Data collection</th>
<th>Method</th>
<th>Contribution</th>
<th>Chapter (Reference)</th>
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</thead>
<tbody>
<tr>
<td>Cancer patients’ descriptions of nature experience</td>
<td>240 cancer patients across 11 studies</td>
<td>Literature review</td>
<td>Systematic literature search and meta-synthesis</td>
<td>Theory</td>
<td>Study 1 Chapter 4 (Blaschke, 2017)</td>
</tr>
<tr>
<td>Cancer patients’ descriptions of nature experience</td>
<td>20 patients</td>
<td>Semi-structured interviews</td>
<td>Grounded Theory</td>
<td>Theory</td>
<td>Study 2 Chapter 5 (Blaschke, O'Callaghan, Schofield, &amp; Salander, 2017)</td>
</tr>
<tr>
<td>Patients’ recommendations for nature-based care opportunities</td>
<td>20 patients</td>
<td>Semi-structured interviews</td>
<td>Deductive content analysis</td>
<td>Patient-reported recommendation</td>
<td>Study 3 Chapter 6 (Blaschke, O’Callaghan, &amp; Schofield, 2017b)</td>
</tr>
</tbody>
</table>
Reactions to nature-based design intervention in oncology waiting room

<table>
<thead>
<tr>
<th>Experts’ recommendations for nature-based care opportunities</th>
<th>73 patients, 13 staff, 52 carers, 5 ‘other’</th>
<th>Questionnaire</th>
<th>Descriptive statistics</th>
<th>Nature-based intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study 4 Chapter 7 (Blaschke, O’Callaghan, &amp; Schofield, 2017a)</td>
<td></td>
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</tbody>
</table>

9.2.2 Method for Synthesis

The thesis produced a mix of interrelating qualitative and quantitative findings. A final step in drawing together this multi-phase research requires a synthesis of the findings. Drawing on outcomes from phases 1 and 2, the most salient concepts are extracted to construct a conceptual framework.

The framework was developed using a systematic approach for further developing the theoretical concepts resulting from Studies 1 and 2 (Chapters 4 and 5) in light of new insights into the uptake of a nature-based design intervention in an oncology waiting room gained in Study 4 (Chapter 7), and cancer patient and healthcare expert recommendations for nature-based care opportunities developed in Studies 3 and 5 (Chapters 6 and 8). Concepts are theoretical formulations, which organize inherent elements of empirical experience through representing shared attributes and patterns of a given phenomenon (Morse, 1995, p. 35). Clear conceptualization of ideas allows categorization, which is important for ordering our understanding and enabling deeper grasp of a phenomenon (Walker & Avant, 1995).

A two-step process was employed to develop concepts that derive from relevant theory and patient-reported data while grounding in practice to maintain clinical relevance (see Figure 3). Firstly, using concept development methodology (Walker & Avant, 1995), salient themes and categories were extracted from the theoretical body of work (Chapters 4 and 5) with the aim to glean existing patterns and relationships within the data and generate new formulations of understanding (concepts). Following an iterative procedure for qualitative concept synthesis (Rodgers, 1989), extracted data sets were clustered according to their conceptual and descriptive similarities and further categorized into new summarizing formulations. 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 two, patient-reported recommendations (Chapter 6) and expert-developed recommendations (Chapter 8) were re-read and analysed to determine their points of convergence (overlaps) and divergence. Data sets 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.

Figure 3. Schematic illustration of two-step process for determining and linking patient needs with patient and expert recommendations.

9.2.3 Synthesis of Theoretical Findings

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 (Chapter 5) 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 human HN 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 captures an innate capacity and desire to draw on nature as a familiar and safe context to mentally and physically explore the threat posed by cancer, and to normalize a life and future now changed by it. This proposition suggests patient-nature interchanges that espouse nature as a resource for dealing with variously challenging cancer experiences.

Studies 1 and 2 contributed qualitative data from 260 cancer patients (240 and 20 respectively) across the lifespan with varying diagnoses, including survivors and palliative care 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. Noteworthy are shared ideas arising separately from both investigations, which confirm and reinforce the salience of core concepts contained in the findings. Figure 4 schematically illustrates the synthesis process, which elucidated points of convergence between the two sets of qualitative findings from phase 1. Further detail is reported in Appendix 17. Five newly formulated concepts resulted to describe important patient needs, which represent 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 normalizing 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 4](image)

*Figure 4.* Schematic illustration of the synthesis procedure that yielded five new concepts (A-E) from 10 themes (T1-T10) and 27 categories.

<table>
<thead>
<tr>
<th>Concept (patient need)</th>
<th>Description</th>
<th>Origin (see Appendix 17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Meaningful connections</td>
<td>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</td>
<td>Study 1: T1, T1.2, T1.3, T1.4, T1.5 Study 2: T9.25</td>
</tr>
</tbody>
</table>
anticipated futures.

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

9.2.4 Synthesis of Practice-Based Perspectives
Study 4 (Chapter 7) contributed 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 experiment further showed that, from a managerial perspective, nature-based design interventions are feasible and can be actioned at minimal cost with very little to no ongoing maintenance burden.

Study 3 (n=20) (Chapter 6) contributed patient-reported, and Study 5 (n=38) (Chapter 8) 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 oncology care and resulted in ten expert recommendations for opportunities and ten implementation barriers rated of highest importance according to expert views. Figure 5 schematically illustrates points of overlap between patient and expert recommendations and presents their collective concerns. A summary is included in Table 5 and further descriptive detail can be found in Appendix 17.
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 included: 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 included: caution around allergic reactions, negative triggers (memories), overwhelm when engaging with nature, and sensory overstimulation. Table 6 outlines overlapping opportunities (n=5) and barriers (n=4) reported by both patients and experts.

![Figure 5. Schematic illustration of overlaps between patient and expert recommendations.](image)

Table 6

<table>
<thead>
<tr>
<th>Expert recommendation (Study 5, Chapter 8)</th>
<th>Patient recommendation (Study 3, Chapter 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opportunities</strong></td>
<td></td>
</tr>
<tr>
<td>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)</td>
<td>Views to nature</td>
</tr>
<tr>
<td>2. Indoor design to maximize use of biophilic elements: natural materials, natural colours, air flow (e.g., windows that open safely), and natural light</td>
<td>Natural design features (other than water)</td>
</tr>
<tr>
<td>3. Physical exercise adapted to patient requirements: stroll garden,</td>
<td>Physical activity</td>
</tr>
</tbody>
</table>
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

### 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)

### 5. Socializing
- range of seating options, gathering and communal spaces, BBQ area, children’s 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

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

3. **Inauthenticity of nature-based design elements:** fake plants, fake scents, tokenistic, corporate design (“cutting edge” award seeking designs)

4. **Mainstream values (decision makers) don't prioritize nature-based opportunities or “design thinking”**

### Desired engagement (sensory and private)

### Social opportunities

### Appropriateness

### Safety

### Healthcare investment (misguided)

### Not valued / not interested

---

9.2.5 Synthesis of Theoretical Findings and Practice-Based Perspectives

The final synthesis process draws together phase 1 and 2 results into a consolidated framework. It organizes patient and expert recommendations around new formulations of salient patient needs (Figure 6).

The five newly formulated concepts describing patient needs, include (A) Meaningful connections, (B) Distance from clinical cancer experiences, (C) Meaning-making, (D) Finding comfort and safety, and (E) Vital nurturance. Synthesis of patient and expert recommendations resulted in nine shared recommendations, which may be used to address the identified patient needs and concerns. Eleven additional patient-reported recommendations are compiled to complete the framework by attending to the beneficial and adverse (and more human) experiential qualities of patients’ nature experiences.

The synthesized concepts illuminate care needs reported in the context of patients’ nature experience. Interestingly, some incongruity was found between recommendations contributed by patient and those contributed by experts. Perhaps, unsurprisingly, experts considered more practical aspects of nature-based opportunities, while patients focused on more human and experiential qualities such as sensory contact with water, nature art experiences, sensory
overstimulation, and negative triggers when engaging with nature. To integrate expert knowledge with the attendant patient values, the framework includes their joint (overlapping) views but also includes additional patient contributions from Study 3 (indicated with * in Figure 6).

![Figure 6. Conceptual framework for adopting nature-based care opportunities in oncology design and practice (*indicates additional patient contributions from Study 3).](image)

### 9.3 Discussion

The thesis findings can be connected with discourses discussing human responses to nature as discussed in Chapter 2. The proposed framework corresponds with theories about nature’s role in human cognitive restoration (ART), positive affect and arousal (AAT), and bonding and explorative behaviour (Attachment theory). Broadly speaking, the findings lend support for the diversely theorized human responses to nature as proposed by Bio-psycho-evolutionary theory and Attachment theory (Chapter 2). The variety of patient-nature interchanges, and motivations for these interactions, were captured comprehensively in the research project and show the multitude of reasons patients possess to engage with nature. Patients articulated a range of benefits they derived from these interchanges. 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 were shown to help restoration from mentally and physically exhausting clinical experiences (cognitive pathway, ART) (Chapter 5). The framework’s concept E (Vital nurturance) describes patients finding vital nurturance when engaging with nature. To this end, a connection can be made with the human predisposition for an affinity with 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 (Chapter 7). While experts recommended caution when using fake plant design materials to avoid tokenism and inauthenticity (Chapter 8), on the whole, patients did accept fake plants as an alternative in situations where real plant materials are deemed clinically unsafe (Chapter 7). However, patients showed preference for natural settings or nature-inspired spaces such as provided by adjoining healthcare gardens for retreat and physical activity (physical or aesthetic pathway, AAT) (Chapter 6). 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 (Chapters 4 and 5). The GT findings (Chapter 5) show how patients use and explore nature in various symbolic and metaphoric ways to reconstruct self-identities that incorporate their cancer experiences (intrapsychic pathway, Attachment theory).

These findings compare with existing literature investigating how the physical oncology environment addresses cancer patients’ support needs. Edvarsson, Sandman, and Rasmussen (2005) investigated the role of the physical oncology environment in cancer care processes. The study analysed data from sixty-two interviews and seven focus groups with patients, carers, and staff and employed GT methodology to explain how experiences of the oncology setting can contribute to the “processes of supportive care settings” (Edvardsson et al., 2005). Analysis showed that the physical oncology environment facilitates “experiences of being able to locate oneself in familiar surroundings, being able to follow one’s own rhythm” (p.374) when the conditions are created for “sensing an atmosphere of ease” (Edvardsson et al., 2005, p. 347). The framework resulting from this thesis integrates with these findings in that it captures several core patient needs that might be responded to through considerate design of the physical environment. Conducive environments, experiences, and atmospheres can be curated using nature-based or other materials.

The intrapsychic importance of constructively dealing with cancer’s impact is shown by P. Baker et al. (2016) and integrates with aspects of the proposed framework. 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 (P. Baker et al., 2016). The study showed how existential meaning-making experiences play out in the curative setting, which have been previously studied in the palliative care setting (Breitbart, Gibson, Poppito, & Berg, 2004; LeMay & Wilson, 2008). The core finding explains a process of “getting back to normal.” Two patterns of normality are described as maintaining continuity with pre-cancer identities and constructing new identities that incorporate cancer experiences: a “new normality.” The study showed that the two patterns exist and unfold simultaneously and in contradictory ways (P. Baker et al., 2016, p. 1). Drawing on Winnicottian theory (Winnicott, 1971), the authors theorize an internal space in which the patient finds safety in order to “play with” different realities in an effort to construct and normalize a shifting identity. Patients in Study 1 (Chapter 4) and Study 2 (Chapter 5) reported accessing nature as a familiar context in which to address the immediate and deeper tasks associated with cancer diagnosis. Some patients used nature as an additional support in the
interval between initial diagnosis and acceptable integration of the cancer experience (Chapters 4 and 5).

It is not unfathomable that people use their physical environments for accomplishing creative and adaptive enterprises. A study of 63 children aged 9 to 17 years old explored how participants use their environment for self-regulation and identity formation (Korpela, 1989). Children used place-bonding mechanisms in order utilize their physical environment to “clear one's mind … in order to 'find oneself' and to create coherence for one's self” (Korpela, 1989, p. 241). The physical environment enabled “psychic self-regulation” through children’s internal play that was geared toward “humanizing it, fixing memories in it, and naming it” (Korpela, 1989, p. 241). Children’s strategies to recruit their physical environment for psychic self-regulation connects with the abovementioned findings about patients’ identity construction and normalization (P. Baker et al., 2016) as well as the insights gleaned from the GT developed in this thesis (Chapter 5).

It bears mention that the concepts contained in the final framework (Figure 6) may not concern patient needs, which can be addressed with nature-based responses only. They may refer to more basic human needs and processes, such as those of identity-construction and self-regulation, which unfold more centrally in cancer patients’ greater life contexts rather than in specific nature experiences only. This issue was raised in a reviewer critique (Appendix 18) received during the publication process of the GT study (Chapter 5), which asked whether the identified patient needs could be equally addressed with non-nature-based responses. This prompt exposes a deeper challenge in HN research. Ulrich’s (1984) seminal “nature view” study is a good demonstration of the issue. His early study showed better outcomes for patients recovering from surgery when having a window view to nature as compared to a brick wall (Ulrich, 1984). The exact cause for the better outcomes (viz., shortened length of hospital stay and fewer strong pain medications), however, is not deducible from the findings. As it stands, the positive outcomes were contingent on the view not being a brick wall. No claims can be made about a nature view per se having caused the effect. Likewise, other research using combinations of visual nature imagery with or without nature-based or other sound accompaniment assessing the effectiveness of distraction therapy during clinical procedures (Diette et al., 2003; Miller et al., 1992; Saadatmand et al., 2013) cannot explain nature per se to be causing the successful outcomes.

The question arises: To what degree, if any, is nature contributing to the outcome? 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 analysis showed that the lower stress levels when viewing indoor plants as compared to the control condition were mediated by “perceived attractiveness of the room” (Dijkstra, Pieterse, & Pruyn, 2008, p. 279). 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 Chapter 7 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” (Chapter 7). 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” (Lechtzin et al., 2010, p. 975). 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.

Several other questions arise in this context: Does artificial nature qualify, or should it qualify, as nature? Are artificially administered experiences categorically nature experiences? Currently, artificial plant representations, such as nature art (Lee et al., 2004), nature sounds (Rejeh et al., 2016), and nature screens (Lechtzin et al., 2010) 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.

To close the discussion, a final question needs stating: What does it matter? 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 thesis 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. In this way, the thesis may meaningfully contribute to cancer patients’ lives and avoid merely “brightening an inconsequential corner” (Adams, 1987, p. 41).

9.3.1 Limitations

All aspects of research has limitations. Some can be mitigated, some not. This section describes the limitations on the research undertaken and describes steps taken to mitigate them.

One important limitation relates to the research field itself. Its relatively short track record of scientific investigation lends little high-quality evidence to build upon and orientate towards. The available qualitative evidence was found to be limited, and available research showed variable study designs. As explained in Chapter 4, methodological rigour, when judged against the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines (Tong, Sainsbury, & Craig, 2007), is relatively weak across the qualitative body of literature relating to cancer patients’ nature experiences (Chapter 4). Particularly, researchers’ reflexive practice remains critically unreported with only few studies describing strategies used for verifying findings (Ray & Verhoef, 2013; Unruh & Hutchinson, 2011). The mentioned shortcomings hamper transferability and weaken credibility of findings. Unclear application and incomplete reporting of methodology foreclose good guidance for researchers who,
therefore, cannot operate the levers of evidence and precedents when designing future studies. These limitations were addressed in several ways in this thesis. First, specific attention was paid to describing reflexive practice and verification strategies (Chapter 5). Second, methodology for the core studies in phases 1 and 2 were carefully considered and are reported in greater detail in the respective Methods sections in Chapter 5 and 8.

The thesis adopted an exploratory theory-building approach, which privileges qualitative inquiry. This design holds key advantages for addressing the research objective, however, there are downsides too. Prioritizing qualitative inquiry means the findings have limits in their generalizability to other cohorts and settings. This affects the utility and transferability of findings in a theoretical and practical sense. No claims can be made about the relevance or suitability of findings to larger or different cohorts, or to different settings. The framework cannot be considered directive across contexts. One mitigation strategy included purposive and negative case sampling, which aims to maximise the range of data (maximum variation sampling) (Chapter 5). Here, critically dissimilar instances of the phenomenon were interrogated to identify significant variation, which could be present in larger populations.

Limitations in the cross-sectional questionnaire survey study relate to the convenience sample recruited in the oncology waiting room (Chapter 7). Likely this sample represents self-selected respondents who participated based on an interest in the nature-based intervention, and likely a favourable one. Based on the predominantly positive responses, the sample may not be representative of those who felt ambivalent or negatively impacted by the intervention. Participation was mostly self-initiated or invited by volunteers who distributed questionnaires in the waiting room (see Approach Script, Appendix 19). An effort was made by myself to randomly approach waiting room users and explain that the survey sought to include negative responses and therefore valued participation of users with ambivalent or negative views.

Lastly, the e-Delphi Study (Chapter 8) highlighted that contributions of experts diverged from those of cancer patients. Notably, experts did not fully address nor equally appraise the experiential qualities contributed by patients, which they reported benefitting from. This finding suggests misalignment of patient needs with healthcare experts’ perceptions and responses to them. To give recognition to unique patient values, the final analysis in this chapter captured patient concerns separately and they were included in the resulting framework (Figure 6).

9.3.2 Challenges
All research encounters challenges and is liable to external and internal threats. Some can be anticipated, some not. An ever-present challenge facing any qualitative researcher who explores human subjective experience is applying appropriate methodology able to achieve the objective. The GT study presented in Chapter 5 exemplifies this challenge. The objective was to study cancer patients’ subjective nature experiences, which required careful study of first-person experience. Phenomenology is appropriate for in-depth study of subjective experience (that is, description of the essences of common experiences), while GT is best suited to study and formulate theoretical expositions about processes or how actions unfold.
over time (Creswell, 2012). The specific study objective could have been achieved with a phenomenological inquiry; however, GT methodology was chosen because it better suited the overall thesis aim to develop more broadly applicable and translatable understanding. The study was at danger of blurring the two domains and methodologies. My own predisposition to psychoanalytic interpretation of experience regularly veered into phenomenological thinking, which further challenged adherence to GT procedures. Following the GT protocol outlined by Corbin and Strauss (2007) (as explained in Chapter 5) was helpful in maintaining methodological consistency.

By way of investigating patient and expert views separately in Chapter 6 and Chapter 8, it was possible to find overlaps, and importantly, determine points of divergence. The difference in patient and expert responses created the challenge to treat both views equally and not prioritize expert over patient views, or vice versa. A consistent commitment was required to remain firmly grounded in patient views while also being fully considerate of expert views as the study progressed toward more collaborative, multi-stakeholder approaches in the second phase.

Researcher biases can challenge the integrity of a research project. Qualitative research traditionally includes a statement by the researcher about her own relationship to the subject matter (Husserl, 1931). To this end, three disclosures are relevant. First, my early educational and professional choices to become a landscape architect were motivated by my own positive experiences with nature and from having observed transformative processes in others who engaged with nature. This bias likely impacted on my research process. Second, the gap between my own background and the clinical research setting is significant. My transfer from the field of Architecture & Design to the field of Cancer Experiences Research occurred six months after commencing candidature. Unlike healthcare researchers who have knowledge, experience, and skill in their respective healthcare cultures, I started out with none. This lack of clinical exposure and clinical research skill presented major threats to the project and drew heavily on my personal time and energy resources for attaining a necessary familiarity with the clinical setting and the relevant research skills. Lastly, the divide between myself and persons living with cancer represented a barrier to understanding their lived experience. I cannot claim to own a lived cancer experience and this limits the depth of understanding I was able to achieve about such experiences, which may have impeded on the interpretive procedures during theory development.

9.3.3 Implications for Future Research
Building theory is invaluable for designing impactful studies (Daveson, O’Callaghan, & Grocke, 2008). Advancing theoretical understanding about the particular mechanism at play in restorative nature experiences in the cancer context can assist the development of effective interventions and guide appropriate selection of outcomes and measures. High-quality and well-designed qualitative research is needed to further build knowledge inclusive of relevant cohort, context, and time specific data. Importantly, faithful adherence to method is needed to ensure accurate results admissible as sound evidence.
Generating clinically relevant knowledge requires research to be carried out in clinical settings with clinical populations. Understanding the specific and unique challenges relating to the oncology setting cannot come from research undertaken in other settings. An appropriate closeness to the patient perspective and patients’ actual ongoing clinical experiences is not achievable from afar. Integrating HN research into the field and setting of Cancer Experiences Research presented a move toward capturing more fully and empirically HN phenomena across different oncology settings and populations.

Randomized controlled trials (RCTs) are accepted as gold standard in clinical research and may be tentatively considered in HN research for increasing rigour and impact. RCTs offer robust research design, process, and outcomes, which can be taken up by diverse readership. However, RCTs are at risk of neglecting important contextual factors and not accounting for context-specific outcomes. Chapter 2 has discussed the complex nature of HN interventions. Some variables cannot be controlled for nor administered and studied in isolation, which renders purist RCT designs questionable in the context of HN research. Swedish HN researchers Annerstedt and Währborg (2011), have put forward recommendations for designing HN research based on standards and expectations of rigorous healthcare and medical research. Their aim is to achieve greater “conformity among studies” (Annerstedt & Währborg, 2011, p. 385). To this end, their proposal is to adopt the Medical Research Council (MRC) Framework for Developing and Evaluating Complex Interventions (Craig et al., 2008). The MRC Framework includes process evaluation in health services research and uses multiple measures for context-specific outcomes (Craig et al., 2008). Appendix 20 provides an example study design for developing and evaluating nature-based cancer care interventions based on the MRC framework.

Complex healthcare intervention research ideally uses a collaborative, mixed-method, and stakeholder-participatory lens, which sounds as compelling as it is challenging. In particular, the e-Delphi study (Chapter 8) demonstrated how potential bias can result from a one-sided investigation where different stakeholder contributions are unequally weighted. The reasonable probability for a different or skewed result when privileging certain types of input over others needs consideration. Different streams of investigation, therefore, need to be weighted according to the needs of individual research projects. Oncology design innovation requires collaboration between healthcare and design disciplines. The exact degree of discipline and stakeholder blending, and the weighting of research strands (qualitative and quantitative) may require further examination to ensure thorough and complete treatment of pertinent issues. Future research needs to sensitively consider procedures that foster productive collaboration.

In summary, HN research requires pragmatic approaches to designing robust and collaborative studies, which combine with patient-centric lenses and keep a sharp focus on clinically relevant outcomes that are on par with medical research standards. Theoretically informed and empirically driven scholarship can produce high-quality, contextually sensitive (clinical), and descriptively rich evidence. Such research outcomes hold promise to meaningfully contribute to HN cancer experiences research.
9.3.4 Conclusion
This thesis has described HN as an emerging and expanding field of research, which aims to explore nature’s impact on health and wellbeing. Globally, cancer incidence and corresponding demand for innovative care solutions are increasing. Given preliminary evidence for positive outcomes related to contact with nature for cancer populations, research is aiming to develop 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.

Inquiry into patient experience is gaining attention and greater traction in oncology supportive care and healthcare design research. Increasingly, the 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 experiences becomes more acute when the imposing cancer circumstance produces feelings of insecurity and uncertainty and is perceived as inescapable. Patients place high importance on organizations providing a substantive response to mitigate unnecessary suffering caused by the clinical settings itself. Health systems that sensitively respond to these oft-neglected human experiences are challenging to create and require deep levels of inquiry and collaborative ingenuity.

The overarching objective of this thesis was to generate a fuller knowing about nature’s role in cancer patients’ health and recovery experiences. The resulting conceptual framework synthesizes salient findings across five individual studies constituting this thesis. New theoretical understanding and empirical content from patient- and expert-reported data about nature-based oncology supports are captured in the framework. This may guide healthcare practitioners, designers, researchers, and patients themselves to creatively and practically participate in future oncology care practice and design. These findings provide evidence for multiple uses of nature as a supportive aid in the cancer care context. The thesis provides concrete recommendations for the application of nature-based concepts in future oncology setting design and may be considered when developing additional psychosocial and existential support services.
References


Appendices
Appendix 1 Phase 1 Study Protocol

Study protocol entitled ‘The Relevance of Nature in the Lives of People Affected by Cancer’ approved by Peter MacCallum Human Research Ethics Committee following low-risk ethics review. The protocol outlines study procedures and measures to ensure ethical conduct of all research aspects concerning qualitative data collection in phase 1, which resulted in the Grounded Theory study (Chapter 5) and the Patient-Reported Recommendation study (Chapter 6). Procedures for the cross-sectional survey study (Chapter 7) were included in this protocol and approved by Peter MacCallum Human Research Ethics Committee after submission of the amendment.
The Relevance of Nature in the Lives of People Affected by Cancer

Date: 1 May 2015  
Project Number: 15/14L  
Coordinating Principal Investigator:  
Sarah Blaschke, PhD Student, Department of Cancer Experiences Research, Peter MacCallum Cancer Centre.

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1. STUDY OBJECTIVES
This study explores the relevance of nature in the lives of people affected by cancer and looks at how nature can be integrated into cancer care environments to expand patient-centred models of care.

The aim is to create in-depth understanding of how contact with nature serves, or does not serve, people confronting cancer diagnosis in a sample of 30 - 40 patients. By first obtaining this knowledge, the project can proceed to develop and test a nature-based intervention in clinical cancer care environments and evaluate its acceptability and feasibility.

The overall rationale for this project is to improve the healthcare environment and patient experiences by making nature accessible through design and architecture and/or sensory stimulation.

2. BACKGROUND
Worldwide, 14.1 million new cancer cases were reported in 2012, which did not include 32.6 million people already living with cancer at that time [1]. As a result, cancer has become one of the leading causes of death accounting for 22% of all non-communicable disease deaths in 2012 [2]. Reducing the burden of cancer and supporting those affected by cancer has become a healthcare priority and requires
low cost but high quality solutions, which need to not only cure but also prevent
disease and maintain or even improve patients’ quality of life for as long as possible.
In light of these global developments and shifting healthcare demands, it is useful to
investigate options that can address these demands and extend high quality
supportive services.

The positive effect of nature on health and wellbeing is described by Maller et
al [3]: “In the context of the growing worldwide [mental illness] burden of disease,
contact with nature may offer an affordable, accessible and equitable choice on
tackling the imminent epidemic, with both preventive and restorative [public] health
strategies”. Herzog supports this appeal by re-stating nature as a restorative and
often underappreciated health resource [4]. Such health strategies or interventions
adopt a salutogenic paradigm, which means to focus on the development of a
person’s own resources rather than focusing exclusively on the disease [5]. Thereby
a person is offered help to improve and maintain a healthful state even when
subjected to pathogenic biological or psycho-social stressors [6].

Following treatment, some people can face life-long health issues and
challenges as a result of their cancer, their exposure to cancer treatment toxicity, co-
morbid health conditions and late and long-term side effects. Cancer patients and
survivors may experience physical, psycho-social and mobility adjustments that
impact their daily lives and compromise their wellbeing and quality of life [7, 8]. Given
compromised physical and psychosocial functioning and the adverse effects on
wellbeing and quality of life, the potential beneficial effects of contact with nature
could have particular relevance for cancer populations.

An existing body of research underpins the claims of health benefits and
improved health outcomes through exposure to nature. Findings from studies of
mixed clinical populations have shown positive association between nature exposure
and lowering physical discomfort during surgical procedures [9-13], reduced length of
hospital stay [14, 15], reduced strength of pain medication [15, 16], improved
psychological wellbeing [17-19], improved positive affect and mood [20, 21]
improved social wellbeing [22], stress reduction [23], and reduction in healthcare
usage [24]. Furthermore, some literature suggests that nature in healthcare settings
may improve healthcare service satisfaction [25, 26].

Concurrent with this literature is a small but growing body of empirical
research about the effects of contact with nature for cancer populations, specifically.
One study piloting a one-year long gardening intervention for 12 cancer survivors
showed nature exposure to improve physical functioning in 90% of participants in three out of four functioning tests and 60% of participants increased their physical activity by ≥ 30 minutes/week. Increase in fruit and vegetable consumption was recorded for 40% of participants [27]. Evidence shows exercise and physical activity to have beneficial effects on cancer prevention [28] and can improve quality of life [28, 29].

One study reports nature and contact with the outside to impact quality of life of advanced cancer patients [30]. The same study suggests that patients who are unable to access outdoor environments can similarly benefit from views to the outside and artwork depicting nature scenes and nature elements.

A randomized-controlled trial of a nature-based intervention for breast cancer patients showed that participants in the intervention group had a greater capacity to restore attention, when exposed to natural environments for 120 minutes per week, compared to standard care only [31]. Challenges associated with attention fatigue and loss of concentration in cancer patients have been reported elsewhere [32].

No studies have specifically addressed the potential for natural environments in cancer care settings to promote social contact, however, one post-occupancy evaluation of a children’s cancer hospital garden has observed this outdoor environment to primarily provide opportunities for parents and children to spend time with each other and for children to interact with other children [33]. Findings from other healthcare contexts suggest outdoor environments increase opportunities for social activity because they are private places to be visited by patients and family members [34] and they are safe places for social interaction [35]. It has been recognized that social support impacts positively on patients’ quality of life [36] and having strong social networks may lower mortality rates after diagnosis [37].

3. METHODOLOGY

3.1 Project design
A two phase sequential exploratory study with mixed methods approach [38] comprising a qualitative interview-based study followed by an implementation study of a complex intervention. This ethics application concerns the first phase only, the interview-based study, which is described below.
3.2 Semi-Structured Interviews

The semi-structured interview will be conducted by the Principal Investigator (PI) and will follow an interview schedule (Appendix A). The schedule is expected to change as data becomes available the research explores novel information which arises in the ongoing interviewing and analysis process. If participants are not able to attend a face-to-face interview session, the interview can also be conducted over the phone. The interviews will be recorded using an Iphone/Ipad recorder app and transcribed for analysis.

Patients will be asked to consider their nature experiences and the importance of nature in their lives. First, they will be asked to explain what nature means to them. They will then be introduced to a working definition of ‘nature’. The definition will be explained to them in plain-language and they will be assured that there are not right or wrong answers. Participants will be asked about the types of nature experiences they found helpful before cancer diagnosis and whether they still find these helpful or not. The benefits patients associate with their nature interactions will be elicited. These could include physical (incl. sensory), psychosocial and spiritual benefits and it is up to the participant to describe these. Further questions will address nature as a potential self-care strategy and if this is seen as useful or not. Finally, participants will be asked what practical recommendations they have for integrating nature into the cancer care environment, if any.

3.3 Observation and Survey of PeterMac’s Green Features and Outdoor Settings

PeterMac offers 3 sites where patients, staff and visitors are able to have contact with the outdoors or engage with nature features. A survey questionnaire will capture the use, preferences and experience values of these spaces.

The overall rationale is to understand if and how patients, staff and visitors value the availability and the features of these types of outdoor spaces and green features in the care setting. Such findings are relevant to the research project because they are directly linked to peoples’ relationship with nature and they provide insight into the effectiveness and appropriateness of such opportunities in the hospital. Furthermore, this data can corroborate findings from the interview study in phase 1 and inform phase 2 of the research project.

3.3.1 Questionnaire Design
The questionnaire includes:
- Demographic information: a) Role at PeterMac b) Gender c) Number of visits to PeterMac d) Age e) Postcode and f) Private health insurance.
- 6 closed-ended (yes/no or Likert-type scale) and open-ended questions: a) Frequency of visits b) Initial reaction upon arrival c) Type of activity and d) Further comments
- 8 statements about the sites rated on a 5 point Likert-type scale (strongly agree to strongly disagree)
- Semantic differential scale using 6 pairs of descriptive words relating to the sites
- 6-item mood scale

Reasoning for including demographic information: Postcode
Initial findings from the semi-structured interview study indicate differences between patients from rural areas and patients from urban/inner city areas. To further explore the relevance of this finding, a 'Postcodes' option is added to the questionnaires.

Reasoning for including demographic information: Private health insurance
To allow for a multi-site study in phase 2, which can strengthen the survey findings, a 'Private health insurance' option is added to the questionnaires. This can control for participants’ socio-economic background when introducing another survey site such as Cabrini Hospital and it can also show if there are any differences in what patients prefer and value depending on their socio-economic status.

Reasoning for including Mood Scale
In order to investigate how participants’ current mood affects their experience of these spaces, a short 'Mood Scale' is added at the end of the questionnaires. This information can show if these spaces have any particular relevance for participants who are feeling ie. distressed and how they find them helpful or not.

3.3.2 Greening Initiative Survey
Anonymous feedback will be collected during a ‘greening’ initiative in the specialist clinic. This initiative will aim to improve the waiting and working environment by installing green features with artificial plants. The survey questionnaire will capture patient, visitor and staff opinions and ask questions about how they experience these....
changes and if they find them helpful or not (Appendix D). The data will provide insight into how the initiative was received, its effects and appropriateness in the clinical setting. It will also give valuable information about the role and impact of these types of ‘nature’ features in the care setting.

Any changes to the specialist clinic will be organised in consultation with the relevant clinic manager to guarantee compliance with PeterMac's health & safety policies.

Procedures
Survey questionnaires will be placed visibly in the waiting room and a collection box will be provided to return the completed forms. The PI will be responsible for all collection procedures such as stocking up survey forms and emptying the collection box. It will be up to the patients and visitors to decide whether they want to fill out the survey questionnaire during their waiting time or not.

Survey Testing
The PI will follow a validated cognitive testing process [39] to ensure the survey questionnaire fulfils its purpose. 5 specialist clinic patients will be asked to give feedback about their question-and-answer process relating to comprehension, retrieval, judgement and response [39]. The PI will sit with the patient while they fill out the survey questionnaire and ask the patient questions and encourage the patient to think-aloud. The survey questionnaire may be improved (i.e. wording) to reflect participant feedback.

3.3.3 PeterMac Outdoor Settings Observation and Survey
Anonymous feedback will be collected about the availability and features of the two outdoor settings provided at PeterMac. These are a) the outdoor setting at the main entrance and b) the PeterMac Sensory Garden. The survey will capture how the different outdoor settings and features are received and will allow for comparison of the different settings including the outpatients clinic waiting room green features. For this purpose, the outpatients clinic waiting room questionnaire (Appendix D) will be adapted to suit these two settings (Appendix F).

Procedures
The PI will count the number of visitors to the Sensory Garden 2 weeks before and 2 weeks after improving signage to the garden. Notes will be taken about a) how many
visitors are staff, patients or other b) gender c) solo or in a group d) approximate length of stay and e) type of activity. This will be done in 30min intervals on Tuesdays and Thursdays. The PI will sit in a discrete area in the garden and not approach any visitors or interrupt any of the ongoing activities.

The PI will place the questionnaires in an appropriate place with clear labelling, instructions and a feedback return box. The PI will inform visitors about the available questionnaire when asked for directions to the Sensory Garden or when patients, staff and visitors otherwise express interest in the Sensory Garden. It will be clearly communicated that the questionnaire is a voluntary option and completely anonymous.

All changes to signage and the provision of informational materials will be organised in consultation with relevant PeterMac managers and staff to guarantee the use of appropriate tone, legibility and communication channels.

3.4 Reflexive Journal
The PI will maintain a reflexive journal during the data collection period. This journal will document the recruitment process and capture relevant observations and interactions with staff and patients. Its secondary purpose is to structure the PI's own reflexive practice, which is crucial to writing a reflexive statement in the outcome reports. The journal may comprise both written and visual materials. The PI may visually document relevant areas at PeterMac such as the Sensory Garden, the main entrance and views to the outside. No individuals will be identifiable on any of the materials.

Digital data will be stored in one folder on the PI's work computer and will be regularly backed up on the Department of Cancer Experiences Research secure drive. Physical data such as photographs and sketches will be stored in a locked filing cabinet in the department.

3.5 Researcher and qualification for fieldwork
The PI will attend a training seminar on qualitative interviewing taught by Clare O’Callaghan at the Peter MacCallum Cancer Centre (PeterMac). Issues concerning
interviewing technique and acceptable practice can be further provided in supervision sessions with Clare O’Callaghan who has extensive experience with qualitative interviewing with cancer care and palliative care patients.

4. PARTICIPANTS
Recruitment for this study will begin with a wide variety of adult cancer patients across cancer streams and become more focused as data becomes available. Patients will be recruited from the specialist clinics and the inpatient wards at PeterMac to capture a broad scope. The goal is to recruit a balanced sample of male/female participants, a wide age range and an adequate representation of different cancer diagnosis. To maximize range (purposive/theoretical sampling), it is necessary to interview participants with varied and sometimes opposing experiences and opinions. The recruitment strategy is described below and permission sign-off has been obtained from Dr David Speakman. The eligibility of each potential participant will be discussed with nurse coordinators, relevant nurses and treating doctors.

Eligibility criteria:
• Patient at PeterMac, East Melbourne
• 18 years of age or older
• Speak and read English sufficiently to complete study requirements

Exclusion criteria:
• Not physically or mentally well enough to complete the interview and participation requirements as determined by their treating clinician

5. RECRUITMENT
• PI will approach patients for recruitment and follow a script (Appendix B) to ensure consistency of approach.

• Recruitment will occur March – August 2015.

• Permission sign-off has been obtained from Chief Medical Officer (CMO) Dr David Speakman.
• Recruitment for survey testing:
5 outpatients will be approached to consider testing the survey questionnaire. The PI will consult with the respective clinicians on the day and seek approval for approaching patients who are waiting for their appointment. The PI will follow an approach script to ensure consistency of approach (Appendix E).

5.1 Strategy for specialist clinics:
Potential participants will be identified from the patient list on Verdi. The list will be taken to the specialist clinic managers and relevant nurses ahead of time to discuss if identified patients are eligible and in good condition to participate. At the same time, clinic managers and nurses will be asked if there are any other patients they consider eligible to participate. After this first consultation, the PI will consult the treating doctors (either in person or via email) to ensure these patients aren’t already participating in other studies and prevent overburdening them otherwise. Then, the researcher will approach potential participants after they have checked in at the desk or at a suitable time according to the patient’s treatment schedule. The project will be briefly explained and patients will be given the Participation Information Sheet and Consent Form (PICF) (Appendix C). Patients will be instructed to return the Consent Form if they decide to participate and are given stamped return envelopes.

5.2 Strategy for inpatients:
As above, eligibility of potential inpatient participants will be discussed in advance with the nurse unit manager (NUM) of each ward and the relevant nurses knowledgeable about the targeted patients. Treating doctors will then be consulted before approaching named patients to ensure their eligibility and not to overburden them. After receiving permission, the PI will approach the selected patients to briefly explain the study and provide the PICF and a stamped return envelope. She will return to the ward patients after 24hrs and collect the completed Consent Form and arrange a suitable time for the interview. If patients are discharged before the PI returns, they will be able to return the signed Consent Form with the stamped return envelope provided to them.
An appropriate time and place for the interview will be determined by the patient and in consultation with the treating doctor and relevant nurse coordinator and nurses. The patient’s needs will be taken into consideration (privacy and monitoring). If there
is no appropriate place available to conduct the interview or the patient has declined and has become not well enough to be interviewed at the scheduled time, then the interview can still take place over the phone once the patient returns home. If the patient will not be released, the interview can be rescheduled according to their condition. Only a minimal amount of forms will be handed out and the PI will await responses before continuing recruitment.

6. PROCEDURES
6.1 Consent processes
The study will be verbally introduced to the patient and, if interested, the patient is given a PICF and stamped return envelope. Patients are given time to think about participation and can take home the information materials given to them. Consent will require participants to read the forms and return signed consent agreement.

6.2 Distressed Participants
Participants are advised at the beginning of the interview that they may ask to skip any questions they don’t wish to answer or stop the interview immediately. They are also reassured that withdrawal will not influence their care plan or their ongoing relationship with PeterMac.

If participants feel that the interview is upsetting or they are distressed as a result of participation in the research project, then the PI will inform the treating clinician who may refer the patient to support services if the participant wishes so. The participant is advised that she may also speak to her treating clinician herself or contact the Cancer Council Helpline anonymously. The PI will also inform the treating clinician if she observes strong signs of distress during the interview or notices severely depressive and potentially self-endangering statements that may cause reason for concern. The participant is informed about these steps in the PICF. The Helpline number is also provided in the PICF and the PI will make sure that the participant is aware of this prior to commencing the interview.

6.3 Participant privacy and data storage
No personally identifiable patient information will be collected at recruitment, except contact details (phone number) for patients who agree to the semi-structured interview. All participants will be asked to provide demographic information and
contact information (address and email) at the start of the interview. Medical details will be drawn from the medical records. All interview data will be given a unique identification code and will be kept separate from contact information. This will ensure that all data collected past the recruitment phase will be non-identifiable.

Two types of personal information will be collected and they will be kept separate from each other to ensure no personal identification is possible through the interview data.

(1) Demographic and medical information: a) age b) gender c) highest level of education obtained d) country of origin and type of setting the patient grew up in (tick-boxes: 8 options incl. ‘other’ option) e) types of nature activity currently carried out (tick-boxes: 9 options incl. ‘other’ option). Data collected from the medical records include: f) time since diagnosis g) type of diagnosis h) type of treatment since diagnosis h) type of treatment at time of interview. See Appendix A.

(2) Contact information will be collected in order to send out a study summary if the participant requests this, which can be indicated on the consent form (tick-box). This sheet is kept separate from the interview data. Information includes: name, physical address, email address, phone number. See Appendix A.

All data collected will be stored safely and securely in the Department of Cancer Experiences Research in locked filing cabinets (Consent Forms) and in password protected folders on a secure drive (electronic data, audio files) that can be accessed only by the study investigators. Data will be kept for 5 years as per the Australian Code for the Responsible Conduct of Research, 2007.

Data will be kept strictly confidential according to the National Statement on Ethical Conduct in Human Research, 2007 and the Australian Code for Responsible Conduct of Research, 2007.

At the completion of each interview, the recording will be downloaded and transcribed onto the Peter Mac shared drive. The recording on the portable device (Iphone or Ipad) will then be immediately deleted. Data will be identifiable with unique participant identification code only. PeterMac IT infrastructure ensures that all shared drives are password protected, monitored for security breach, and are backed-up according to international security standards. Each interviewee will be given a unique identification code.
7. ANALYSIS
Qualitative study method using grounded theory methods [40, 41] will be used to analyse the transcribed semi-structured interviews. The transcribed material will be subjected to open coding, which means forming descriptions of statements in the text. The analysis process is inductive and uses constant comparison to determine categories and themes. Initial findings will also inform the recruitment process in order to saturate data. Saturation is achieved when interviews no longer provide new information so that categories cannot be developed further and theory can be generated. If data is not saturated, and data collection needs to cease because of the time constraints on data collection, comparable categories will be grouped to inform thematic findings. If data is saturated, theory will be developed and presented. If time or project restrictions don’t allow for data saturation, theoretical thematic descriptions will be presented and are expected to provide valuable insight into nature’s relevance for cancer patients and provide material and research evidence for developing Phase two. The analysis will be managed with ATLAS/ti qualitative data management software. It is anticipated that approximately 30-40 interviews will be carried out unless data is saturated earlier, in which case interviewing will cease.

8. RESULTS
At the conclusion of the interview study and the completion of final data analysis, results will be presented in a research article, published in peer reviewed publications and form part of the PI's PhD thesis. At this point (August 2015) all audio files will be deleted from the PeterMac shared drive IT infrastructure.

Results from the three survey questionnaires (Waiting Room, PeterMac’s Entrance Outdoor Area, PeterMac’s Sensory Garden) will also form part of the PI's thesis and where possible support improvements to the PeterMac care setting. It may also serve to design the second phase of the research project and provide ideas and insight into appropriate nature-based interventions.

9. ETHICAL CONSIDERATIONS
The study will be conducted according to the NHMRC National Statement on Ethical Conduct in Human Research 2007 (and updates), and the World Medical Association
Declaration of Helsinki 2013. The risk to patients and staff during participation in this study is expected to be negligible or low.

APPENDICES
Appendix A: Semi-structured Interview Schedule including Demographics Sheet
Appendix B: Participant Approach Script
Appendix C: Participation Information and Consent Form
Appendix D: Greening Initiative Feedback Form
Appendix E: Survey Testing Participant Approach Script
Appendix F: Outdoor Settings Feedback Forms

REFERENCES


Appendix 2 Phase 1 Ethics Approval Certificate

Ethics approval certificate from Peter MacCallum Human Research Ethics Committee the study protocol entitled ‘The Relevance of Nature in the Lives of People Affected by Cancer’ received February 2015.
Peter MacCallum Cancer Centre

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East Melbourne Victoria
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ABN 42 100 504 883
www.petermac.org

PETER MACCALLUM CANCER CENTRE AUTHORIZATION TO CONDUCT A RESEARCH PROJECT

Peter Mac Project No: 15/14L

Project Title: The Relevance of Nature in the Lives of People Affected by Cancer

Principal Investigator: Sarah Blaschke
Associate Investigator: Prof Penelope Schofield, Hon A/Prof Clare O’Callaghan

Approval Date: 23 February 2015
Approval Expiry: 23 February 2017

I am pleased to advise that the above project has received ethical approval and satisfies Peter Mac research governance requirements and may now be conducted at Peter MacCallum Cancer Centre. Conduct of the project is subject to compliance with the conditions set out below.

Approved Documents:

- Protocol & Appendix A: Semi-structured Interview Schedule including Demographics Sheet, Appendix B: Participant Approach Script & Appendix C: Patient Information and Consent Form, dated Feb'15

In order to comply with the National Statement on Ethical Conduct in Human Research (2007), Guidelines for Good Clinical Research Practice and local research policies and guidelines, you are required to notify the Peter MacCallum Cancer Centre Ethics Committee Secretariat of:

- Any proposed amendments to the project including any proposed changes to any of the approved documents;
- Any unexpected developments in the project with ethical implications;
- Your inability to continue as Principal Investigator and any other change in research personnel involved in the project at Peter MacCallum Cancer Centre;
- Any proposed extension to the duration of the project, past the above stated approval date;
- Any decision taken to end the project prior to the expected date of completion.

You are also required to submit to the Ethics Committee Secretariat:

- An Annual Progress Report every 12 months for the duration of the project.
  Note: Continuation of ethics approval is contingent on submission of an annual report in a timely manner, and
- A Final Report upon completion of the project.

The Peter MacCallum Cancer Centre Ethics Committee may conduct an audit of the project at any time.

Please refer to the Peter MacCallum Cancer Centre Ethics Committee Secretariat website (http://www.petermac.org/research) for access to forms, policies and guidelines and other information and news concerning research at Peter MacCallum Cancer Centre.

The Peter MacCallum Cancer Centre Ethics Committee is organised and operates according to the NHMRC National Statement on Ethical Conduct in Research Involving Humans (2007) and in accordance with the Note...
for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and the Health Privacy Principles enumerated in the
Health Records Act 2001 (Vic) and Section 95A of the Privacy Act 1988 (and subsequent Guidelines).

Please be advised that the Principal Researcher and any Associate Researchers named on the application did not
participate in deliberative discussions or decision-making regarding the project.

Yours sincerely,

Dr. Dianne Snowden
Ethics Coordinator
Ethics Committee Secretariat
T: 9656 1699
E: ethics@petermac.org
Appendix 3 Phase 2 Study Protocol

Study protocol entitled ‘Identifying opportunities for nature engagement in cancer care practice and design: a Delphi study’ approved by Peter MacCallum Human Research Ethics Committee following low-risk ethics review. The protocol outlines study procedures and measures to ensure ethical conduct of all research aspects concerning the Delphi study in phase 2 (Chapter 8).
Project description and protocol

Full study title  Identifying opportunities for nature engagement in cancer care practice and design: a Delphi study
Ethics Project Number  16/46L
Study Period  May 2016 – December 2016
Primary Investigator  Sarah Blaschke, PhD student
Supervisors  Primary: Prof Penelope Schofield,
Secondary: A/Prof Clare C O’Callaghan
Institution  Sir Peter MacCallum Department of Oncology, Faculty of Medicine, Dentistry and Health Sciences, The University of Melbourne, Parkville, VIC, Australia
Study Site  Peter MacCallum Cancer Centre
Funding  None

## Project Summary

<table>
<thead>
<tr>
<th>Title</th>
<th>Identifying opportunities for nature engagement in cancer care practice and design: a Delphi study</th>
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<td>Primary Investigator</td>
<td>Sarah Blaschke</td>
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| **Aims and Objectives** | The aim of this study is to solicit knowledge from relevant experts drawn from a range of professional and academic roles (including cancer-specific experts where relevant) and explore levels of opinion consensus to determine opportunities for, and barriers to, providing nature engagement in cancer care settings.  
1. To understand what experts perceive are design elements and healthcare practices, which can promote helpful nature engagement in cancer care settings.  
2. To explore what experts perceive are the barriers to providing opportunities for nature engagement in cancer care settings.  
3. Preliminary recommendations will be formulated for future testing in cancer care contexts. |
| **Study design** | Online Delphi methodology will be used to conduct a structured, iterative feedback process using a series of 4 questionnaires (rounds). First, an open-ended questionnaire is administered to an “expert panel” with the aim to uncover salient issues (items) with relevance to the topic. In step 2, anonymized summaries of responses are fed back to the experts who verify and, if they wish, reconsider their own responses. In rounds 3 and 4, items are ranked according to their relative importance. Finally, a prioritized list is generated reflecting levels of group consensus about the items’ relative importance.  
Four rounds comprise:  
1: Brainstorming and item generation by experts (Opportunities and Barriers lists)  
2: Consolidated lists are circulated to experts for revision and validation  
3: Selection of top-10 items from each list  
4: Experts rank pared-down items (priority ranking)  
Cancer patients’ nature-related recommendations are extracted and consolidated from preceding investigation and presented to experts in Questionnaire 1. Their recommendations will be considered by experts recruited into this study. |
| **Participants** | The panel will be composed of four expert groups: healthcare practitioners, management representatives, designers, and researchers.  
The recruitment target is a minimum of 10 experts per group (n=40). The sample target takes into account that not all participants are expected to complete all four rounds and that a minimum of 7 panelists (for each sub-group) are required for reliable outcomes and comparisons. To achieve the minimum sample size, a maximum of 200 experts will be invited to participate.  
Selection of national and international experts will firstly make use of the researchers’ expert networks and follow guidelines for identifying experts outside the researchers’ own networks. Predefined inclusion criteria will supplement the selection procedure: 1) capable of contributing relevant input (knowledge and experience); 2) willingness and sufficient time to complete all four rounds; and 3) sufficient English skills to communicate ideas effectively. |
| Data | Questionnaires will be electronically administered via email from May 2016 to October |
Identified experts will be emailed an invitation to participate including a project description and Questionnaire 1. Passive consent is given by responding to the email and returning Questionnaire 1. Each round is planned to run for approximately four weeks: two to three weeks for panelists to respond (reminder sent one week prior to the round closing date) and, one week to analyze response data and draft the next questionnaire.

**Questionnaire 1**
- sent on the same day the expert is invited to participate
- Section A constitutes a summary of cancer patients’ anonymized recommendations and cautions related to nature engagement
- Section B asks two basic, open-ended questions requesting experts to list at least six items (Opportunities and Barriers) followed by brief explanations

**Questionnaire 2**
- all items generated are collated and re-circulated to all experts
- each item is presented with a one-sentence explanation and non-identifiable background information of the panel member who generated the item
- experts are asked to: 1) verify correct and fair interpretation of their responses and, 2) suggest additional items

**Questionnaire 3:**
- uses a structured format and lists items in random arrangement to minimize response bias
- each panelist selects 10 items (“top ten”) from each list (Opportunities and Barriers)

**Questionnaire 4:**
- elicits levels of consensus in the ranking of items
- presents group responses for each item: total sum of points assigned to each item by the entire panel; individual panelists’ own Round 3 response and; a summary of comments
- panelist rank items for each of the condensed lists (Opportunities and Barriers) on corresponding 10 point Likert-type scales (1= not at all important, 10 = very important)

<table>
<thead>
<tr>
<th>Time period</th>
<th>It is anticipated that the study will run from May 2016 to December 2016.</th>
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<tbody>
<tr>
<td>Questionnaire 1: May – June 2016</td>
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<td>Questionnaire 2: June – July 2016</td>
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<td>Questionnaire 3: July – August 2016</td>
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<td>Questionnaire 4: August – September 2016</td>
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<tr>
<td>Final analysis and write up: October – December 2016</td>
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Process flow chart

Relevant national and international experts identified:
- healthcare practitioners
- healthcare management
- healthcare designers
- researchers
40 experts will be recruited

May - Jun
Maximum of 200 experts invited via email:
- attached project description
- attached Questionnaire 1
- return of Questionnaire 1 is considered consent

Questionnaire 1:
- Experts consider summary of cancer patients’ recommendations
- Experts generate items: Opportunities & Barriers

Analysis Questionnaire 1, drafting and finalizing Questionnaire 2

Jun - Jul
Questionnaire 2:
- Collated lists reflecting all items generated by panel are circulated back to experts for verification

Reminder sent one week prior to round closing date
Analysis Questionnaire 2, drafting and finalizing Questionnaire 3

Jul - Aug
Questionnaire 3:
- 2 refined lists (Opportunities & Barriers) returned to experts
- Experts choose their top-ten items from each list

Reminder sent one week prior to round closing date
Analysis Questionnaire 3, drafting and finalizing Questionnaire 4

Aug - Sep
Questionnaire 4:
- Aggregated statistics of short-listed items returned to experts
- Expert rank (1-10) the importance of remaining prioritized items

Reminder sent one week prior to round closing date
Final analysis Questionnaire 4:
- Items of highest priority and level of consensus (divergence) calculated

Additional phone interviews conducted if final analyses require further clarification

Oct - Dec
Summary of results sent to participants
1. Introduction

1.1. Rationale

With the worldwide surge in incidence, cancer will soon impact at least one in three people, either personally or through a relative or friend [1, 2]. Reducing the burden of cancer and supporting those affected by cancer has become a healthcare priority. It is known that a significant amount of this healthcare burden is preventable; one third of lives lost to cancer are attributable to behavioral and lifestyle choices, and 30% of these cancer deaths are preventable by attending to key risk factors [2]. In response, healthcare policy must not only consider effective clinical care and alleviate the burden associated with cancer treatment but also promote positive health behavior and prevent poor lifestyle choices. Such health-centric strategies focus on patients’ own resources to manage health and disease [3] and aim to strengthen patients’ capacity to maintain or regain good health in the context of pathogenic biological or psycho-social stressors. To this end, exposure to, and engagement with, nature presents an often underappreciated health resource [4] and could be considered an opportunity to broaden health-centric care strategies: “contact with nature may offer an affordable, accessible and equitable choice on tackling the imminent epidemic, with both preventive and restorative [public] health strategies” [5]. In this context, Nightingale’s seminal and timeless instructions for “those who have personal charge of the health of others” are still relevant for healthcare givers and receivers today: “What nursing has to do … is to put the patient in the best condition for nature to act upon him” [6] (p.133).

Opportunities to connect with nature are attracting interest in healthcare setting and service design. The most recent cancer facility’s development in Australia best demonstrates this growing trend. The Victorian Cancer Care Centre (VCCC) Project in Melbourne is a purpose built cancer research, treatment, care and education facility planned to be completed in June 2016 costing AUD $1 billion [7]. It includes three indoor garden rooms and seven landscaped outdoor spaces accounting for 2.3 % of its total floor space\(^1\); a striking amount of space dedicated to opportunities for nature engagement. This presents almost six times more accessible landscaped space as compared to the percentage of floor space of the former East Melbourne cancer facility. Empirical evidence suggests various bio-psycho-social benefits from contact with nature in cancer settings [8-12] and recent investigations reveal nature’s relevance for some cancer patients’ experiences of health and recovery [13, 14].

Healthcare setting design represents an expensive intersection of healthcare industry and infrastructure as well as potential opportunities for healthcare improvements [15] and increased consumer satisfaction [16]. Such healthcare innovations can widen the horizon of possible solutions to growing healthcare burden but require deliberate and rigorous investigation to ensure responsible action is taken and wastage avoided. This complex issue involves multiple governing bodies and stakeholders who have the task of innovating cost-efficient and high quality healthcare settings and services that respond to cancer patients’ health and recovery requirements.

The present study follows from Phase 1 qualitative research [13, 14] into cancer patients’ use of nature and its relevance in their experiences of health and recovery, which uncovered cancer patients’

\(^1\) Total floor space measurements provided by VCCC Redevelopment Director; VCCC landscaped area measurements provided by contracted landscape architects; measurements of accessible landscaped area in former cancer facilities taken from scaled plan drawings.
recommendations for integrating nature engagement opportunities in healthcare (further details in Appendix A). Their recommendations will be considered by experts recruited into this study.

1.2. Research Objective
Excellent leadership in healthcare requires expert advice in the design and delivery of high quality patient care and support. To evaluate the feasibility of integrating nature engagement opportunities into healthcare, a synthesis of opinion from a range of experts is needed. This study will solicit input from relevant experts drawn from a range of professional and academic roles (including cancer-specific experts, where relevant) about opportunities for nature engagement in the cancer care setting and explore factors they deem critically important for its provision. The study’s definition of an expert is given in Section 3.2. Experts.

1.3. Research Aim
This study aims to solicit knowledge and explore levels of consensus from experts to determine opportunities for, and barriers to, providing nature engagement in cancer care settings.

1.4. Research Questions
1. Based on cancer patients’ recommendations, what do healthcare experts perceive are design elements and healthcare practices, which can promote helpful nature engagement in the cancer care setting?
2. What do experts perceive are the barriers to providing opportunities for nature engagement in the cancer care setting?
3. Based on expert opinion, what practical recommendations can be made for integrating nature into healthcare and design practice? (e.g. supportive care and patient self-care; healthcare policy and; healthcare architecture and design)

2. Method
Online Delphi methodology will be used to conduct a structured, iterative feedback process using a series of 4 questionnaires (rounds). First, an open-ended questionnaire is administered to an “expert panel” with the aim to uncover salient issues (items) with relevance to the topic. In step 2, anonymized summaries of responses are fed back to the experts who verify and, if they wish, reconsider their own responses. In rounds 3 and 4, items are ranked according to their relative importance. Finally, a prioritized list is generated reflecting levels of group consensus about the items’ relative importance. Since its inception, the Delphi method evolved to address a variety of research problems such as eliciting degrees of agreement, delineating differing group attitudes and positions, or understanding the rationales of particular judgments and opinions [17, 18]. Delphi variants applied to such explorative enquiry include e.g., modified, exploratory, ranking, and policy Delphis, which are particularly well suited for investigating areas where little prior knowledge exists [19]; where empirical data is lacking [20] and; where cursory understanding of group attitudes and priorities is desired [17]. The method’s flexibility and ability to easily assemble and coordinate participants across disciplines and geographic locations partly explain its growing popularity in medical and nursing research [21]. Mullen [17]
reports its use in medical, health service and nursing research for “forecasting developments in medicine and health technologies”, and “identifying priorities for nursing research and also priorities for spending and service developments” (p. 49). Two examples show its application in the cancer context for gathering international input for developing pain assessment tools for palliative care [22] and, engaging healthcare experts from diverse backgrounds with experience in survivorship care to develop realistic strategies for improving healthcare for cancer survivors [23].

2.1. Design
The study aims to guide concept development and elicit levels of consensus amongst diverse disciplinary viewpoints in order to generate new care opportunities related to nature engagement in the cancer care setting. The best suited variant for this purpose is the modified electronic Delphi with a four-round design, which provides the following key advantages: 1) serves the dual purpose of soliciting broad expert opinion followed by priority ranking [24]; 2) can conclude at a pre-defined number of rounds because strong consensus is not required [17]; 3) structures a rigorous and rapid feedback-based (online) communication process [25]; 4) frees communication from logistical challenges, peer pressure and ‘group-think’ scenarios [26]; 5) cross-pollinates multidisciplinary expertise achieving broader understanding than would be reached from a single discipline alone [24].

2.2. Rounds and timeline
Four questionnaires will be electronically administered via email from May 2016 to October 2016. Rounds are planned to take four weeks [27]: two to three weeks for panelists to respond (including one reminder one week prior to the round closing deadline) and; one week to analyze response data and, based thereon, draft the next questionnaire. The present study follows Okoli and Pawlowski’s [24] recommendation for a four-round Delphi that aims to collect rich data, consolidate ranging expert opinion, and indicate levels of consensus. Round 1 serves idea generation, Round 2 verifies summaries of responses, Round 3 short-lists items of priority, and Round 4 ranks prioritized items.

2.3. Questionnaires
Delphi is a form of iterative enquiry that builds upon ongoing data collection. Its primary research tool is a series of questionnaires built from participants’ stepwise input. Therefore, only Questionnaire 1 (see Appendix A) will be available for distribution at the start of recruitment and questionnaires 2 to 4 are subsequently created to reflect content from the ongoing data collection.

Questionnaire 1, Section A first introduces cancer patients’ recommendations. Section B will query experts’ ideas and perceptions about opportunities for nature engagement in the cancer care setting and ask for factors they perceive are barriers to its provision. Questionnaire 1 (item generation) will be designed to take no more than 15 minutes to complete and questionnaires 2 to 4 (verification and ranking) will take less than 15 minutes to complete unless panelists wish to elaborate. Questionnaire 1 will be pilot-tested by two to three researchers, unfamiliar with the Delphi method. They will be asked to pilot-test the questionnaire and give
feedback about their question-and-answer process [28]. This is to ensure Questionnaire 1 is comprehensible to novice Delphi responders and that the intended scope and quality of response will be achieved. The questionnaire’s conceptualization, layout and wording may be revised based on the feedback received.

2.4. Anonymity

One of Delphi’s defining features and strengths is the anonymity of responses. Mullen [17] states that preserving anonymity in Delphis “removes effects of status, powerful personalities and group pressure” (pp. 46-47). Keeney [21] notes that anonymity “facilitates respondents to be open and truthful about their views” (p. 197). Varying degrees of anonymity have been used in Delphis. Some studies have adhered to strict criteria such as anonymizing responses to researchers themselves and blinding panelists to one another’s identity [17]. There is no agreed upon level of anonymity or de-identification other than preserving “the anonymity of responses … for at least part of the study” [17] (p.47).

Advantages of panelists knowing each other’s identities include greater motivation to engage because of association with prominent experts, stimulating exploratory thinking and idea generation, and introducing greater accountability for considered personal responses and the overall Delphi study outcome [17]. The present study will make use of these advantages and also acknowledge the known fact that complete blinding can be unrealistic because experts might know each other outside the study [21]. This level of anonymity and confidentiality is termed “quasi-anonymity” [21], which denotes that responses will remain anonymized throughout the study and are known only to the researchers. Since the panel constitutes experts from professional and academic backgrounds only, there is no need to adopt the common strictures of anonymity required when involving cancer patients. Panel members can be known to each other, however, it will be clearly stated that publications will not reference any personally identifiable participant information.

3. Participants

Selection of 200 national and international experts will firstly make use of the researchers’ expert networks and follow guidelines for identifying experts outside the researchers’ own networks. The study will recruit a minimum of 40 experts.

3.1. Selection of experts

Five groups of diverse yet relevant stakeholders have been identified in the area of cancer care innovation: 1) cancer patients; 2) healthcare practitioners; 3) healthcare management; 4) healthcare setting designers and; 5) researchers. The panel will be composed of healthcare practitioners, management representatives, designers, and researchers. Patients’ recommendations will be represented in Questionnaire 1. Their perspectives were drawn from the preceding qualitative Phase 1 study (described in 1. Introduction; further details in Appendix A). The rationale for not recruiting additional cancer patients is twofold. Firstly, the present study builds upon a substantial amount of data already collected from qualitative interviews eliciting patient experiences, suggestions, recommendations, and cautions related to nature engagement. Secondly, of interest are the responses and perceptions of those who bear on decision-making and healthcare policy development to
ascertain the feasibility and realistic limitations of providing opportunities for nature engagement in the cancer care setting.

Selection of national and international experts will firstly make use of the researchers’ expert networks and then follow Delbecq et al.’s [29] guidelines for identifying experts for nominal group studies (Figure 1), which increases rigour in recruiting relevant individuals outside the researchers’ own networks. This procedure has shown to be transferable to Delphi studies [24, 27]. The following predefined inclusion criteria have been previously adopted in Delphi panel recruitment [27] and will supplement the present identification procedure: 1) capable of contributing relevant input (knowledge and experience); 2) willingness and sufficient time to complete all four rounds; and 3) sufficient English skills to communicate ideas effectively.

![Figure 1](image-url)  
**Figure 1** Expert selection process (adapted from Okoli and Pawlowski. [24])

### 3.2. Experts

An important component of the Delphi method is the identification of experts. The dictionary definition of an expert, “a person who is very knowledgeable about or skilled in a particular area” [30] has been found insufficiently instructive for assembling a Delphi expert panel [31]. Consequently, studies have employed broader terms to identify and include relevant experts including: “informed advocates” [17], “informed individuals”, “specialist in their field” or persons with “knowledge about a specific subject” [21]. Central to these formulations is the description of individuals who possess both knowledge and experience representative of the capacity to articulate informed opinion and provide relevant input about a given topic, which will be this study’s working definition of an expert.

### 3.3. Sample Size

The recruitment target is a minimum of 40 experts accounting for 10 experts per group (healthcare practitioners, management representatives, designers, researchers). This will allow for diversity of views and
reveal any divergence of opinion between groups, while maintaining a volume of responses that is manageable for a single researcher to process. The sample target takes into account that not all participants are expected to complete all four rounds (attrition) and that a minimum of 7 panelist (for each sub-group) are required for reliable outcomes and comparisons [17]. To achieve the minimum sample size, a maximum of 200 experts will be invited to participate.

Delphi studies have been conducted with varying panel sizes ranging from single digits to low hundreds [17]. The absence of strict guidelines allows individual research projects to determine panel sizes according to their purpose and limitations [21]. However, the most reliable Delphi studies were conducted with fewer than 20 participants [17]. Recommendations suggest populating panels with 10 to 18 experts for sufficient input to warrant meaningful elicitation of diverse disciplinary viewpoints [17, 24]. Seven is considered an acceptable minimum panel size with accuracy rapidly declining as the number becomes smaller [17]. It is understood that the levels of census amongst experts are of more interest than the power of frequencies of response [32, 33], which is often misunderstood when mistaking the Delphi method for a quantitative survey [17].

3.4. Recruitment
Identified experts will receive an email containing an invitation to participate (see Appendix B), a project description and participation information sheet (see Appendix C), and Questionnaire 1. Passive consent is given by responding to the email and returning Questionnaire 1. Participation is voluntary and can be withdrawn at any stage. Participants can request their demographic information and where possible other contributions to be withdrawn; however, due to the study’s iterative process not all contributions can be withdrawn once included in previous rounds. Reasons for declining will be recorded if provided.
4. Data Collection and Analysis

4.1. Procedure

Questionnaires will be electronically administered via email from May 2016 to October 2016 according to Schmidt’s [32] sequence detailed in Figure 2 below.

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Brainstorming (Discovery)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cancer patients’ recommendations are extracted and consolidated from preceding investigation (Appendix A)</td>
</tr>
<tr>
<td></td>
<td>Questionnaire 1: Item generation by experts (Opportunities and Barriers lists)</td>
</tr>
<tr>
<td></td>
<td>Analysis: Duplicate items are removed, remaining items consolidated and edited for consistent terminology</td>
</tr>
<tr>
<td></td>
<td>Questionnaire 2: Consolidated lists are circulated for revision and validation</td>
</tr>
<tr>
<td></td>
<td>Final lists are refined</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase 2</th>
<th>Narrowing down (Prioritizing)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Questionnaire 3: Selection of top-10 items from each list</td>
</tr>
<tr>
<td></td>
<td>Analysis: Sum of points allocated to top-10 items calculated</td>
</tr>
<tr>
<td></td>
<td>Selected items are consolidated into revised lists not exceeding 20 items per list</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase 3</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Questionnaire 4: Experts rank pared-down items (priority ranking)</td>
</tr>
<tr>
<td></td>
<td>Descriptive statistics (median and mean scores) calculated for each item</td>
</tr>
<tr>
<td></td>
<td>Final result: 2 ranked lists reflecting levels of consensus</td>
</tr>
</tbody>
</table>

Figure 2 Delphi questionnaire administration process (adapted from Schmidt [33])

4.2. Phase 1

The initial phase constitutes creative brainstorming and aims to elicit a maximum variety of items, before quantitatively ranking them.

**Questionnaire 1: Generation of items**

This questionnaire will be attached to the invitation email. Section A constitutes a summary of cancer patients’ anonymized recommendations and cautions related to nature engagement extracted from the preceding qualitative study and literature review. Section B asks two basic, open-ended questions requesting experts to list at least six items (as recommended by Schmidt [32]) for questions 1 and 2 followed by brief explanations of their chosen items.

1. List at least six items relevant to your expertise describing design features, applications, initiatives, or care practices related to nature engagement, which healthcare and design practitioners could feasibly implement within the cancer care context.  
   *This list seeks to generate a list of design and healthcare opportunities (Opportunities-List).*

2. List at least six important barriers or factors that you believe affect the provision of nature opportunities in cancer care contexts. These can include, for example, physical, psychosocial, economic, or political factors.
This question seeks to generate a list of barriers and key risk factors related to the provision of nature opportunities (Barriers-List).

Additionally, experts will be asked to offer a brief explanation of the importance of their suggested item. Space will be provided below each item for free text description. These brief accounts will build a qualitative, empirical basis for producing recommendations (Q 3); serve deeper understanding of the listed items and; assist consolidating responses for the second round.

Analysis (Questionnaire 1)
All data (items and explanations) will be entered and managed in qualitative data analysis software Nvivo version 10 for MacIntosh [34]. The analysis will first remove identical responses, then collate, synthesize and edit remaining ideas to achieve consistent terminology of items expressing similar ideas and, finally, logically group items into emerging categories. An inter-rater process will assist interpretative congruity as recommended for thematic analysis [35].

Questionnaire 2: Validation of categorized items
This questionnaire (see Appendix D) will be designed based on responses from Round 1 and aims to strengthen construct validity [24] according to the concept of “member-checking” [35]. All items generated thus far will be collated into meaningful categories, as produced by inter-rater agreement, and will be re-circulated to all experts. Each item is presented with a one-sentence explanation and non-identifiable background information of the panel member who generated the item (Figure 3). A brief summary of the comments from Round 1 is provided. Experts will be asked to:

1. Verify correct and fair interpretation of their responses and that items have been placed in an appropriate category;
2. verify and, if they wish, refine the categorizations and recommend additional items.

<table>
<thead>
<tr>
<th>Category 1 XX</th>
<th>Item description</th>
<th>Item originator (profession, field of practice, time in practice, country of prof. residence)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Outdoor seating area</td>
<td>Architect, healthcare and public spaces, 10 years, US</td>
<td>24hr accessible, sheltered outdoor area with comfortable seating at different heights, access to internal emergency phone.</td>
</tr>
</tbody>
</table>

| 2             | Virtual reality | Radiation therapist, oncology, 3 years, AU | Virtual reality headsets for use during diagnostic procedures, selection of different nature scenes and sounds. |

Figure 3 Example of Questionnaire 2 layout

Analysis (Questionnaire 2)
Based on responses, items will be further refined and again subjected to inter-rater discussion.
4.3. Phase 2
In this phase panelists will state their priorities and lists will be condensed accordingly.

**Questionnaire 3: Prioritizing items**

Questionnaire 3 (see Appendix D) uses a structured format and will list the items generated thus far in random arrangement to minimize response bias. Each panelist will be asked to select 10 items (“top ten”) from each list (Opportunities and Barriers), which s/he deems relevant and critical to the consideration of nature opportunities in the cancer care setting. Items 1 to 10 are selected according to the their importance as judged by the expert who is asked to assign “1” to the most important item, “2” to the second ranked item and so on (Figure 4).

**Analysis (Questionnaire 3)**
Twenty most selected items from each list will be aggregated representing a majority vote. Lists will be reduced according to the importance of items calculated based on the sum of points allocated by each expert to their top-ten items i.e. item “1” indicating highest importance is coded with 10 points, item “2” coded with 9 points and so on. As recommended by Schmidt [32], to avoid burdening panelists with too many items, the target size of total items for the final round will be no more than 20 items for each list (Opportunities and Barriers).

<table>
<thead>
<tr>
<th><strong>Opportunities</strong></th>
<th>Item description</th>
<th>Item originator (profession, field of practice, time in practice, country of prof. residence)</th>
<th>Explanation</th>
<th>Your top-10 items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor seating area</td>
<td>Architect, healthcare and public spaces, 10 years, US</td>
<td>24hr accessible, sheltered outdoor area with comfortable seating at different heights, access to internal emergency phone.</td>
<td>[type here]</td>
<td></td>
</tr>
<tr>
<td>Virtual reality</td>
<td>Radiation therapist, oncology, 3 years, AU</td>
<td>Virtual reality headsets for use during diagnostic procedures, selection of different nature scenes and sounds.</td>
<td>[type here]</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4** Example of Questionnaire 3 layout

4.4. Phase 3
The aim of this phase is to elicit levels of agreement amongst all experts and detect any diverging opinion between different expert groups.

**Questionnaire 4: Ranking items**

Questionnaire 4 (see Appendix D) is designed to elicit levels of consensus (not achieve consensus) in the ranking of relevant items. This questionnaire includes group responses generated for each included item thus far: the total sum of points assigned to each items by the entire panel; individual panelists’ own Round 3 response and; a summary of comments provided thus far (Figure 5). Each panelist will individually submit a rank ordering of the items for each of the condensed lists (Opportunities and Barriers). Each item is presented with a corresponding 10 point Likert-type scale (1= not at all important, 10 = very important).
Statistical analyses will be performed using IBM SPSS Statistics version 23 for Macintosh [36]. Descriptive statistics (median and mean scores) will be calculated to indicate items’ relative importance. Descriptives will be calculated for the full sample and by expert group. The study’s aim is to explore levels of consensus rather than achieve consensus. Consensus will be defined as 75% agreement [37].

Finally, if further understanding of qualitative responses is required, a small number of one-on-one follow-up interviews will be conducted with experts to clarify any ambiguity and gain a fuller understanding of final results. Experts will be informed in the participation information sheet that they may be invited to participate in a voluntary follow-up interview at study completion.

5. Participant privacy and data storage

All consented participants will be assigned a unique identification code. Questionnaire 1 will collect demographic information and contact details in the introduction page (Page 1), which will be stored separately from participants’ Questionnaire 1 responses (Page 4, items and descriptions). Following personal information will be collected: name, contact phone number, e-mail address, description of professional role, years served in field of expertise, country of professional residence/affiliation. Participants’ identifiable information (name, contact phone number, e-mail address) will be matched with their unique identification code in one digital masterfile only. Other demographic non-identifiable variables will be compiled with their unique identification code and used in rounds 2 – 4 (description of professional role, years served in field of expertise, country of professional residence/affiliation). All returned questionnaires 1 - 4 will be labeled with participants’ unique identification code and any personally identifiable information removed to ensure that summarized responses returned to the panelist remain anonymous. Participants who withdraw can request removal of their demographic information and other contributions, where possible. Where possible, reasons for withdrawal will be solicited should participants discontinue. However, the study’s iterative process does not allow withdrawing contributions which have already been discussed and analyzed in previous rounds.
All data collected will be stored safely and securely in the Department of Cancer Experiences Research in locked filing cabinets and in password protected folders on a secure drive (electronic data) that can be accessed only by the study investigators. PeterMac IT infrastructure ensures that all shared drives are password protected, monitored for security breach, and are backed-up according to international security standards. Data will be kept for 5 years as per the Australian Code for the Responsible Conduct of Research, 2007. Data will be kept strictly confidential according to the National Statement on Ethical Conduct in Human Research, 2007 and the Australian Code for Responsible Conduct of Research, 2007.

6. Result and Dissemination
At conclusion of the final phase, a ranked list representing key considerations according to the expert panel will inform understanding of existent opinion about opportunities to engage with nature in the cancer care contexts. Participants will be sent a summary of results at study completion.

Presentation of results will include the total number of items generated in Phase 1 and the strength of the items taken into Phase 2. Levels of consensus will be tabled and sufficient raw data provided (e.g. number of panelists in each round) to support calculation of statistics. A summary of non-identifiable demographics will be presented to validate the participation of relevant and qualified experts. Based on the findings, it will be possible to revise the theoretical understandings reached in Phase 1 qualitative investigations. Preliminary recommendations can be drafted for testing in the cancer care context, and propositions can be generated to inform future research. It is anticipated that the results of this research project will be published and/or presented in a variety of forums, and form part of the Principal Investigator’s dissertation.

7. Appendices
Appendix A: Questionnaire 1
Appendix B: Email letter of invitation
Appendix C: Participant Information Sheet
Appendix D: Questionnaire 2 to 4 example layout

8. References


34. QSR I. *NVivo qualitative data analysis software for Macintosh, version 10*: QSR International Pty Ltd; 2014 2014.


Identifying opportunities for nature engagement in cancer care practice and design: a Delphi study

Investigator  Sarah Blaschke, PhD student
Co-Investigators Prof Penelope Schofield and A/Prof Clare C O’Callaghan
Institution  Sir Peter MacCallum Department of Oncology, Faculty of Medicine, Dentistry and Health Sciences, The University of Melbourne, Australia
Contact  Email: Sarah.Blaschke@petermac.org  | Tel: +61 3 9656 3645  | Fax: +61 3 9656 3645

PROJECT DESCRIPTION

High quality patient care and support require expert advice in the design of healthcare settings and services. This study evaluates the feasibility of integrating nature engagement opportunities into cancer care settings by soliciting input from relevant healthcare practitioners, management representatives, designers, and researchers.

The study will produce preliminary recommendations for future testing in cancer care settings. This Delphi study uses a series of 4 questionnaires each taking no more than 15 minutes to complete. They will be sent to you via email in approximately 4 week intervals and you will be sent an email reminder one week prior to the round closing date. Questionnaires 1 and 2 ask basic open-ended questions about your ideas for nature engagement opportunities and factors you perceive are important to consider. Questionnaire 3 and 4 require you to do a simple item selection and ranking exercise. All responses will be de-identified throughout the study, which means that your input will remain strictly anonymous.

Questionnaire 1 will collect basic demographic information. Any personally identifiable information (name, contact phone number, e-mail address) will be stored separately and kept strictly confidential and won’t be used in any publications. If you wish to participate, return of Questionnaire 1 will constitute consent. The questionnaire-feedback process is anticipated to take place between May 2016 and October 2016. If final analyses require further clarification, you may be invited via email to participate in a voluntary follow-up phone interview.

There are no costs associated with participating in this research project, nor will you be paid. Participation is entirely voluntary and you are able to withdraw at any point. Demographic information can be removed if requested; however, if you choose to withdraw not all contributions can be taken out if included in preceding rounds. Results of this research project will be published in a variety of forums and used by the researcher Sarah Blaschke in her dissertation. You will receive a summary of results at completion of the study.

All completed questionnaires will be saved in password-protected folders on a secure drive (electronic data) that can be accessed only by the study investigators. All physical data collected will be stored safely and securely in the Department of Cancer Experiences Research at the Peter MacCallum Cancer Centre in locked filing cabinets. All Data will be kept for 5 years as per the Australian Code for the Responsible Conduct of Research, 2007. In accordance with relevant Australian and/or Victorian privacy and other relevant laws, you have the right to request access to the information about you that is collected and stored by the research team. You also have the right to request that any information with which you disagree be corrected.

Who has reviewed the research project?

This research project has been approved by the Human Research Ethics Committee (HREC) of the Peter MacCallum Cancer Centre. This project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007), which has been developed to protect the interests of people who agree to participate in human research studies.

Further information and who to contact

If you want any further information concerning this project or if you have any problems, which may be related to your involvement in the project, you can contact the researcher with the above contact information.

If you have any complaints about any aspect of the project or the way it is being conducted, then you may contact:

| Reviewing HREC name | Peter MacCallum Cancer Centre Ethics Committee |
| HREC Executive       | Officer Ethics Coordinator                  |
| Contact              | Phone: + 61 3 9656 1699  Email: ethics@petermac.org |
Appendix 4 Phase 2 Ethics Approval Certificate

Ethics approval certificate from Peter MacCallum Human Research Ethics Committee the study protocol entitled ‘Identifying opportunities for nature engagement in cancer care practice and design: a Delphi study’ received May 2016.
PETER MACCALLUM CANCER CENTRE AUTHORIZATION TO CONDUCT A RESEARCH PROJECT

AU RED HREC Reference No: LNR/16/PMCC/65
AU RED SSA Reference No: LNRSSA/16/PMCC/78
Peter Mac Project No: 16/46L

Project Title: Identifying opportunities for nature engagement in cancer care practice and design: a Delphi study

Principal Investigator: Ms Sarah Blaschke

Approval Date: 24 May 2016

I am pleased to advise that the above project has received ethical approval and satisfies Peter Mac research governance requirements and may now be conducted at Peter MacCallum Cancer Centre. Conduct of the project is subject to compliance with the conditions set out below.

Approved Documents:

<table>
<thead>
<tr>
<th>Document</th>
<th>Version</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>2</td>
<td>19 May 2016</td>
</tr>
<tr>
<td>Appendix B: Email Letter of Invitation</td>
<td>2</td>
<td>19 May 2016</td>
</tr>
<tr>
<td>Appendix C: Participant Information Sheet</td>
<td>2</td>
<td>19 May 2016</td>
</tr>
<tr>
<td>Appendix A: Questionnaire 1 Item generation</td>
<td>1</td>
<td>05 May 2016</td>
</tr>
<tr>
<td>Appendix D: Questionnaires 2 to 4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In order to comply with the National Statement on Ethical Conduct in Human Research (2007 and updates), Guidelines for Good Clinical Research Practice and local research policies and guidelines, you are required to:

- Submit an Annual Progress Report every 12 months for the duration of the project. *Note: Continuation of ethics approval is contingent on submission of an annual report in a timely manner;*
- Submit a comprehensive Final Report upon completion of the project;
- Submit any proposed amendments to the project including any proposed changes to any of the approved documents;
- Notify any unexpected developments in the project with ethical implications;
- Notify any change in Principal Investigators/Associate Investigators involved in the project at Peter MacCallum Cancer Centre;
- Notify if a decision is taken to end the project prior to the expected date of completion.
The Peter MacCallum Cancer Centre Ethics Committee may conduct an audit of the project at any time.

Please refer to the Peter MacCallum Cancer Centre Ethics Committee Secretariat website (http://www.petermac.org/research) for access to forms, policies and guidelines and other information and news concerning research at Peter MacCallum Cancer Centre.

The Peter MacCallum Cancer Centre Ethics Committee is organised and operates according to the NHMRC National Statement on Ethical Conduct in Research Involving Humans (2007) and in accordance with the Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and the Health Privacy Principles enumerated in the Health Records Act 2001 (Vic) and Section 95A of the Privacy Act 1988 (and subsequent Guidelines).

Please be advised that the Principal Researcher and any Associate Researchers named on the application did not participate in deliberative discussions or decision-making regarding the project.

Yours sincerely,

Dr. Dianne Snowden
Ethics Coordinator
Ethics Committee Secretariat
T: 9656 1699
E: ethics@petermac.org
Appendix 5 Participant Results Summary Letter 1

Letter outlining the summary of results sent to twenty cancer patients who participated in phase 1 qualitative interviews.
Summary of results: “The Relevance of Nature in the Lives of People Affected by Cancer”

Dear XXXX,

This letter presents a summary of results from the research study titled “The Relevance of Nature in the Lives of People Affected by Cancer”, which you participated in. You are receiving this letter because you indicated that you wish to receive an update at the end of the study. First, I would like to sincerely thank you for your contributions. Your perspectives helped in gaining a good and balanced understanding about the different aspects of cancer patients’ use of nature, and the ways they find nature helpful, or not.

Two research papers have resulted from interviews with 20 Peter Mac cancer patients, which took place from February to May 2015.

1. The first paper titled “Cancer patients' perspectives on nature: Normalizing dichotomous realities” has been submitted to a medical journal and addresses how nature is relevant and useful for cancer patients in their experiences of health and recovery. It explains the inner processes taking place when engaging with nature after cancer diagnosis and during treatment.

2. The second paper titled “That extra life, that vibrancy’: Nature-based engagement in cancer care” is in its final stages of write-up and provides practical insights about appropriate and safe integration of various opportunities for nature-based engagement into the cancer care setting.

Overall the study found that nature can be used in the cancer setting to create sensory stimulating environments, features, and activities, which offer appropriate levels of engagement for vitalizing patients. Access to nature also affords patients, in deprived environmental (hospital) conditions, personal space and freedom for social and private exploration.

The following broad recommendations and cautions for assisting patients to have beneficial and safe opportunities to engage with nature in cancer care settings were identified:

**Recommendations and their Rationales**

- **Views to nature** create distraction from unpleasant conditions and provide needed comfort; they connect patients with a more familiar reality beyond (and outside) the setting they are confined to.
- **Accessible nature environments and safe nature-based activities** (e.g.s. hospital gardens, sheltered outdoor environments, safe paths for walking, light gardening activities, collecting nature objects) offer varied and compatible forms of physical activity and movement.
Nature-based features and activities should avoid undesirable and too demanding situations that potentially cause strong dislike, overstimulation or overwhelm (e.g.s. poor quality artificial plants, poorly maintained environments, too complex or ambiguous nature-based artwork and displays, long or vigorous walks and moving too far away from the hospital when outdoors); consideration must be given to some patients’ limited capacity for engagement (caused by, for example, fatigue, limited mobility, psychological/emotional distress, restrictions around contact with organic matter when immunocompromised).

Safety is of paramount concern when engaging with nature in the cancer setting; attention must be given to aspects such as allergy inducing and toxic plant materials, slippery or otherwise challenging surfaces, and exposure to harsh weather conditions.

The second phase of the research project will now proceed to engage a panel of relevant healthcare experts, designers and researchers who will be asked about their ideas and opinions about nature engagement in cancer care settings. The aim is to gain insight into the practical possibilities and limitations for incorporating nature-based opportunities in cancer care practice and setting design. The study will take place between June 2016 and December 2016.

I hope this letter conveys the important contribution you have made to this study. Thank you again for your interest and time investment. If you would like further information about any aspects of the project, please feel free to get in touch with me by using the contact details below.

With best wishes,

Sarah Blaschke

Contact
Cancer Experiences Research
Locked Bag 1
A’Beckett Street
Victoria 8006
sarah.blaschke@petermac.org
Appendix 6 Participant Results Summary Letter 2

Letter outlining the summary of results sent to 38 healthcare and design experts who participated in the Delphi study.
Summary of results: “Identifying opportunities for nature engagement in cancer care practice and design: A Delphi study”

This letter presents a summary of results from the research study titled ‘Identifying opportunities for nature engagement in cancer care practice and design: A Delphi study’, which you participated in. You are receiving this letter because you indicated that you wish to receive an update at the end of the study. First, I would like to sincerely thank you for your contributions. Your input helped to gain a deeper understanding about the different concerns related to nature-based initiatives in oncology contexts.

The aim was to better understand the practical possibilities and limitations for incorporating nature-based opportunities in cancer care practice and setting design. The Delphi panel was composed of 38 healthcare and design experts (Table 1) whose input generated 19 categories of expert recommendations and cautions for nature engagement in cancer care (Table 2) and includes a listing of 10 Opportunities and 10 Barriers rated of highest importance when considering beneficial and safe nature-based opportunities in cancer care design (Table 3). Tables are presented below.

Published papers resulting from this study:


I hope this letter conveys the important contribution you have made to this study. Thank you again for your interest and time to participate.

With best wishes,

Sarah Blaschke

Phone +61 3 8559 5904
Email sarah.blaschke@petermac.org

Victorian Comprehensive Cancer Centre Building
Level 9, 305 Grattan Street,
Melbourne Victoria 3000
### Table 1 Characteristics of Delphi Panellists

<table>
<thead>
<tr>
<th>Expert groups</th>
<th>Expertise n=38</th>
<th>Q1 n=38</th>
<th>Q2 n=32</th>
<th>Q3 n=31</th>
<th>Q4 n=32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare practitioner (HP)</td>
<td>134</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Healthcare management (HM)</td>
<td>25</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Healthcare architects and designers (AD)</td>
<td>64</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Academics (A)</td>
<td>253</td>
<td>11</td>
<td>10</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

#### Dual roles

<table>
<thead>
<tr>
<th>Dual roles</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, AD</td>
<td>86</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>A, HP</td>
<td>121</td>
<td>6</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>A, HM</td>
<td>22</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>AD, HP</td>
<td>47</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>HP, HM</td>
<td>28</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Geographic location

<table>
<thead>
<tr>
<th>Geographic location</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>19</td>
<td>16</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>USA</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>UK</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>New Zealand</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Canada</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Denmark</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Sweden</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table 2 Categories and number of validated items generated by the Delphi panel in Q1 (n=38) and Q2 (n=33; 87%)

#### Categories (Number of items grouped into each category)

**Opportunities**

| A. Accessibility. To enable access to nature engagement (5) |
| B. Clinical appropriateness and safety (2) |
| C. Design. To enable optimal multi-sensorial connection with nature (12) |
| D. Education and awareness. To enable the context for nature engagement (3) |
| E. Physical exercise, sensory stimulation, aesthetic experience (2) |
| F. Potential nature-based activities (9) |
| G. Repair and maintenance (3) |

**Barriers**

<p>| A. Building and site constraints (3) |
| B. Champion unavailable (1) |
| C. Cost and lack of resources (4) |
| D. Inaccessibility (3) |
| E. Inadequate knowledge and lack of awareness about existing knowledge (9) |
| F. Inappropriate design choices and execution (4) |
| G. Incompatible with current healthcare paradigm (2) |
| H. Individual preferences - one “design” doesn’t fit all (1) |
| I. Negative trigger (1) |
| J. Patient burden, limitations, and underutilization (4) |
| K. Patient perspective not included (2) |
| L. Risk and safety (4) |</p>
<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Q3</th>
<th>Q4</th>
<th>Q4</th>
<th>Total</th>
<th>Mdn (M)</th>
<th>% ≥ 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q3</td>
<td>Q4</td>
<td>n=32</td>
<td>84%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Opportunities</strong></td>
<td><strong>Ranking</strong></td>
<td><strong>Item description</strong></td>
<td><strong>Category</strong></td>
<td><strong>Q3</strong></td>
<td><strong>n=31</strong></td>
<td><strong>Q4</strong></td>
</tr>
<tr>
<td>1 (C)</td>
<td>Window views from clinical areas onto nature, garden, sea, sky, weather, people watching, greenery, trees, outside world, daylight, night sky, escape, movement,</td>
<td></td>
<td></td>
<td>253</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2 (A)</td>
<td>Accessible outdoor settings and courtyards: Easy and effortless access, automated doors, nearly, some areas with high visibility, close proximity to clinical trails, Resting points, Exercise opportunity for staff, nature walks, Sand and walking, mobility and balance training, assisted walking, nature exercises rooms,</td>
<td></td>
<td></td>
<td>301</td>
<td>91</td>
<td>91</td>
</tr>
<tr>
<td>3 (E)</td>
<td>Physical exercise adapted to patient requirements: Stoll gardens, walking paths with points of interest and distance markers, plant species, Medicinal Plants, meandering trails, Resting points, Exercise opportunity for staff, nature walks, Sand and walking, mobility and balance training, assisted walking, nature exercises rooms,</td>
<td></td>
<td></td>
<td>301</td>
<td>91</td>
<td>91</td>
</tr>
<tr>
<td>4 (B)</td>
<td>Appropriate safety measures and surface materials for limited mobility: Handrails, smooth paved paths, ramps rather than steps, colour contrasting cutting along pathways,</td>
<td></td>
<td></td>
<td>301</td>
<td>91</td>
<td>91</td>
</tr>
<tr>
<td>5 (D)</td>
<td>Educate healthcare team, management, patients, designers, policy- and decision makers about value, benefits, and appropriate implementation of nature-based opportunities:</td>
<td></td>
<td></td>
<td>301</td>
<td>91</td>
<td>91</td>
</tr>
<tr>
<td>6 (C)</td>
<td>Design for privacy: Zoning, screening, semi-enclosed spaces, restful, contemplative and solitary spaces, some outdoor places shielded from inside views, separate but near spaces for staff to retreat (away from patients and workplace)</td>
<td></td>
<td></td>
<td>301</td>
<td>91</td>
<td>91</td>
</tr>
<tr>
<td>7 (G)</td>
<td>Design proposal needs to address repair and maintenance requirements of nature-based features within available maintenance budgets (easy to maintain). Tasks to be carried out by skilled professionals:</td>
<td></td>
<td></td>
<td>301</td>
<td>91</td>
<td>91</td>
</tr>
<tr>
<td>8 (C)</td>
<td>Protection from adverse weather conditions (sun, shade, high/low temperatures) and unpleasant stimulation (overpowering scents, noise, loud sounds, toxic plants, clutter)</td>
<td></td>
<td></td>
<td>301</td>
<td>91</td>
<td>91</td>
</tr>
<tr>
<td>9 (F)</td>
<td>Socialising: Range of seating options, gathering and communal spaces, BBQ area, children play areas, semi-private enclosures for personal conversations</td>
<td></td>
<td></td>
<td>301</td>
<td>91</td>
<td>91</td>
</tr>
<tr>
<td>10 (C)</td>
<td>Indoor design to maximize use of biophilic elements: Natural materials, natural colors, air flow (including windows that open safely), and natural light</td>
<td></td>
<td></td>
<td>301</td>
<td>91</td>
<td>91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Q3</th>
<th>Q4</th>
<th>Q4</th>
<th>Total</th>
<th>Mdn (M)</th>
<th>% ≥ 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q3</td>
<td>Q4</td>
<td>n=32</td>
<td>84%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Barriers</strong></td>
<td><strong>Ranking</strong></td>
<td><strong>Item description</strong></td>
<td><strong>Category</strong></td>
<td><strong>Q3</strong></td>
<td><strong>n=31</strong></td>
<td><strong>Q4</strong></td>
</tr>
<tr>
<td>1 (A)</td>
<td>Building design and site constraints, Missed opportunities: Layout, building orientation, surrounding views, Lack of available space were not considered in planning and development phase:</td>
<td></td>
<td></td>
<td>200</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>2 (E)</td>
<td>Decision makers, management and administration often lack knowledge and/or awareness about benefits of nature engagement:</td>
<td></td>
<td></td>
<td>200</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>3 (D)</td>
<td>Inaccessibility: Heavy, locked doors, no electronic door opener, barriers, thresholds, doorways and pathways too narrow for wheelchair or gurney access or too wide paver joints become tripping hazards, insufficient seating, co-opted as smoking areas, access for the very sick and frail not considered</td>
<td></td>
<td></td>
<td>200</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>4 (C)</td>
<td>Cost and resource allocation: Cost for routine repair and maintenance, Staff and volunteer time, acquiring indoor equipment (screens, virtual reality, AV), lack of funding,</td>
<td></td>
<td></td>
<td>200</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>5 (F)</td>
<td>Inappropriate design choices and execution: limited greenery, cold and stark, too much landscape (concrete, clay), uncomfortable seating, too demanding, complex, static, or boring environments, insufficient shading, materials too hot to the touch, structures/cultures that cast odd shadows</td>
<td></td>
<td></td>
<td>200</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>6 (K)</td>
<td>Healthcare facilities design often guided by clinical functionality, efficiency, cost restrictions and/or habitual practice, not necessarily the patient perspective;</td>
<td></td>
<td></td>
<td>200</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>7 (G)</td>
<td>Mainstream values (decision makers) don’t prioritize nature-based opportunities or “design thinking”</td>
<td></td>
<td></td>
<td>200</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>8 (B)</td>
<td>Champion (advocate) needed</td>
<td></td>
<td></td>
<td>200</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>9 (E)</td>
<td>Not prioritized in construction and development phase of healthcare projects</td>
<td></td>
<td></td>
<td>200</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>10 (F)</td>
<td>Inauthenticity of nature-based design elements: fake plants, fake scents, tokenistic corporate design (“cutting edge” award seeking designs)</td>
<td></td>
<td></td>
<td>200</td>
<td>88</td>
<td>88</td>
</tr>
</tbody>
</table>
Appendix 7 Literature Review Search Protocol

Protocol outlining the search strategy for systematically retrieving qualitative literature from various databases. Key search terms and combinations are included for each database searched.
1. Databases, keywords and search strategies

**EBSCOhost: CINAHL & PsycInfo**

Cluster 1:
Exp Neoplasms/
OR
cancer* or neoplasm* or tumor* or carcinoma* or malignanc* or leukemia* or leukaemia* or oncolog* or metastas*
AND
Cluster 2:
garden* or horticultur* or wilderness or forest* or woodland*
AND
"natur* based" or "natur* assisted" or "urban green*" or "green care" or "benefit* of natur*" or "natur* setting*" or "natur* environment*" or "outdoor nature" or "interacting with nature" or "nature experience*" or "experiencing natur*" or "nearby nature" or "environmental intervention" or "physical environment feature" or environment* impact" or healing environment* or "outdoor* environment*" or "indoor plant*" or "window view*" or "restore attention" or "attention restoration" or "distraction therapy" or "distraction techniques" or outdoor adventure or "therapeutic camping" or windowless or "green park*" or "urban park" or "nature based sound"

**Ovid: MEDLINE**

Cluster 1:
Exp Neoplasms/
OR
cancer* or neoplasm* or tumor* or carcinoma* or malignanc* or leukemia* or leukaemia* or oncolog* or metastas*
AND
Cluster 2:
garden* or horticultur* or wilderness or forest* or woodland*
OR 1514-06
"natur* based" or "natur* assisted" or "urban green*" or "green care" or "benefit* of natur*" or "natur* setting*" or "natur* environment*" or "outdoor nature" or "interacting with nature" or "nature experience*" or "experiencing natur*" or "nearby nature" or "environmental intervention" or "physical environment feature" or environment* impact" or healing environment* or "outdoor* environment*" or "indoor plant*" or "window view*" or "restore attention" or "attention restoration" or "distraction therapy" or "distraction techniques" or outdoor adventure or "therapeutic camping" or windowless or "green park*" or "urban park" or "nature based sound"

**Search Limits:** English language and humans and yr="1985 -Current"

**Cochrane Database of Systematic Reviews**

neoplasms
OR
cancer* or neoplasm* or tumo* or carcinoma* or malignanc* or leukemia* or leukaemia* or oncolog* or metastas*
AND
garden* or horticultur* or wilderness or forest* or woodland* or natur* or environment* or park* or "urban green"* or "green care" or "indoor plant"* or window* or "restore attention" or "attention restoration" or "distraction therapy" or "distraction techniques" or outdoor* or "therapeutic camping"

Search Limits: Publication Year from 1985 to 2015 (Word variations have been searched)

2. Inclusion criteria

Studies of the following types are considered:

- Systematic reviews and meta-analyses
- Empirical studies including observational studies
- Published in peer-reviewed journal articles
- Full text available in English language
- Investigation of nature contact in healthcare contexts by qualitative reporting.
  - on ‘nature experience’ as defined below
  - include populations affected by cancer.

3. Definitions

Healthcare Contexts

For this review the term healthcare contexts is used as an umbrella term to describe any setting in which the patient receives clinical care or partakes in a planned health intervention. Hence, it includes hospitals, private clinics, day centres, residential homes, sites of structured outdoor interventions and the patient’s own home. Of special interest were studies about cancer patients’ home environments considering this is where the majority of cancer patients wish to be.
Nature contact

contact with:

“the phenomena of the physical world collectively, including various forms of vegetation and habitat, natural and humanly designed landscapes, natural cycles, processes, 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 as well as perceived inner states evoked by these elements”
Appendix 8 Phase 1 Participant Approach Script

Script for approaching patients for recruitment into phase 1 research.
Approach Script

The Relevance of Nature in the Lives of People Affected by Cancer

Hi my name is Sarah and I am a research student here at PeterMac.

If outpatient:
I am currently conducting an interview study to explore the role of nature experience and contact with nature in cancer care. I am looking at the possibility to develop a nature-based program for cancer centres like PeterMac and I would be very interested in your thoughts about nature and your experiences with nature. Before I continue on, does this sound like something you might be interested in? Do you have any questions before I go on?

If inpatient:
Your doctor.....has said it would be ok for me to talk to you about an interview study I am currently working on here at PeterMac. The study is about exploring.....[continue as above]

[If “yes”, continue; if “no”, state, “That is fine. Thank you for your time”]

Contact with nature can mean many different things to different people. For this study, I would be interested to find out more about how you view nature and how important nature is for you in your own life. For this study, ‘nature’ is defined as a broad concept that can include all types of natural or man-made landscapes like the beach, native bush or a backyard garden. It can include a range of activities like walking, gardening or just sitting and viewing nature from a window. It can even be about viewing nature art such as paintings or listening to nature-based sounds. Your participation would include an interview with me that usually takes between 30 minutes to an hour or longer.

Would you be interest in more information about this study? Do you have any questions about the study?

If unsure:
It sounds like you would like a bit more time to think about this, which is fine. You can take this home with you (hand patient PICF) and you can get in touch with me if you have any further questions want to discuss. Please also feel free to discuss this with your family and friends.

If no:
This is okay. I just want to remind you that this will not impact your relationship with the hospital or staff. Thank you for your time.

If yes:
Here is a Participation Information Sheet and Consent Form (hand PICF to patient) You can take this home [if inpatient: take time] and read through the information - you don’t need to make a decision right away. If you decide you want to take part in the study, you can return the signed Consent Form to me in the envelope. It has our address on it and a prepaid stamp. I will then contact you and arrange a convenient time for you to do the interview. Thank you, I really appreciate your time and help in this research study.
Appendix 9 Semi-Structured Interview Schedule

Semi-structured interview schedule designed for phase 1 investigation. Part one (questions 1 to 5) served data collection for the Grounded Theory Study (Chapter 5) and part two (questions 6 and 7) served data collection for the Patient-Reported Recommendation study (Chapter 6).
Interview schedule

The Relevance of Nature in the Lives of People Affected by Cancer

Introduction

Thank you for agreeing to take part in this interview. The main aim of this study is to find out as much as possible about your experiences with nature before and after your cancer diagnosis.

I have a number of questions that I would like to ask you about your experiences. Each person interviewed is asked the same questions. If any of the questions are unclear, I’m here to help you understand the content of the questions. So please feel free to ask me to repeat a question or explain more about what is meant by it. The whole interview should take about 30 minutes to 1 hour of your time.

Please let me know if any questions are upsetting to you, or if you would prefer not to answer any question. We can stop the interview or take a break at any time. There are no right or wrong answers.

Do you have any questions?

Before we commence I will ask you a few demographic questions so that we can understand the backgrounds of patients providing information. Your name will not be added to these sheets. [Researchers fills out Demographic Sheet]

I’d like to remind you that we’re going to audio-tape this interview so that we can analyze the information we collect. I’m going to put the tape on now.

Questions

1. I want to begin by asking you to tell me a little bit about what nature means to you?

| Meaning what the term 'nature' includes such as going outside, viewing nature through a window, going for walks, gardening etc.. |

[If relevant/necessary: Everything you have said is very valuable and there are no right or wrong answers. Nature can mean many different things to different people and I just want to make sure you don't feel lost and are clear about how nature is defined in this context.]
Because this is a research project, we must ensure that everybody taking part in the interview knows how nature is defined in this study so we can answer the research question. In addition to what you just described as nature, this study also includes (wording dependent on participants words):

“nature in this study is about the physical world, including different plants and vegetation, natural and man-made landscapes like gardens and parks, natural cycles and weather, wildlife and other natural objects from the earth. This definition also includes man-made creations like images and sounds of nature”

<table>
<thead>
<tr>
<th>2. Can you describe some of the more common nature experiences you remember having before your cancer diagnosis?</th>
<th>2.1 What do you feel these experiences gave you? How would you typically feel after…X?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 What do you feel these experiences gave you? How would you typically feel after…X?</td>
<td>2.2 Were there any particular situations or events you can think of that would make you want to go into nature or experience….X?</td>
</tr>
<tr>
<td>2.2 Were there any particular situations or events you can think of that would make you want to go into nature or experience….X?</td>
<td>Probe: This could be anything like feeling tired or stressed or feeling energetic or adventurous…?</td>
</tr>
<tr>
<td>2.3 Are there any other places or activities that are not nature related that would give you a similar feeling of….X?</td>
<td>2.4 And now, about what you described earlier relating to your nature experiences, how often would you usually visit…X (ie. the beach, the park etc) or do…X activity (ie. walking, gardening etc)?</td>
</tr>
<tr>
<td>2.4 And now, about what you described earlier relating to your nature experiences, how often would you usually visit…X (ie. the beach, the park etc) or do…X activity (ie. walking, gardening etc)?</td>
<td>[if appropriate] 2.5 How would you feel if you didn’t visit…X or do activity…X for a longer time? Would you miss it, would you notice a difference?</td>
</tr>
<tr>
<td>3. Do you think having cancer has affected your relationship with nature and the things you like to do in nature?</td>
<td>3. Do you think having cancer has affected your relationship with nature and the things you like to do in nature?</td>
</tr>
<tr>
<td>[if patient is clearly not able to do X anymore] 3. How does your current experience with cancer affect your feelings about nature and the things you do in nature?</td>
<td>[if change] 3.1 How, if at all, have your thoughts and feelings changed about nature since your diagnosis?</td>
</tr>
<tr>
<td>[if change] 3.1 How, if at all, have your thoughts and feelings changed about nature since your diagnosis?</td>
<td>3.2 [if not yet described] Has this also caused you to look for other types of nature experiences today or do you, for any reason, avoid these?</td>
</tr>
<tr>
<td>3.2 [if not yet described] Has this also caused you to look for other types of nature experiences today or do you, for any reason, avoid these?</td>
<td>[avoiding] 3.3 Can you describe the reasons why you avoid…X?</td>
</tr>
<tr>
<td>[avoiding] 3.3 Can you describe the reasons why you avoid…X?</td>
<td>[seeking other] 3.4 Can you tell me a bit more about….X and how you feel this helped you, if at all?</td>
</tr>
</tbody>
</table>

Nature Experience 2015_Project Nr. 15/14L

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4. Do you find yourself using any type of nature-related activities or images during treatment that help you a little to get through it?

This could be anything like thinking about your favorite places in nature or listening to nature-based sounds or looking at pot plants and nature images.

**[If yes]**

4.1 Can you describe a little more how this helps you?

4.2 Can you put into words what it is about nature that helps you? Is there anything you can pin-point? If nothing comes to mind that is totally fine too. There are no right or wrong answers. **[word question according to respondents description]**

4.3 Can you describe any times or situations where this is not helpful?
- adverse effects
- missing activities you used to do in nature
- loss of connection to nature/outdoors

**[If no]**

4.4 Are there any particular reasons you haven’t done this or is it something you just never thought of doing?

4.5 Can you imagine this being helpful? And in what ways?

5. Have there been any nature-related experiences you have had since your diagnosis that are particularly memorable?

**[If any]**

5.1 Can you tell me a bit more about this?

6. After having had this experience with cancer, what would you advise a person newly diagnosed with cancer to do in terms of caring for yourself that relates to nature?

7. What suggestions do you have (or recommendations) about how to bring these nature experiences you just described as helpful [if applicable] into a cancer care setting like PeterMac?

8. Is there anything you would like to ask me?

**Closing the Interview**

That brings us to the end of our interview. I want to very briefly summarize the key points you described to me.

**Brief Summary**
Do you feel like this summarizes what you just told me and that I understood what you described to me?

Thank you for your time and for sharing your experiences with me. We expect that the results of this study will become available towards the end of 2015. If you didn’t indicated on the Consent form that you would like to receive a summary of the findings but you would like to, you can let me know now and I will note this on your form. Would you like to receive a summary of our findings?

Again, I thank for your time and for sharing your experiences with us.

Reconfirm confidentiality / anonymity
Appendix 10 List of Memos and Example Memo

Document containing a list of analytic memos written during the Grounded Theory study. Memo titles are listed in chronological order. One full-text example is provided to illustrate the nature of the researcher’s analytic thinking and process.
| 1 getting away vs "going into" | 55 normalizing |
| 2 "dealing conversations" | 56 ordinary - extra-ordinary |
| 9 change in perception of awe vs appreciation for nature | 57 psychosomatic - benefits |
| 3 a garden or a quiet place | 58 Quantifying nature's benefit |
| 4 A Matrix | 59 range of distraction |
| 5 Abnormalizing | 60 ranges within ranges: continuum |
| 6 Age is the culprit not cancer | 61 relationship to nature doesn't change |
| 7 appreciation | 62 running away vs having a break |
| 8 being alone in nature vs being alone with nature | 63 shaming cancer patients with nature |
| 10 changing focus | 64 follow the process |
| 11 Clare's hand motion | 65 something utterly different |
| 12 connecting | 66 space from people |
| 13 core phenomenon | 67 spaciousness |
| 14 cost - part of the process | 68 Spiritual Care |
| 15 dictionary definitions | 69 Stimulus |
| 16 dying | 70 the cancer scenario |
| 17 embodied nature experience | 71 Awe - the now |
| 18 enriched environment - enriched experience | 72 Timelessness |
| 19 everyday noise | 73 touchstone |
| 20 Everyday Noise - Tranquility | 74 treetop level |
| 21 Existential Cycle | 75 trusting the treatment process |
| 22 float | 76 types of nature experience |
| 23 follow all the instructions | 77 what is nature then? |
| 24 fortunate to be living at this time | 78 what nature offers |
| 25 Going outside is like running away | 79 what part of the process |
| 26 Grounded Theory | 80 Connectedness |
| 27 Grounded Theory: Context | 81 Nature Experiences |
| 28 Grounded Theory: Process | 82 sharing vs gaining perspective |
| 29 Grounded Theory: Theoretical Integration | 83 blue range categories |
| 30 Halfway House | 84 Cycle vs Experience |
| 31 home similar to being in nature | 85 Theoretical Construct 1 |
| 32 Hydrologic Cycle | 86 Reconstitution |
| 33 ideas emerging | 87 Micro and Macro |
| 34 immersion | 88 Operationalizing Nature |
| 35 in hospital away from the hospital | 89 Capturing a Phenomenon |
| 36 **integrated into the process | 90 Nature Experiences Typologies |
| 37 learning to use nature | 91 Exquisite Experiences |
| 38 longing for nature experience | 92 Core FOUND: 06 |
| 39 me-time | 93 Sampling re Who? |
I believe the findings now show that nature is not a viable intervention in cancer care. Not because it is not ‘desired’ or useful but exactly because of what it provides, it is not ‘packageable’ in a form of an intervention to be brought to the patient. What was described was the need and desire for normality, to maintain or return to normality. Nature provided this experience in numerous ways. It highlighted the desire to connect to something real, something that is perceived as real. It could be said that life is experienced through the senses, aliveness is a sensuous experience and we experience ourselves and the world we live in through our senses. I think that B.J. Miller has given me a couple pieces of the puzzle, to fill out the puzzle. Saying that anaesthesia is the opposite of aesthetics, numbing, deadening of the senses – what is experienced through the senses can be said to be aesthetics, form, shape, engagement with material, with the material world. What normality then is is a return to the senses, an experience of the world through our senses, just experiencing the world as it is. An embodied experience. What was appreciated and described were the many many ways of making a sensuous experience, which really just is a human experience. Nature was described as a means to make simply human experience. That connection to the senses could be described as ‘connection’. To make a connection and make an experience of aliveness on your own terms. It is nature’s disinterest in you in your situation that makes space for experience. It provides the raw materials for experiencing.

If thinking about integrating this basic concept into health care systems then it would be about humanity really. About creating opportunities to experience sensuously the world we live in and experience sensuously ourselves in the world as part of the world. Healthcare functions (necessarily) on a basis of anaesthetic which is e.g. hospitals its functions, it is about relieving the pain, making away with stressors and discomfort and in many ways numbing the senses for a good purpose. However, if we think of incorporating nature in a model of care – we could look at it as introducing aesthetics or ‘sensuous experience’ or simply humanity, human experiences. The conundrum here is very simply put that nature functions on the basis of ‘disinterest’ in you. It is entirely
disinterested in your situation, but what it does it provides all the building blocks all the raw materials to make a sensuous experience. It becomes accessible via its ‘nature’ of being disinterested in you. It has not invested interest in you but provides you with all you need to be alive and make an ‘alive’ sensuous experience. Therefore, if the concept of nature was incorporated into models of care then it would be about simply adopting an approach that values and provides sensuous experiences, embodied experiences, or it simply places humanity at the center and values the ‘experiences’ as worth having and worth targeting or focusing on.

Ok, I can tell that this is not really capturing the core of it. I’m circling around the outside of the kernel and trying to attach ‘new’ insight material to the kernel and there aren’t any clear attachment sites. I do believe that it is in the process of writing that these attachment sites become clear.

One thing that I definitely must take on-board, even if just for having found the right and useful term, is “disinterest”. That is exactly what I have been trying to express by using the word indiscriminate – which has never fit quite right. The notion of disinterest – is a very freeing one and it entails the notion of giving space. Giving space. Maybe this approach of incorporating nature is about giving space to having the ‘human experience’. About valuing those things that provide us with essential human experiences, sensuous experiences. To actually value these experiences in such a way that it is worth providing them even in a hospital setting. Again, here I am struggling with this idea of ‘intervention’. What this thinking absolutely doesn’t mean is that now it should become a sensory intervention instead of a nature intervention. It is the same premise here. The whole notion of intervention is counterproductive and actually an antithesis to the ‘idea’ of making a human experience. It also, again, rests on a whole host of assumptions that cannot be made.

Dignity, is another important word that I have been thinking about. Dignity and respect. This approach entails dignity and respect for the human experience.

My thinking right now is that all it could do is provide raw material for human experience to be had – therefore also providing space for human experiences to be had. It is therefore (must be) a very passive thing. Disinterested. Empathy, compassion, patient, one who suffers, compassion, to suffer together. Anaesthetic. How to bring aesthetic into an environment that is built upon the concept of anaesthetic, that expresses this in its architecture, its culture, its treatments. Not that this is anything bad, it is required, it is what is needed. But the question now is, is there a space for aesthetic in this environment or should it simply be anaesthetic because it serves that purpose. I think this question very basically comes down to asking what the value of ‘the experience’ really is. If ‘the experience’ every moment of experience, of aliveness, of perception is valued then yes, then it does matter and it matters deeply. If this is not valued then there is no space for it.
Appendix 11 Documentation of Research Procedures (Grounded Theory)

Recruitment and data collection flow chart illustrating each participant’s flow through the study in phase 1. The back-and-forth interaction between participant selection, data collection, and data analysis is illustrated.
Appendix 12 Visual Model depicting Analytic Insights in Grounded Theory Analysis

Illustration of one out of five visual models created during the analysis process of the Grounded Theory study (Chapter 5). A list of categories and codes were extracted from transcribed data contributed by participant 06. Using raw data and the analytic codes and categories, a visual model was created to better understand the experiences described by the participant.
Working Model. Interpretation and visualization of participant 06 (E’s) nature experiences

Final Model. Interpretation and visualization of participant 06 (E’s) nature experiences
Grounded Theory Study_ Participant 06_Codes and Categories for Analytic Modeling

1: Embodied Existential Cycle

A1: Heightened Experience

06: a garden is a deep experiential connection to something that is alive

A1: Heightened Experience Sub: Exquisite Experiences

06: the garden represents exquisiteness (beauty) and death

A1: Heightened Experience Sub: Extraordinary Experiences

A1: Heightened Experience Sub: Extrasensory Experiences

A2: Existential Relating

A2: Existential Relating Sub: Cosmological Disruption

06: can't make use of Christian cosmology - turned away from it (Christian background)
06: deliberately killing plants (weeding) to create beauty was a profound & terrible moment
06: in terms of what is soothing and calming and helpful when I’m unwell, I need a sense of reality
06: looking for meaning in being given a terminal diagnosis & having a baby at the same time (life & death)
06: nature can provide support structure/strategy without religious connotations
06: nature expresses the constant necessity for death in life
06: people are moving away from organized religion into various forms of spirituality
06: plants were pivotal in accepting cancer diagnosis
06: plants, nature, gardens address in different ways spiritual needs of a diverse community
06: the beauty and imperfection of nature is synonymous with the nature of cells
06: the garden represents exquisiteness (beauty) and death
06: the garden represents life and death
06: the hospital garden as a touchstone - place to feel safe, private and contained

A2: Existential Relating Sub: Gaining Perspective

06, 10: Bigger Picture: understanding ones place in the world - ones reality
06: A garden facilitates timelessness and gives perspective
06: and you go back to the simple and good things in life
06: Gardening: gives perspective
06: in terms of what is soothing and calming and helpful when I’m unwell, I need a sense of reality.
06: staying in touch with the outside world (window view) felt like a 'real thing' and made being ill manageable
06: the garden is a significant part of spiritual and emotional care for a wide range of people

A2: Existential Relating Sub: Meaning-Making


06, 09: (A) Hospital: garden/outdoor symbolizes 'touchstone'
06, 10: Bigger Picture: making meaning of ones life situation through observing nature
06, 10: Bigger Picture: understanding ones place in the world - ones reality
06: (A) Design: when receiving chemo it is extremely helpful to witness the passage of time (garden)
06: a garden is a deep experiential connection to something that is alive
06: Bigger Picture: something that feels 'real' makes being ill more tolerable
06: deliberately killing plants (weeding) to create beauty was a profound & terrible moment
06: it is the key metaphor that has helped me to deal with my experience.
06: It is very grounding, it makes me feel more real, it’s very soothing. It makes me feel more alive.
06: looking for meaning in being given a terminal diagnosis & having a baby at the same time (life & death)
06: nature can provide support structure/strategy without religious connotations
06: people are moving away from organized religion into various forms of spirituality
06: plants, nature, gardens address in different ways spiritual needs of a diverse community
06: providing children contact with the cycles of life
06: reconstitute ones place in the world - understand ones own story by being with plants
show the garden is a significant part of spiritual and emotional care for a wide range of people
the hospital garden as a touchstone - place to feel safe, private and contained
witnessing the passage of time (changes) benefit of having a nature park

**A2: Existential Relating Sub: Meaning-Making Sub: Structures**
only makes sense if you make it alive
Bigger Picture: cell mutations as one of nature's evolutionary processes
Bigger Picture: nature's mechanics as ones cosmology
Bigger Picture: nature's mechanics as ones cosmology (metaphor)
can't make use of Christian cosmology - turned away from it (Christian background)
cell mutations are part of the 'bigger processes'
Cosmology based on evolution and biology is alive and beautiful not 'material'
evolution is only possible because of cell mutation (natural sexual selection)
ideas of evolution and biology form the basis of ones cosmology
majority of cell mutations isn't "useful" but critical to the process of evolution
nature creates human life which includes diversity, beauty, death & imperfections (cancer)
nature expresses the constant necessity for death in life
neglected garden is symbolic of carelessness
often rare cancers are caused by just one small thing (gene mutation)
the beauty and imperfection of nature is synonymous with the nature of cells
the garden represents exquisiteness (beauty) and death
the garden represents life and death
there is no evolution, no diversity, no beauty without cell mutation
without cell mutation you can't have all the diversity and beauty

**B1: Emotional Processing**

**B1: Emotional Processing Sub: Acceptance, Letting Go**

**B1: Emotional Processing Sub: Dealing, Coping**

**B2: Mental Strategies**

**B2: Mental Strategies Sub: Change-of-Focus**
B2: Mental Strategies Sub: Distraction

B2: Mental Strategies Sub: Mind-off-things
06: Active-together: Gardening: takes mind off things
06: deeply engaged in it and also just find that I can let go of whatever I’m thinking about – like a meditation and be immersed

B2: Mental Strategies Sub: Mind-set-change
06: Gardening: gives perspective

Connectedness

Connectedness Sub: Nature
06: a garden is a deep experiential connection to something that is alive
06: connection with nature providing spiritual care to people of different backgrounds

Connectedness Sub: Other(s)
06, 10: (A, B) Suggestion: garden provide a different context for interactions
06: (A) having emotional conversation because it felt more private and separate and it was kind of outside the hospital but immediately, immediately accessible

Connectedness Sub: Self
06: escape from the hospital really helpful for accepting (bad news)

Connectedness Sub: Surroundings
06: staying in touch with the outside world (window view) felt like a 'real thing' and made being ill manageable

Continuum 1: Normalizing – Abnormalizing

Continuum 1 Sub: Abnormalizing

Continuum 1 Sub: Normalizing
06, 07, 09: Positive mechanism: normalizing
06, 09, 10: Nature is something real
06, 14: Normalizing
06: a sense of normalcy is helpful when unwell
06: accepting the 'new normal' - normalizing
06: Being with something real is normalizing
06: Bigger Picture: something that feels 'real' makes being ill more tolerable
06: it is very grounding, it makes me feel more real, it’s very soothing. It makes me feel more alive.
06: nature as a vehicle for normalization - it has the properties of something 'real'
06: part of a 'normalizing' experience is to experience something real
06: Positive feeling: solidity
06: the new normal is the reality one lives in 'now'

Continuum 2: Getting Away - Seeking Connectedness

Continuum 2 Sub: Getting Away
06: (A) having emotional conversation because it felt more private and separate and it was kind of outside the hospital but immediately, immediately accessible
06: a hospital garden is effective when it is contained in the core of the hospital - not in a 'different' place
06: escape from the hospital really helpful for accepting (bad news)

Continuum 2 Sub: Seeking Connectedness
06, 09: being connected to something real (view to outdoors) as coping strategy
06, 10: (A, B) Suggestion: garden provide a different context for interactions
06: a garden is a deep experiential connection to something that is alive
06: connection with nature providing spiritual care to people of different backgrounds
06: staying in touch with the outside world (window view) felt like a 'real thing' and made being ill manageable

Intervention

Intervention Sub: Adverse Effects
06: (A) After cancer: strong reaction to fake nature – negative
06: (B) thinks emotional value of garden outweighs the risk of bacterial infection
06: Active-together: (A) animals are too demanding (high level of engagement) when feeling very sick through soil
06: Active-together: (A) animals are too much to handle when being sick - can only handle plants

**Intervention Sub: Caution**

06, 08, 15: (A,B) Caution: bacteria
06: (A) Caution: is careful about cuts and scratches
06: (B) believes normal environmental bacteria can cause pneumonia as much as 'soil' bacteria
06: (B) believes restriction around soil bacteria are unfounded
06: (B) Caution: advises nothing with prickles (cuts & scratches)
06: (B) Caution: bacteria
06: (B) Caution: neutropenia and gardening
06: (B) Caution: some planting design (conservatory) can feel false, artificial, too contrived
06: (B) Caution: time and maintenance required to upkeep live garden/plants
06: (B) Design: contrived garden designs are unnatural and do not offer the quality of peaceful respite
06: (B) Hospital: artificial nature feels quite deathly when in a vulnerable state
06: (B) it will take some time and maintenance if it is to be a really 'live' compelling thing
06: (B) outdoor garden not more dangerous than opening a door
06: (B) soil bacteria no different (worse) than bacteria, molds & fungi in the air
06: Active-together: (A) animals are too demanding (high level of engagement) when feeling very sick
06: Active-together: (A) animals are too much to handle when being sick - can only handle plants
06: being exposed to soil is part of the everyday reality we live in

**Intervention Sub: Sensory Garden**

06: (Neg) blog post (PeterMac art collection vs sensory garden) summarizes what went wrong
06: (Neg) Sensory Garden: artificial nature, neglected
06: (Neg) Sensory Garden: compared to PeterMac's art collection - negative
06: (Neg) Sensory Garden: devastating experience
06: (Neg) Sensory Garden: feel stale and man-made
06: (Neg) Sensory Garden: neglected state - distressing
06: (Neg) Sensory Garden: neglected state - feels like betrayal
06: (Neg) Sensory Garden: neglected state – hurtful
06: (Neg) Sensory Garden: neglected state - symbolic of lack of caring

**Modified Nature Experience**

**Modified Nature Experience Sub: frequency**

06: After cancer: lack of energy
06: Active-together: (A) animals are too demanding (high level of engagement) when feeling very sick
06: Active-together: (A) animals are too much to handle when being sick - can only handle plants
06: After cancer: animals are too demanding
06: surprised about strong reaction to lack of nature in hospital when very ill
06: After cancer: only able to handle plants (less demanding)

**Modified Nature Experience Sub: type**

06: and you go back to the simple and good things in life
06: being able to look at something when you don't have much energy

**Nature Activities**

**Nature Activities Sub: at Home**

06: Active-together: (A) animals are too demanding (high level of engagement) when feeling very sick
06: Active-together: (A) animals are too much to handle when being sick - can only handle plants
06: Active-together: Gardening: providing healthy food for children
06: Active-together: Gardening: reduces business – timelessness
06: Active-together: Gardening: takes mind off things
06: Active-together: growing produce for ones children
06: Passive-alone: meditation
06: Passive-alone: Nature activity: watching birds
Nature Activities Sub: in Hospital
06: Active-together: (A) animals are too demanding (high level of engagement) when feeling very sick
06: Active-together: (A) animals are too much to handle when being sick - can only handle plants
06: Active-together: cold and windy weather didn't stop us from going to the garden
06: being with some life and some change can make cycles of chemo feel less static
06: Passive-alone: (B) people want to read about gardening
06: Passive-alone: being with a real plant (garden) is heavenly compared to medical environment
06: Passive-alone: going into the garden was about accepting that you had difficult news
06: Passive-alone: meditation
06: Passive-together: most significant conversations happened in the garden

Nature Exp. Typlogies
Nature Exp. Typlogies Sub: Conducive/Assisting
06, 10: (A, B) Suggestion: garden provide a different context for interactions
06, 10: Bigger Picture: understanding ones place in the world - ones reality
06: (A) having emotional conversation because it felt more private and separate and it was kind of outside the hospital but immediately, immediately accessible
06: (B) Design: outdoor areas are a place to have important conversations (privacy)
06: A garden facilitates timelessness and gives perspective
06: Active-together: Gardening: providing healthy food for children
06: Gardening: being part of the cycle of life
06: many people have their 'coming to terms' conversations in the garden (women's hospital)
06: nature as a vehicle for normalization - it has the properties of something 'real'
06: nature can provide support structure/strategy without religious connotations
06: nature soothing when dealing with chaos, demands and overwhelm
06: Passive-alone: going into the garden was about accepting that you had difficult news
06: Passive-together: most significant conversations happened in the garden
06: reconstitute ones place in the world - understand ones own story by being with plants

Nature Exp. Typlogies Sub: Embodied
06, 07: Nature activity: sitting with plants
06, 08: Positive Sensory Experience: witnessing change - breaking out of the static
06: a garden is a deep experiential connection to something that is alive
06: Passive-alone: being with a real plant (garden) is heavenly compared to medical environment
06: Positive Sensory Experience: witness the passage of time - moving through time

Nature Exp. Typlogies Sub: Immersed
06: deeply engaged in it and also just find that I can let go of whatever I’m thinking about – like a meditation and be immersed

Nature Exp. Typlogies Sub: Mental
06: Passive-alone: meditation

Nature Exp. Typlogies Sub: Novel
06, 08: Positive Sensory Experience: witnessing change - breaking out of the static

Nature Exp. Typlogies Sub: Personal Presence
06, 09: (A) Hospital: garden/outdoor symbolizes 'touchstone'
06: a garden is a deep experiential connection to something that is alive
06: nature creates human life, which includes diversity, beauty, death & imperfections (cancer)
06: nature is the key creator of cancer and human life

Nature Preferences
Nature Preferences Sub: Elements
06, 10: Nature preference: layers of green foliage
06: the aesthetic of layers upon layers of green foliage

Nature Preferences Sub: in Hospital
06, 10: Garden: the more alive the better (real nature)
06: (A) After cancer: strong reaction to fake nature - negative
06: (A) Design: engagement needs to be very 'gentle' when sick
06: (A) Hospital Views: I kept the window, the blind open 24 hours a day
06: (B) Caution: some planting design (conservatory) can feel false, artificial, too contrived
06: (B) Design: it must be a living garden
06: (B) Design: It must be alive
06: (B) Hospital: artificial nature feels quite deathly when in a vulnerable state
06: (Neg) Dislike artificial nature: courtyard next to left on UG - devastating, feeling neglected
06: (Neg) Dislike artificial nature: feels heart-braking
06: (Neg) Dislike artificial nature: feels rage-inducing
06: (Neg) Dislike artificial nature: neglect and uncaring
06: (Neg) Dislike artificial nature: tokenistic
06: (Neg) dislike for plastic plants increased after cancer
06: (Neg) doesn't like being around or in contrived nature
06: (Neg) Sensory Garden: artificial nature, neglected
06: (Neg) substituting real plants with artificial plants is painful and neglectful
06: a garden that facilitates 'coming to terms with' doesn't need to be remarkable - it needs to feel alive & real
06: an alive garden is one that changes over, lives and cycles
06: flowers can be uplifting when feeling emotionally vulnerable
06: flowers in a garden are so much more appealing because they are alive
06: gardens that are too contrived feel false, artificial
06: plastic plants are worse than 'contrived' nature elements (raked pebbles)
06: the quality of 'real' nature is paramount when feeling ill - contrived nature feels deathly

**Nature's Effect**

**Nature's Effect Sub: emotional**

06: Positive feeling: uplifting
06: (A) Design: aesthetically being in the garden is very soothing
06: (B) thinks emotional value of garden outweighs the risk of bacterial infection through soil
06: a garden that facilitates 'coming to terms with' doesn't need to be remarkable - it needs to feel alive & real
06: Gardening: critical to well-being
06: Gardening: deeply engaging
06: Positive feeling: emotional value
06: Positive feeling: soothing
06: nature soothing when dealing with chaos, demands and overwhelm

**Nature's Effect Sub: existential (transcendent)**

06: normalizing
06: Nature is something real
06: (A) being with a plant in everyday life is a helpful support strategy (compared to seeing a psychologist)
06: A garden facilitates timelessness and gives perspective
06: a garden is a deep experiential connection to something that is alive
06: a garden should be a place of retreat and nurturance, not a big show
06: a garden that facilitates 'coming to terms with' doesn't need to be remarkable - it needs to feel alive & real
06: a sense of normalcy is helpful when unwell
06: accepting the 'new normal' - normalizing
06: Active-together: Gardening: reduces business - timelessness
06: being with some life and some change can make cycles of chemo feel less static
06: connection with nature providing spiritual care to people of different backgrounds
06: Gardening: being part of the cycle of life
06: Gardening: gives perspective
06: It is very grounding, it makes me feel more real, it’s very soothing. It makes me feel more alive.
06: nature as a vehicle for normalization - it has the properties of something 'real'
06: nature can provide support structure/strategy without religious connotations
06: nature soothing when dealing with chaos, demands and overwhelm
part of a 'normalizing' experience is to experience something real
Positive feeling: contained
Positive feeling: inspiring / inspiration
Positive feeling: reconstitution, restoration
Positive feeling: renewal
Positive feeling: respite
Positive feeling: solidity
Positive Sensory Experience: witness the passage of time - moving through time
the garden is a significant part of spiritual and emotional care for a wide range of people

Nature's Effect Sub: mental/psychological
Positive Sensory Experience: witnessing change - breaking out of the static
a contained hospital garden feels 'focused', calm and secure
Active-together: Gardening: reduces business - timelessness
Active-together: Gardening: takes mind off things
being with some life and some change can make cycles of chemo feel less static
Gardening: critical to well-being
Gardening: deeply engaging
Gardening: gives perspective
Positive feeling: secure
Positive Sensory Experience: witness the passage of time - moving through time

Nature's Effect Sub: physical
Gardening: providing healthy food for children
Gardening: better than just looking at a garden
Gardening: critical to well-being

Nature's Effect Sub: social
(A,B) Hospital: gardens promote social interaction
03, 06: Hospital: (A,B) gardens provide spaces for informal (not hospital-based) interactions with other patients and staff
(B) Design: gardens provide privacy
nature can provide support structure/strategy without religious connotations

The Clinical process

The Clinical process Sub: disliking it
(A) Hospital Views: keep blinds (window) open 24/7
(A) Hospital Views: isolation without window view most disturbing experience
first visit to PeterMac was horrific
Hospital: importance to have outdoor area/garden close by for staff & patients
I actually have to keep looking away from you because I have to deliver my message to the hospital.
in terms of what is soothing and calming and helpful when I’m unwell, I need a sense of reality.
Sensory deprivation: isolated from everything but the trauma
what went wrong: PeterMac high status (displayed/art) but feeling personally neglected

The Clinical process Sub: navigating it
Treatment inside / outside comparison
Hospital: park important for staff

The Clinical process Sub: trusting it

X1: Integrated into the Process
(B) Design: Suggestion: garden integrated into hospital - not a 'different' place
(A) Hospital: garden/outdoor symbolizes 'touchstone'
Treatment inside / outside comparison
Design: having the possibility of having a pause in the garden and just seeing a garden as you are moving through cancer treatment, is a soothing, nurturing - renewing thing
in terms of what is soothing and calming and helpful when I’m unwell, I need a sense of reality.
Nature: helps dealing with crisis

X2: The Cancer Scenario
06: (A) Hospital: comfort in knowing that a garden is available
06: (B) Care Team: garden must be close enough for staff to have lunch breaks in
06: (B) Design: flowers would be more helpful to more people in a hospital compared to productive crops
06: (Neg) blog post (PeterMac art collection vs sensory garden) summarizes what went wrong
06: a cancer diagnosis throws you out into orbit – destabilizing
06: and you go back to the simple and good things in life
06: bad run of coincidences can create bad experiences even at an extraordinary hospital
06: being isolated from everything but the trauma made it worse
06: being sick made 'important things' in life unbearable and overwhelming
06: Cell mutations are part of the 'bigger processes'
06: first visit to PeterMac was horrific
06: having a child and being diagnosed with an incurable disease
06: how to make sense of living with incurable cancer
06: important things were to raise children and follow her vocation
06: it is the key metaphor that has helped me to deal with my experience.
06: living through repeated cycles of chemo can feel like you are not getting anywhere
06: plants were pivotal in accepting cancer diagnosis
06: surprised about strong reaction to lack of nature in hospital when very ill
06: what went wrong: PeterMac high status (displayed/art) but feeling personally neglected

X2: Nature Definition

06: a garden is not just a tokenistic visual thing
06: an alive garden is one that changes over, lives and cycles
Appendix 13 Data Collection and Analysis Audit Trail

Illustration of all research activities and recorded timelines for: raw data coding, data reduction and analysis, data reconstruction and synthesis, analytic memos, new questions arising during the analytic process, and inter-rater reliability procedures (Chapter 5).
Appendix 14 Logic Diagrams Depicting Theory Development

Examples of two logic diagrams resulting from the final stages of analysis when the core category (axial coding) was determined and the remaining categories arranged into meaningful relationship to explain the essential experiences described by participants.
Theme B & C occur in an entirely idiosyncratic interplay of patient characteristics, history, context and how the patient conceptualizes his/her cancer experience. Patients often described aspects of both dynamics reflecting an oscillation between practical and metaphorical approaches.
Nature functions as a “Container-Catalyst” for normalization, experienced in following ways:

Pathways through which nature is contacted and, in turn, can be affected:
- cognitive
- physical
- social
- emotional/psychological
- existential

Hypothesis: Nature cannot be administered as an intervention in the clinical context to support cancer patients because

1. the essential quality ascribed to nature’s mechanism for normalizing is “disinterest” (as conceptualized by Immanuel Kant)
2. nature can be viewed as an intermediate area or transitional space (as conceptualized by DW Winnicott) in which patients can freely and privately “play” with reality and stepwise accept and be with what is going on (disavowal as conceptualized by S. Freud)

Nature functions as a container-catalyst for cancer patients to embody and normalize the dichotomous realities (paradox) they are confronted with. Nature through its “disinterestedness” provides an intermediate area in which cancer patients can disengage from their role as the ‘cancer patient’ and may find respite from their strain. Nature’s familiar features, materials, principles and mechanisms provide rich material for meaning-making and also invite the patient to privately and freely “play” with different realities, which can be an important psychological process to stepwise accept and deal with disruption.

Essential experiences described when contacting nature are relevant to this hypothesis:
- joining back with ones “normality” and “getting away” or escape from “abnormality”
- freedom or relief from abnormal, unfamiliar and uncertain conditions (clinical)
- “calling to attention” and quickening/livening of sensory perception (in its various forms)
- opportunity to embody and inhabit more fully ones lived experience (life past, present or into the future) whatever the present conditions - an unforced recognition of, and self-identification with, nature’s principles and mechanisms
- a holding environment and raw material to contemplate paradox and facilitate meaning-making without interference

More explanation: Nature enabled normalizing experiences because of its “disinterest” in patients’ stories and freed them from the estranging identification as the “cancer patient” and experiences related to being this cancer patient. Thereby patients found refuge from discomfort and suffering, an arrival into a fuller sensory experience and a form of “reality checking” was made possible. Nature’s properties are antithetical to those of the anaesthetic experience (clinical environment) and invite a psychological process of “playing with reality” and regaining some form of normality.

In conclusion: to package, medicalize and productise nature in order to purposefully (opposite of “disinterest”) intervene (interfere) in a cancer patients life is not warranted because it acts against the very mechanism by which a cancer patient may negotiate and regain a sense of normality when contacting nature.

Terms defined:
- disinterest: freedom from bias or involvement
- anaesthetic: pertaining to or causing physical insensitivity (numbing the senses) intervention: Interference so as to modify a process or situation

Nature environment: “disinterested” container | provides rich and recognizable material for embodied sensory experiences (aesthetic) and for “playing with reality” Clinical environment: “intervening” container | provides insensate and unrecognizable material for numbing sensory experiences (anaesthetic) for a good reason
Appendix 15 Transcripts of Peer Debriefing Sessions

De-identified transcripts of audio-recorded debriefing sessions with three volunteers who engaged in discussion about emerging insights and preliminary findings in phase 1.
Sarah explains briefly where the study is at and the current findings. Seeing parallels to Psychoanalysis and questioning nature as an “intervention”.

Not sure I’m clear yet how to come in. I’m not sure what it is you think you found that is different from the paradigm at PeterMac is.

The initial idea was that we would create some type of intervention and then test and trial this intervention. And I’m seeding now that nature might be giving patients something that they are not getting in the clinical environment, escape, it is more about finding a natural pace and a space away to deal with what is going on rather than having somebody from the outside intervene or try and do something to them – active support. So, I am wondering or asking if there, then, is any merit in using nature so purposefully? This intervention in some form would be an active thing, it would be offering possibilities to do things in nature, connect to nature in the sense of therapy.

Isn’t that what you might have thought about trying to do?

That was the initial step, yes, now I’m just seeing that cancer patients do appreciate nature but it is because they are getting away from the sense of being intervened on.

You think that is the main advantage, rather than, if you bring nature in somehow, they would have an experience of beauty or

That has also come up a lot, the theme of beauty, appreciated and being surrounded by something that is uplifting. I think that does have merit, I think that translates into design more generally. I guess, how to design spaces that provide those qualities. I am still finding that, with nature specifically, there is something about getting away and that nature also gives them this mirror image of their own – what they have said a lot is that they see the beauty, they see the destruction, they are confronted with these metaphors that they see themselves in. They might come into this state where they are in a way ‘dealing’ but very much in their own space, in a place that is detached from the clinical experience.

Where have they gone to? On a very practical basic way – where have you taken them to or where have they gone to?

Ahm, most of those descriptions were from the park next to us, Fitzroy gardens, is what they talked about a lot, but then they also described these things a lot form being at home, looking out their own windows. There is very much this thing of being able to understand what is going on, of seeing those natural processes. How something comes alive and dies, there is that living metaphor. What has come up so much is dichotomy, paradox, these opposing realities that they are in, that they feel like they are just themselves, but at the same time they are now a “cancer patient.” And then, just the ‘hoping for the best, preparing for the worst.’ It is that constant paradox they exist in and it seems that nature there is something that provides that metaphor in a very real sense, in a very living embodied sense, right in front of them that they then are also part of. And there is that very interesting interplay that is there, that is perhaps not so much present in a beautifully designed room or when you are contemplating beauty on its own. Nature, there is as well something else going on that seems to be quite tied to nature.
So, what would your question be now? If you had to do a question, what would your question for your thesis be now?

*I think it would be something down the lines if nature could act as something like an intermediate area, where patients deal with these realities and come to their own resolution of it, or perhaps even non-resolution of it – but, I think I would be interested more in seeing what that process is really, what is going on for them in nature, rather then what I am doing now, which was about how this could be packaged up and brought to them as an intervention.*

So, it might be more ‘what are cancer patients’ experiences of nature, how do they experience nature?’

*The overall question of my thesis is ‘what is the role of nature in the lives of cancer patients?’ but it has been implied that it would lead to an intervention, that is the predominant stance here, that some kind of product should come out of it, some practical value – it should contribute to clinical practice in that way that there is something we ‘do’, ‘see’ and ‘test’. And I’m, all of a sudden thinking it might be inappropriate to be doing that with nature.*

And you can’t just do, a qualitative, using qualitative methods just stay with your question. What does nature mean for patients with cancer?

*That is…*

**Trying?**

*That is what I am trying to get to now – is to, I guess, argue to look a little deeper.*

It seems to me that depending on what your research suggests what nature means, or the different meaning of nature, it might be, you know some of them it might be clusters of what it means to patients or a hierarchy of what it means to patients. Ahm, depending on what you find might determine on your intervention. If they all said to you, hypothetically, the reason why nature is really important is that it is out there and it’s – I’m looking at the trees at the moment – and it is a thing of beauty in itself, in the midst of a concrete jungle and it gives me hope for an outside life. Then maybe there is, from that might follow, there is no intervention about bringing nature into the hospital, it should stay out there because the patients tell you, it is important that it is out there. It gives them hope for the future, there can be this wild untamed life that is not a concrete jungle that can bloom out there – it may be, if an intervention flows may be dependent on the results of what you are analyzing your interviews – what it tells you about the meaning and the importance because it might be contra-indicated for making nature spaces in the hospital for example. But it might, no, you can plan for that you should be arranging this outside in various ways. You have to see what results come before you can see what the intervention is but that is not, are you ok with that? Would that be alright for you?

*That definitely was the way that the project is set up with the qualitative phase. What I was really curious to hear your perspective on, if you think that spaces that might be nature or not nature, if for people it can tap a deeper psychological process, dealing with something like a cancer diagnosis. Do you think, or perhaps experience, or from what you have heard, do you think it actually can play a significant role? Or is that perhaps unimportant in the face of what is going on? Sometimes I wonder if I’m just chasing shadows, and I ask myself what is the importance here?*

[pause]
It might have been slightly easier for me to answer if you asked me for instance babies and the role of nature, rather than cancer patients.

Yes, maybe I should ask you about that then?

No, no, you know we have a social worker here called Cynthia Holland who has worked here for about 20 years – who did her MPhil and a PhD on mothers with cancer. I don’t remember reading about nature in either of her two theses but she might be interesting to also talk to about the question of intermediate space. Just let me have a minute to think about.

Yes, maybe you can tell me about how you think it works for mothers and infants? Because I think essentially it boils down to just simply human psychology, regardless of cancer patient or not. Many patients seemed to feel that to themselves they are not the “cancer patient”.

Yes, I’ve been trying to be mindful when talking about patients with cancer, not to define them entirely by the diagnosis and illness. And probably with a question like that it might, because it’s broad, my answer might be broad and vague. If you asked me something a tiny bit more specific then my answer might be a tiny more specific. My answer would be that it would have to vary enormously. For the, for the mother infant and somebody else caring for the baby, like a grandparent I could imagine that it would vary enormously, the role of nature might play according to their love of being outside. The park, going to the park…

So in a sense it’s about the meaning it had to them before they got ill?

Partly that, so often socializing takes place in say, in a natural setting. That can be very supportive for mothers. Children might love being in nature, looking at the trees, the mother might be very aware of giving the baby a sensation of beauty. There is a whole spectrum of mothers who might not necessarily be so moved by nature - of things natural. As you were talking earlier, I was reminded of the composer, the American composer, the name will come to me in the minute. (music for a Mexican movie) and how important it is for him to go off into nature, maybe for four days at a time, maybe into the desert or somewhere, just to commune and tap his spiritual roots. So I assume that there is a whole lot of people who would feel very re-vitalized and others who can take it or leave it. I just pause for a second and think about anything else to say about mothers and babies.

Yes. Do you find here in the hospital, there is a garden here I think. Do you find that women here talk about the garden a lot? Does that seem to play a role here?

I can take you up and show you afterwards, it is absolutely tiny, you might be very surprised. You might be very surprised to see it. It is also shared by the mothers with babies in intensive care. Interestingly, how very different from the Children’s (talks briefly about the Children’s landscaped hospital concept)
For myself I have no doubt that there is, in some ways, that being surrounded by the natural world or bits of the natural world is important. Whether it is pots and shrubs or flowers. In a way that is how we decorate, because it is an aesthetic beauty and in a way it also touches something else in us, basically I think people feel cared for when there are shrubs around, pots and flowers. I will take you upstairs.

Do you think that in the design of a hospital environment do you think that people can feel significantly more cared for?

[pause]

When we moved from the old Women’s hospital to the new Women’s hospital, which served so many people so well for decades – had to expand and a lot of the time internally it was a
Do you find when you work with women or children here – do you notice them responding to these sort of things? I’m guessing again there would be a spectrum right?

Yes, and – and there will be some many where the experiences have been very, for them, distressing and they may not be the space to notice that. So that somebody, who might have been very distressed last week might have been in the middle of distress, whereas this week they might feel better might be able to notices those things a bit more and I do think that they indicate the attempt of the hospital, the commitment to care. And then like everything, I think over time, I think it is about getting used to something. I would have expected the comments of the newness of the hospital – people were feeling cared for and now several years later, more the sense of being used to it.

Hm. I would like to ask you one more question, if that’s ok, it is also a bit more general? I wonder what your perspective is on “intervening” in peoples’ lives in a crisis situation? Do you think that there are situation were non-interventions actually gives a person the space to deal with things rather than intervening? I’m sure it is very dependent on the situation –

What is your role at PeterMac?

Well, I’m just a student there.

Probably you shouldn’t say “just”!

[laughs] So, I am a student there.

For the moment

And I am in the Cancer Experiences Research department and generally it seems like we have that stance that the more intervention, the better. It seems that we come to them with that assumption, that approach. And what I am hearing more and more is that we should also give space for letting them just ‘be’ – sometimes, perhaps.

I’m not sure where you have been hearing that from. Ahm, and obviously, in a way a lot of the interventions that I might be involved in, here, which is an infant mental health clinician, they might not carry the same urgency for immediate action that it might have when somebody who might have highly aggressive cancer. We are very influenced in the field of mental health by the knowledge that if something looks like we should intervene quite quickly. There is research that suggests that if it doesn’t go well for a mother and infant in the first month where there is a lot of sadness or negativity, a lot of pain, anger. If we can’t help wit that in the first month and they don’t get help then there can be really, really long-term effects for attachment for years. And possibly, even, likely nowadays it might even affect social, physical…

Yes, there have been quite a few study done right? That have looked at the first two or three weeks, the very first period of an infants life and how it affects later on in life and how they perform in every way in life.

Yes, yeah. There is a bit of me that thinks that sometimes time isn’t on our side, that we should not necessarily wait. You know, sometimes we can offer and it is not always accepted, the help. But mostly I am involved in offer of help where there is no child protection where
one doesn’t have to act to protect the child. But equally I think there will be times where stuff that we think might be…well, let me give you another example. Sometimes, the parent, say it is about an emotional difficulty in the child and if this is answering your question too widely, stop me. But sometimes, the mother may not ask for help about other issues until we helped with something specific about the child so my colleague worked with a mother who was helped with a child with eating difficulties and then once that was done the mother said, say she was abused herself and a colleague asked: “did I not ask you the right question?” In a way couldn’t you tell me this sooner? The replied: “I needed to know that my child could be helped”. And you can conceptualize that a number of ways, ahm, you know that there are times when there is an implicit test, you know, can we be helpful and if we can manage that then patients or parents may trust us with a deeper level of telling us more and see if we can help with that. You know, if we can show in some ways that we are trustworthy.

So do you think that the infant in some way would sense that in the mother, even if she might not show obvious signs? Would the infant pick up those notions that there was some abuse.

It is hard to say, it depends on the age of the child and it also depends on how much disturbance the mother or the father has to deal with. We think that kids are incredibly sensitive, they do pick things up, the younger they are the more confused they might be by what signs they pick up. We think that kids are very, very accurate. Sometimes it is in the literature by Daniel Stern that babies are much more accurate interpretations of adult action because they spend their lives looking at the intentions of adults.

Because their life basically depends on it?

Yes, that is right. There is a lovely experiment – in a bout six months, it’s much earlier it comes online, we just don’t have the experimental evidence yet, but if I was to pretend you are a baby and I was to pretend as the adult experimenter, if I was to drop my spoon in my glass and I kept doing it like that [drops spoon in glass twice and deliberately misses the glass] if you were the six month old baby, you would just pick up my spoon and you’d just drop it immediately. You would have read my intention as to try and get it in. So we think that babies actually try and read adults’ intentions form day one – so we think they are very accurate observers of what goes on.

Do you think hat, for infants that they kind of form, perhaps disturbance because of adult behavior or is the temperament and the characteristics of the baby and how that meets the disturbance. I guess my question is how much the baby’s own character influences how it develops or are the parents really the biggest influence how the baby develops?

We used to think that it was – theories change, it has changed - so that it was one or the other, then it became much more a gene environment interaction – that we didn’t come into the world and empty slate or something. It was acted on us. Then we grew our awareness of different temperament and attachment styles and clearly the infant made a contribution. And then it was an equal environmental and genetic factors. Now I think much more there is, it is tipping back to how important it is the environment that we are born in and in that you live and that that will shape a lot of the character, the temperament, the personality. So, and kids will be very different. A very securely attached kid might be different form a slow to warm kid, a feisty kid that might be, the four % that challenges the world, that might give them more resilience. I think that resilience is a thing that we have really underestimated and don’t know enough about. And only I think the long-term studies will show us, like the Dunedin one in New Zealand and others will show us. And also the Harvard alcoholism temperament one. You know, people in their 80s look back and reflect who have been followed in this study for 40 years or so, can reflect on what was helpful how they came through it and all the rest of it. I still think, however much we know there is much more that we don’t know.
Where does your deep intuition lie?

[pause] it would lie with the, the social and emotional environment would have a huge influence, it must depend on what the kid is born with but in a sense it is not just me, say with my child, maybe like 4 generations in say my family and my partner’s family also having an effect in what I bring to the baby. I think the

Quite unconsciously right?

Yes, I think we got used to thinking about the mother’s mother etc but I think you can trace some things going back several generations. So it is my sense it would have to be that. One grandmother showed me on her phone, her grandson singing his baby a lullaby that she had sung to him that he had no conscious memory that that was exactly the same lullaby that she had sung to him when he was a baby. I think that some things are just very, ahm, much part of what we would call the implicit memory system. The first three years of our lives that we don’t have memories of. You know just thinking for instance about new york and how important it is if they can, the well of middle class people to have a place to get out new york and just think what is it like to live in new york in the concrete and what is it like to get out – what is that like? Is that enough? Ahm, how does one give its children… (...) the difficulty of finding the natural environment for the child. Ahm, I think is going to be increasingly difficult and challenging for us. And in a way that takes me right back to your question. We think it is so, I want to go beyond “healthy” or “healing”, I think how positive it is for children to be in a natural environment, or nature, ahm, and how challenging it is sometimes to find a park or something. And you want to do something with cancer patients, wanting to see the effect. How hard to arrange that, in terms of space and time opportunities and maybe each persons readiness to use that. With a child one might be driven to try and find a park for the afternoon. With a cancer patient you might feel that the one thing you need to do is take the patient out for a moment, take them away from where there is tubes and lights etc etc and take them to something that would feel very good an healing to be in. And the logistics of doing it in a way, maybe an idea of maybe bringing a natural space into the hospital would be very nice. Should we go upstairs?

Yes, I would really love to see that garden.
You might be a tiny bit disappointed.
I have heard about it....
The question remained the same, it is still 'what does nature mean in the lives of cancer patients?' That is what I set out and started with a qualitative phase, so I basically interviewed cancer patient and asked them about their nature relationships and their connection to nature, and what it means to them.

**And is that still open-ended?**

Yes, it was very open-ended. They were semi-structured interviews but they were completely open and basically started by asking patients what their own definition of nature is.

*Okay, that is what I was going to ask.*

Yes, it was really without any predefined idea about nature. Some of them, would say something like ‘well, nature, to me, is my own true in nature’. And I thought ‘wow, okay, let's run with that.’ So, it was entirely opened, really. Most of them, you know, did talk about the trees the bees and the flowers but there were also some other takes on it.

*Okay.*

And I’m coming to a close now with the analysis of this first phase. I've come to some really interesting findings. Really, completely different to the ideas I started out with, and, I think completely contrary to what most people's assumptions were. Like, in what situation wouldn't nature be good?

*Sure.*

You know, and, so to me, the question always was ‘what is this nature thing going to look like?’ This intervention that we will create for cancer patients, but the question was never ‘is this appropriate or not?’ And, now that I'm coming to a close and I'm sitting here with the findings, I am coming to reject nature as an appropriate intervention in this setting.

*Nature defined as?*

Nature defined as the natural environment, the thing that cancer patients retreated to.

*So the non-human nature?*

Yes, the nonhuman natural environment. Yes.

*Yes, tell me why first. Tell me why you are rejecting nature.*

I'm rejecting it on quite philosophical grounds. The thing is that every cancer patient I have talked to found nature really helpful and most of them had a very profound connection to nature and they dealt with this in different ways, they connected with nature in different ways and it meant different things to them but, really, in every case it was helpful in some way. And, when I started getting that I thought ‘oh, great, this sounds really positive, there is really a good response’. But then when I sat with that and looked a little deeper at what they were actually saying, like what was really going on for them, it turns out, I think, that for cancer patients, what they find and why they go to nature is to regain a sense of normality.
That is that there is some continuity out there as with what is happening to them?

Yes, exactly. Yes, it is that, it is that. It is like they are in this dichotomous situation now where they feel like they are themselves and, at the same time, they are now this cancer patient. This real other identity or entity if you want, as we have created in our society ‘the cancer patient’. So, they are stuck in this dichotomous situation in these two realities and it seems that what they are expressing is that they just want a sense of normality and they want to return to whatever is normal to them.

Yes, okay, so nature is that to them?

Yes, nature is that.

As opposed to what is killing them.

Yes exactly. And I believe they just when get away from the clinical environment.

Yes, which is really understandable.

Exactly, you know, and all these things are happening to them and they are identified as this other person and there's all the grief and the sterile environment and what they do is they might retreat to nature, in one way or another and then they might connect with a normality, with their old identity, or what they feel like is their identity. And there's this interesting kind of play that happens when they are in nature, they are able to play with reality and check reality. Like do a reality check. There's this adjustment that happens in the natural world. And so to me, then, to take nature and package it up and medicalise it and create an intervention and bring it into the clinical setting, to me, is completely contrary to what they are saying is helpful about nature.

Right, so that would then no longer be an alternative to that setting. Okay, so can I ask you, there's a whole field of empirical research on the effects of certain landscapes, which you have probably come across. We know at least in Western contexts, you know, that classic English landscape of turf, mixed trees, Serpentine curves and so on tends to leave people with a positive affect, they feel better. And that is correcting for all kinds of class and status, across the board when people see those landscapes they feel better. And that is associated with things like lower blood pressure and all kinds of measurable outcomes. I suppose what I want to know is, is your worry that if you tried to domesticate these landscapes, if you make them clinical, people will no longer have these effects? Because I would have thought, the clinical question is, ‘we don't care what it ‘means’; we just want to get results! We don't care...’

Yes, and I think that is exactly the problem. I feel like I am up against this problem. I think those outcomes, those benefits, they stand. Yes, you know there was that seminal piece of research by Roger Ulrich that many people know about, about the window view, looking out on a brick wall compared to looking out on trees. And I think those outcomes they stand. I think it is clear that contact with nature is beneficial in many ways to human beings, cancer patient or not.

Yes. Yes.

Yes, I think that stands, but I think, my situation in my project is that the psycho oncology world works on an intervention basis. So that means the aim is to somehow intervene in cancer patients lives to make them better. So, the idea was how nature can become this intervention.
Yes, then your worry is that by definition that would do exactly the opposite.

Yes, exactly. I think even if nature is brought into the medical environment as perhaps type of sensory stimulation, a sensory element, perhaps that could enrich the design, it might make it more interesting and engaging – then I think we need to start talking about aesthetic experience, sensory experience, and I think that is lovely and I think there are benefits and I think that is something really useful and good. Something that, I think, works and that we can also see in examples like the Children's Hospital. Those elements, where nature is brought inside, one way or another, even if it is fake nature as a design element – you can expect all those things to happen that happen when you experience art.

Yes, so you are distinguishing between the various effects of this say aesthetic experience and the almost ontological benefits of 'being elsewhere'.

Yes, the kernel of being in nature …

... Of being outside ...

It is almost like, when I was asking them about nature, it was almost like nature was a proxy for explaining what is helpful.

Yes, so for whatever is good, yes, sure.

The question seemed to be ‘what is natural to me?’ You know, like, ‘what helps me naturally?’

Okay. So, this is all the anti-Satre. I don’t know if you have gotten to the Sartre chapter in Philosophy in the Garden, but for him nature is everything that is repulsive and ...

… So the negative case …

Yes, he identifies his humanity with freedom of consciousness and so gardens are everything that he is not, so trees are ..

Yes, so trees are just stupid…

Yes, it is just stupid, unjustifiable existence. And ...

And, it has no intention.

Yes, yes, and it is also that Sartre loathed himself physically. The nature becomes his exiled self, everything he hates about himself is nature. Everything he celebrates is mind. And so you get this interesting situation, for somebody like Sartre would always be more comfortable in an apartment eating synthetic food and when he was ill towards the end of this life, he treated himself like absolute shit. His body for him was just something that needed to be punished.

I think some cancer patients might feel like that.

Oh okay, so like an estrangement from the body?

Yes, yes.

So, I guess what I want to know is, is your criterion of value ultimately clinical or are use somewhat interested in design? Are you saying …
Well, it started out clinical because I made this switch into psycho-oncology and here the requirement really is to have a clinical outcome, to have a clinical intervention, something that can be implemented in the Petermac that would work with nature and cancer patients. And what that would look like was completely unclear and that was the purpose for the interview phase. And now, I am coming around again to think perhaps design is really where nature could come in, in the aesthetic sense. I feel at this point I need to reject the idea of using nature to intervene in a person's life. Just the idea of it…

Okay, when you say nature in that sense you kind of mean nonhuman, most unspoiled nature. Like I pointed out in the first chapter, this is nature transformed and so is this. All of this is nature, it isn’t alive or growing, and we make strange distinctions where, for example, is a dog nature? Well, you know … Sort of, dogs make people feel better, but do they make people feel better because they are friendly or because they are nature or because they are attractive or?

That is really an interesting question, I think, with anything. This is where I have come to with nature, what is ‘really’ going on? Is it that the dog is friendly, is it because it is different to me, it is ‘other’, it is outside of me and I have a relationship to it. Like, what is actually the underlying mechanism, what is going on there that creates a certain ‘thing’? And with nature, it is so tricky, it is very slippery.

One of the points in Philosophy in the Garden, is that there is no single meaning. By definition nature is something always just out of reach, slightly withdrawing from us, at the same time it always has some kind of meaning. We can’t help saying what nature is, saying it is one thing or another but is also beyond us. It always exists in a kind of …

It is that real dichotomy, isn’t it? That paradox, that in a way we are really manifest in nature, at the same time, there is a sense of it transcending us.

Or vice versa, we are transcending it …

Yeah, it is that constant interplay, that back and forth…

That is pure Heidegger, that is what he talks about. Where we are simultaneously in it, but stepping away from it and moving away from it and, it is whatever you want. Nature is my habits, we can talk about my habits; why do this and why do this and nature is, my clothing transformed, nature is that staff over there in the wilderness. You have to have a kind of ontology of nature that is broad enough to accept all of the stuff:

Yes, and that is so problematic, that is really problematic.

Yes, it is really tough.

So problematic.

Although, because this is your Ph.D., you can have a working definition …

Yes, I have come to working definition of nature, which is basically the physical environment …

So that is the nonhuman?
Yes, it is the nonhuman physical environment that is either left natural or that is humanly designed and organised. So it can include the garden, so it can be humanly arranged and designed and organised.

_But it is not us?_

I am not considering my own inner nature, no, so I am looking at the external manifestation of nature.

_Okay, insofar as we die and mate and eat, we are still not nature in that sense? Is that what you mean? For you, nature is an external something?_

Yes.

_Okay._

Yes, when thinking about this intervention. It needs to be things that the intervention could have included of the natural –

_So human is not nature?_

Not in this sense, that is not asking me what nature is or is not, this is for the purpose of the intervention - there just need to be some parameters around it. Like when some patients were talking about their own inner nature, they were free to do that because it was open-ended, but, I think, in order to contain this whole thing, it needs to be more tangible, like the landscape, the plants, the bees and the trees … In any case, I just feel like nature’s off the table as an intervention.

_Okay. I just want to check that I understand. Is it off the table because, because it will be demonstrably clinically bad? Or is it off the table because it is a bad idea?_

I do not believe that it would be clinically ‘bad’. I imagine if there was such a thing as a nature intervention, let's say there was a 10 week program where you sit patients into a sensory garden in the hospital and they contemplated the meaning of their life while looking at plants, let's say that was the intervention, I am pretty certain that there would be some positive outcomes.

Yes, like measurable positive outcomes …

Yes. You can certainly then argue about the cause of the outcomes. Is it because they have social supports, is because they just had a nice time in the garden? It could be all sorts of things, it is a black box and you never really know what it is.

_Well you could, but it would be really expensive._

Yes, and a few lifetimes later, you might know …

_Exactly. Just as an aside, there is aesthetic research that shows what people get from artworks, from qualitative research, but it is very expensive because you need to sit down and interview all these people and it takes a lot of time. This is why art galleries never do it. They have rooms full of rich evocative masterpieces and no one knows what happens …_

Isn't that amazing?! I think that is so fascinating, the fascinating thing is really always ‘what goes on?’ What goes on behind the curtains?
We know what happens with critics because they write about it and we know what happens with novelists because they write about it but the general public whom they want to develop a relationship with, who knows? No one knows! The art galleries say they can't deal with that, so they just do numbers. Who comes in, did they have a positive experience, ranked from 1 to 5. A positive experience of what? 'No, we can't do that...' And, you could do it with a sensory garden, but nobody is going to fund it.

Yes, I think, I think what really goes on in nature and the reasons why patients might seek nature is just that normalising effect.

So, it is an association: nature = health = good. Is that right?

Yes. I think what it really is looking at is an adjustment process where they are thrown into a situation, into this dichotomous reality and they are adjusting to it and coming to a new form of ‘normal’. And this kind of normal integrates the cancer experience, in very individual ways. I think it is an adjustment process where when they are in nature, they are disassociated from the cancer patient identity and they are given a sense of, a certain amount of freedom to just be with it and let ‘it’ happen naturally.

Mhm. And why is that?

What I have found, what has come through a lot - and this is just another hypothesis right now. I think what nature does is that it provides a context of ‘disinterest’. Like what Immanuel Kant writes about.

Yes.

It is like a container that provides them with raw material for meaning-making, that allows them also to identify with nature in a way. Like, ‘that is also part of me’, in nature things live and they die, there are cycles, a connection with what one is going through right now, when a storm comes I smacks you over, that is also part of reality and that is part of a cancer experience. There is that metaphorical raw material in nature that they use for meaning-making. But it is encountered in a disinterested context and so I think what nature does is, that it is just that without relating to a person as a cancer patient. And that is exactly the contrast to the clinical environment because the clinical environment is an interested context, it is invested, it is intervening, is looking at you and assessing what you need and that is then what we are going to do with you.

That is interesting because the clinical context is also so impersonal and sterile and such a bleak environment.

Yes, but there's also that other aspects, like disinterested really means divorced from bias from interest from one's personal investment. So in nature you are just not identified. So then you are free to use all this rich material around you to think about your situation and think about what is going on.

This is that line from Nietzsche in the Nietzsche’s chapter ‘we like being outdoors so much because nature has no opinion of us’.

Yes, that is very much like it! Nietzsche also said, there’s that other line in your book, something like ‘walking in a building and walking in a garden is like taking a walk in ourselves’.

In ourselves...
Yes, and I think that is what is going on! So I think, what I'm saying is with this normalising process, it's absolutely not that there is nothing going on, I think there is actually a lot going on, and what is going on makes me have to reject this as a clinical intervention. Does that make sense?

It does, yes ... Because the danger is by making it overtly - I'm just going to talk through the idea to make sure I understand it - the danger is by making it overtly and overly clinical, you no longer give people that disinterestedness, you are not allowing them any more to cultivate disinterest.

Yes, and even if it was a fairly open intervention where you might for 10 weeks sit them in the garden and just let them do what they do and invite them to meditate on a plant or whatever, I think that is still, that is still too interested, that is still too purposeful. You know, that is also what Kant writes about, he talks about 'purposiveness without purpose'. That is what he writes about.

Yes, yes, you have directedness but no aim. Yes, I mean there are two things here. There is, one, there is, it seems to me to be, it is like an empirical hypothesis that - let me wind back a sec - this is an epistemological problem, in that all you are entitled to do, in this instance, is to speculate because you can't test your hypothesis. So you can't - it may well be that if you drop someone in this setting, in the clinical setting, that they are fine, it might be that it really doesn't undermine that disinterestedness and it is clinically useful - the point is that it is merely - that you can't know. All you can do is speculate, or suggest or wonder. Is that correct?

I guess, at this point, it is. Unless there was a trial to actually test that.

Yes, yes. To me, that is just a side point, but in terms of writing a Ph.D. it is a thing where you have to recognise the epistemological limits. So you have to say, well, this is what I think would be the case but ultimately I can't test it, I don't know. But my hunch is that the longer you spend in any environment, the less disinterested it becomes. So this nature, this good and healthy and continuing thing that they seek when they are ill, if they were always in it (they are anyway) but if they were always in it, it would then cease to be this 'other' and would become another place intertwined with their grief and regret and their horror. It may well be that you seek anything that allows you to gain some purchase and people call it nature because they are usually estranged from it. But if you had a group of people who were quite intimate with natural landscapes, have raised children in them, have lost children in them, have been married and divorced in them, perhaps it might not have that same otherness. And then, it might well be that you have to make the argument that actually it doesn't mean anything to them in that sense but sometimes it is just beautiful. Sometimes it is just aesthetically stimulating or whatever it is. Does that make sense?

Yes, that does make sense, that does make sense, yes. I think it is a very individual thing, especially the degree of what happens - like if this thing did happen in nature, the degree of it and the intensity of it has to be a very individual thing, it has to be. And it would have to be connected to a person's history and the significance they give to nature, what it is to them. That would affect the contexts ability to facilitate it or not. Yes, I think, then, in the end what could be taken out of this, might be exactly your last point, your conclusion, which was, in the end it is a beautiful thing. It is aesthetically pleasing and in that is a lot of value. If you bring that into the clinical environment to counteract the starkness of it. I think, I think that is where I am seeing myself heading right now, wondering if the value of art, or artful experiences in the clinical setting, - which don't need to be just pictures and paintings on the wall, there are many forms of an artful experience - if that actually is something more potent to be looking at. I feel like I have this opportunity here to create something of value and I would like it to have some kind of impact and contribution, practically, for the clinical setting
to become a better place. And I’m thinking, to me, what I’m hearing a lot from patients is that those sensory experiences and all the wonderful things that flow from having the senses awakened helps. Even if it is just in a very small way, like eating gooey vegetables after fasting for 24 hours, the sensory experience of coming alive again, that quickening – Kant writes about that and he calls it ‘Belebung’, but I think the English translation ‘quickening’ doesn’t really capture the meaning of ‘Belebung’, unfortunately. It often happens, it's so often happens and it is so frustrating, translations are very difficult.

*Why is quickening not quite right?*

Because ‘Belebung’ means like ‘beleben’ means more to resuscitate, actually, ‘wiederbeleben’ is to resuscitate. And ‘Belebung’ is coming alive again

*To enliven?*

To enliven, yes …

*To revive, to rejuvenate?*

Yes, to revive and to come alive again but also in a heightened sense, beyond just feeling alive. So quickening to me doesn’t capture that

*It doesn't get it … Although, it does connote something of that in English, when you think of your experience, a quickening experience it's not just living up, it is ..*

Is it a heightening?

*Yes, a heightening and an enrichment, an enhancement. But I can see how that would be frustrating, there's a whole cluster of words, to rejuvenate, to revive, to vitalise and so on that all to do with life. Okay, there is an enormous amount of research on aesthetic benefits, just for everyone but also for sickness. And it's fairly well demonstrated. The interesting thing though is, when you engage in any kind of aesthetic experience, there is always a danger that it will be unpleasant.*

Yes! And that is so interesting! Especially thinking of the clinical environment with cancer patients. I did go down this track thinking about the value of aesthetic experience and ‘coming alive again’ and ‘inhabiting to your senses fully’, ‘fully experiencing the moment’, and how wonderful that would be. But then, when you think about it, if you are stuck in a body that is in a lot of pain, is that really the moment when you want to become fully awake to all your senses?

*Yes, you might want to anaesthetized.*

Exactly, that is exactly what the clinical environment is, it is an anesthetic experience, for a very good reason!

*Absolutely.*

I think that is also something people jump to too quickly, thinking that the clinical environment is so sterile and everything is bleak and dark end and it numbs all your senses and it takes you away from yourself. But I am coming to wonder if it does that for very good reason, in many situations. I think that needs to be seen as well.

*Yes, yes. I'm speculating here but it strikes me that whenever you afford people one of these experiences, if it is, if it is to be rich and if it's going to give you something there will be risk*
involved. And so, you know, clinically there is always this tendency to want to make things pleasant, beautiful, calming and relaxing and I understand the reason why. You don't want someone necessarily flooded with adrenaline or anxious whatever it is. But, but that is the risk. You know, if you think of the best novels, they rip you to pieces, they are incredibly rich aesthetic experiences and they gut you. And there were times in my life where my wife was very ill, for example. There were some novels that I couldn't read. I was in enough pain. I did not want to read rich evocation of someone's inner life when mine was falling to pieces. And it seems to me, part of health is knowing when you can't face reality. And so this is why, you know, in Philosophy in the Garden, for every Leonard Woolf or Nietzsche who confronts the savagery and the decay and the grief and the loss, there is a Jane Austen who is just seeking consolation. There is a Collett who just wants a moment of peace. You know, so, I guess, the clinical question is how much do you want to determine those outcomes? There needs to be a certain ...

I think it goes back to it being such an individual thing where, if we thought about aesthetic experience as a therapeutic experience, to some extent, it would need to be so individually administered, you cannot make everything aesthetic, like having colours and arts, entertainment and comedy in the hospital.

I'm sure it would be useful for some people

Yes, but for some not!

Exactly.

And I think that is again the clinical mindsets that is the problem here. It is that mindset that has a blind spot. You focus in on what is good and what should be good but you always seem to miss the paradox, you miss the other side.

When we think of some Holocaust museums. For some people they are a kind of crushing, overwhelming experience of evil. For other people they can be kind of monument for what survived and what was uplifting and beautiful. You cannot possibly fix those outcomes. You can't. It would not be a great work of art; it would be a great piece of architecture. There is the one Holocaust monument where children can climb on it, so it becomes a plaything, it becomes a place of –

That would mess with many people!

I know! But it is, as a work of architecture, it is a monument to life and not to its destruction. But to other people it is incredibly somber and seeing children climb over it would be like spitting on the memory of people that they lost. There is no right. You can't say there is a right or wrong experience with this artwork. And this is the danger with anything with any work of art or philosophy, it can be therapeutic ...

But it can also not be.

Yes, it can also be bad for you. Like, if you are at your wits end, if you are incredibly stressed and anxious, do you really want to read Nietzsche? It is good philosophy but do you really want to read it? So there is the sense of, sometimes the best thing that these clinical settings can do is offer people the opportunity to curate their own healing.

Yes, yes, yes! I came to that thought, that is what I came to a couple of weeks ago when thinking about disinterest and thinking a solution might be, for architecture, to offer raw material but not administered in such a way that you would an intervention, it might not even be overtly suggestive, but it might just offer that raw material - that in itself is the invitation
for people to take and give to it what they need. It is at the level of what people need. The problem is that this is so contrary to the clinical approach, I don't even dare to say the word disinterest at the Petermac at the moment, it would sound totally nuts. Disinterest!? You know ‘these are our patients, we need to be very ‘interested’ in them in every way and care for them in every way. We must think of every way we can intervene to make things better …’

That is a funny thing because Drs aren't interested a lot of the time. They are quite disinterested because you can't care for these people always. Sometimes, to do the best thing for a patient - do you know what I mean?

I think that might be more of a personal disinterest …

I guess, what I mean is that sometimes they do what is right, not what they feel is good. They cultivate and interior disinterest, a moral disinterest, and their feelings are not involved, they can't be, they would go mad. If you are constantly dealing with death and suffering, you couldn't possibly invest your feelings into that all the time. It would be the end of you, which isn't to say that doctors are automatones, but, I think, it is psychologically necessary to have that distance and I think it is also clinically necessary because sometimes you need to do what you ought to do, not what you feel like. And if you are doing what you doing out of bias, out of partiality, it is not morality. I think that is a really interesting point. And so the question from the clinical standpoint is, do you want to cultivate an environment where you have that kind of moral disinterest, where they are capable of making decisions because it is right for them, because they may not, they might just feel like crawling up into a ball, and want to be left alone. They might feel like screaming at you because they feel like this completely unfair. But that might not be what is right for them. You are still trying to get an outcome, and Kant is not outcome focused.

Yes, he is process focused.

But still, the notion of disinterestedness is clinically important,

It is such an interesting interplay because there is that notion of disinterest from the clinician out of necessity and out of moral obligation, and at the same time I think it is deeply, deeply important for cancer patients to be treated as a person, to feel that ‘interest’ in care coming from the care team, in their situation. So there is, as well, that tension.

My suspicion, this is from experience, not from research. My suspicion is that demonstrated care is more craft than a feeling. Do you know what I mean, so doctors learn to show people that they care without caring.

I don't know, I have read a few interesting studies about clinical communication that talks about that little bit and it seems like care or a ‘caring attitude’ cannot really be trained as such. Or not to any significant degree, and it seems those are really personality traits that some have and some don't. Patients might perceive a really caring person because they simply just have that ability to be caring. It is interesting to think of clinical communication between a practitioner and a patient, it is a kind of creative act, really. This is what some research has found. That communication in itself becomes an improvised act in which care is communicated in all sorts of ways, not necessarily through the right words but it is more a …

A disposition...

Yeah, supposedly you can't really train ‘caring’, it seems to be something you're either gifted with or not.
That is interesting, my hunch would be that as a disposition, it probably could be trained but we just don’t know how.

I would think so too. Maybe doctors need to have acting classes.

But is that kind of what it is? When my wife was ill, she … the doctor came along, the specialist and said... He was very well dressed, he had nice French cuffs and a nice tie and he said ‘well, it is possible that this liver damage might progress so far that you will get encephalitis and that could cause your brain to swell and you could get brain damage and if that is going to be the case then we should look at getting a transplant and if you have a transplant then there is a chance you would die, and there would also be lasting effects…’ And he was sort of going through this like he was pulling down a menu, like if this then this, if this then this. That is him being a diagnostician, he is giving a legitimate prognosis, he is demonstrating all the things that are going on in his heads and he is following his trees of possibility, but it was, it was no way demonstrating care or concern, but his treatment saves her life.

Yeah, maybe a question is ‘is it their role to be that caring element in the healthcare setting?’ Maybe their role is just to keep people alive. A lot of patients say that they have a lot of trust and faith in the Petermac and they feel like Petermac does a wonderful job and that, in a way, they are getting exactly what they need and expect, which is, they want to go there, they want the drugs and the treatments and whatever it takes to stay alive and that is what they are grateful for. That is what they expect from there. And I think there might be a bit of a misconception about the clinical environment inherently not doing what it is supposed to do, in that it isn’t ‘humane’ enough and it isn't beautiful enough and caring and loving. You know, maybe it shouldn't be that, maybe it should just be the place you go in order to continue living and then you return to your life where you find the beauty and meaning.

I don't know. Again, for me, it is an empirical question. We can only speculate. But my hunch is that for some people, they like that neat division. There is me the sick person, and then there is home. In nature, or whatever it is. And when I am a sick person, of course I want to be comforted and I want the music and I want friends around, but I am there to do a job and I want to be fixed and then I go away to normal life. The question, of course, is, sure, but are there cases where in order to be fixed you need to feel loved, or you need beauty, or whatever it is.

Even if that was the case, is then the clinical setting, Petermac, is that really the place where you should receive that element? Maybe not!

I don't know.

Maybe not. Maybe it is just not. And maybe people like me, designers and architects, who want to make this a beautiful place and a beautiful experience, at the Petermac, maybe that is just not appropriate. I don't know. Maybe that is not what is asked for or needed. And maybe the help that we are envisioning, these experiences that are indeed really valuable, should perhaps be offered elsewhere, in a different context. Maybe holistic care, integrative care doesn't necessarily mean that it all has to happen at the same time, in the same place, all enmeshed. Maybe holistic or integrative care can be a sequential, rather than enmeshed.

Maybe, I don't know.

There are so many conflicts.

Suppose, you see, it strikes me that there could be an option where people can curate.
Yes, I like that thought, you said that before. That a person could curate their own aesthetic or artful experiences according to their own needs.

Not every room needs to be the Tate, not every room is going to be a landscape garden, but you want to be able to say to people maybe, ‘we also have this too’. And they can or they cannot. But it is there.

Yes, it is an invitation.

Exactly, yes. Yes, and so you don’t have to do it, but if you do want it, it is there waiting for you. Sometimes people don’t want that, they just want Netflix and a cup of tea. You know, You know, and sometimes there’s just that right moment when they need to reflect or they need reverie or they need some peace and quiet or whatever it is. And then there is the space, whatever it is. I'm trying to think of good examples.

The medical mindset of ‘prescription’ is that once you have found something that seems to help, where you see good outcomes and the research shows benefits, it then ‘needs to be applied and prescribed’, and that might not be necessarily the case with aesthetic experience and artful experience. Petermac is a registered art gallery. There is a whole collection of artwork and I question if that is a good thing. I don't know if it is. I have heard from some patients that they look at these beautiful landscape paintings and they just think this is what they are losing. I am dying. And they sit there and they have to wait for hours, staring at these beautiful paintings and they just think ‘oh crap’. I think the medical model immediately has taken art as something ‘good and helpful’, it helps and distracts and gives hope, comfort and beauty and experiences of meaning making, and all that good stuff, so then it should be in every room - and so they have done. It is an art gallery, everywhere are beautiful paintings. What I’m coming to now is that I am questioning this entire approach and mindset.

The clinical approach?

Yes, the clinical approach. Yes, maybe more so then the question of nature, or not nature. Should nature be an intervention or not. I am just starting to see a more endemic problem. There is an underlying process, something that goes on. There is huge individuality in how people experience anything, patient or not. And I think that is not considered well in the entire clinical approach, also in the design and architecture of the setting. It is not considered. I just fear that now, if the hypothesis is formed that art should be there for cancer patients, and the same for nature, the conclusion will be that we should put nature all around the hospital because we have all these ‘outcomes’ – then comes the medical mindset with its prescriptions, and then we start ‘prescribing’ nature to everyone?!

Yes, so you would have your chemo, then your radiation therapy, then you have your art therapy, that is step three, yes ...

It is this approach that I want to knock at. It is really problematic.

Will you be opposing it on - there is a very straightforward clinical empirical argument there to say that if you make people have an aesthetic experience (first of all you can't, but let's just say) you will not get good clinical outcomes. So then you are still using their logic to assess it, but in your own terms you will fail because these kinds of experiences ...

That would be an interesting study to do but it would be impossible to do. You would never get ethics clearing to recruit patients to have a really bad experience and report back.

You could, at least, you might be able to discuss that a priori. There is a lot of research on aesthetic experience and there is also a lot of philosophical analysis of aesthetic experience
and it basically says something like this. Aesthetic experience may have outcomes, might, but ultimately it is valuable intrinsically. You value the experience for the experience. Now you can try to force that experience to come up with clinical outcomes, sometimes that will work, but sometimes you will get the opposite result. Because by focusing on the clinical, people will be unable to value it for its own sake. So the same if you go to an art gallery and you're trying to find something that is historically valuable, but if you are so focused on finding that you won't have a good experience at the Art Gallery and it is only through that experience that you gain what is beneficial. So it is a contradiction if you seek happiness you probably won't be happy. That is a kind of class of problems whereby seeking something you are unable to get what you are seeking. And it is only by not seeking it that you might find it.

Would that also translate into the idea that you basically cannot administer aesthetic experience?

Yes, I think you can offer it, you can invite it and suggest that but you can't force it.

Yes, you cannot force it, and I would really question such studies and trials that try and get outcomes from an aesthetic experience.

I think you could get outcomes.

I wonder if those would be very circular outcomes that might just prove something the research has hypothesized a priori …

Yes, I guess what I mean is that if you are doing fairly good qualitative research, I think you could go into an aesthetic study with an open-ended attitude and just talk to people about their experiences and surely could categorize it. I think you could show that these experiences were valuable and you could show that in some cases there were good outcomes. You know, someone might have, speaking of visual arts, someone might have been kinder to their mother. You couldn't possibly force that to happen. You couldn't go to a family counseling centre and get them to read about Pierre and hope that people will be nicer to their parents. But some people reading that will change their behaviour. For most people, it is the experience itself of reading the book and that is it.

That is the problem with nature. I really need to disappoint people and say, you can bring in nature and force those experiences, you can't force family re-conciliation by reading a book.

Yes, yes, something will happen. Something will happen. Just you might not like it. And it might not be healthy. And I completely understand the attitude, in a way this is a helpful philosophical distinction, of practising technique or craft, where there are supposed to be reliable methods for reliable outcomes - now, of course, we know that is not true because doctors half the time don't know what is going to happen, they play with numbers - but still, they have a craft model, if you do X in Y circumstances you get Z. That is not how art works. That is not how aesthetic experience works. Partly because artists work that way, yes they are craftspeople but often the best art, you don't know what it is going to be until it is there. Similarly, if you are engaging with an artwork you don't know what your experience of it will be. And even then you often can't make sense of it. It is that kind of radical open endedness that you need to cope with if you want to introduce nature or art into this kind of setting. You cannot clinicalize it, it doesn't function with the same principles. Something will happen though. Something will happen.

Yes, I think I will finish my thesis with that sentence ‘something will happen’.

But you might not like what it is. I mean, you know, this kind of stuff drives doctors bonkers. If they prescribe medicine for someone but they don't know that their colleague has prescribed
another medicine or something else, there might be all kinds of contraindications, someone might get lonely or incredibly sick because a whole bunch of doctors are not talking to each other - now, that might have been solved if communication was better, but that is what happens all the time with artwork.

Yes, there are just too many moving parts to really nail it down …

Yes, you know, you get a book that everyone is reading, a certain percentage of people will have a similar experience. They will be able to say about the book, this character was tragic, that scene was redundant, that ending was crisp or whatever it was, but they are not in the position to say, well for such and such it will remind him of his mother and as a response to that they would talk to their mother about tax evasion. It's fuzzy.

Yes, there is no predictable path.

Even if everyone can agree on what the object is and its parts, even if you can say they have used colour in this way and have used the frame and this way and so on, even if kind of objectively it is well understood you just don't know what is going to happen. And it is similar with nature, but we do know that flowers are going to bloom every year, and we know that the sky is going to be up there and the fence is going to be there and all those parts but you put someone in there and you just don’t know.

Yes, yes, yes.

Austen had this reaction in nature, Nietzsche had this reaction in nature and Sartre just left, so you know …

So then, is there even any … my deep intuition is that design and architecture does have a place in health care - I do, somehow I just have that feeling that it can help.

Sure!

How do you frame it? Where is its place? I will just divorce this question from nature per se, and refer to design and architecture in this instance - and the design could include nature …

I do think that nature is important, if only as a subcategory of the aesthetic. You know, not all aesthetic experiences are of artworks, you can have an aesthetic experience of a sunset or a plant or a face or whatever it is, but there are certain things that are more likely to lead to a rich aesthetic experience and one of them –

It might be in the way you organise a hospital and you could arrange it in a way where certain experiences are accessible in certain places. And you have a good way of communicating to people that in certain areas, certain senses are catered to -

But when you do that there is a danger that people might have extremely painful experiences. And clinically the question might be that sometimes it is good, maybe it is clinically useful for people to face their horrors. I don’t know. I have no idea. Some people are going to draw on these landscapes to console themselves for fantasy and they will feel better for a little while and maybe they won’t go and talk to their children. Other people will go to the same area and will be confronted with horror and regret and immediately will call their children and explain what is happening with them. You can’t determine that but you can provide rich objects and landscapes to prompt some kind of reaction, you know. I think that is the best you can do.

Yes. Because it is so individual and subjective it seems to me that there really is no way to determine what these objects would be. There are ones I guess that are more rich and ones
that are less rich and that we can objectively agree on but then again if the experience of it is so subjective, then is there any criteria for determining the design of these objects or spaces or landscapes. I guess there is a rationale behind it …

*I think you can, I think some objects …*

I guess if you need to do something, then you might as well do it well …

*Yes, do it well …*

That does make some immediate sense …

*I think genuinely some objects have more aesthetic value than others. They offer more lasting, subtle, vivid warm or rich experiences but the content of those experiences is completely up to the people who are experiencing. But the objects, some objects are more evocative than others. So, the question would be then not should they all be high quality, of course they should be high quality, but what kinds of objects will they be. A German Expressionist painting is going to have all kinds of meanings to all kinds of people, but they do have a mood. They are often quite confronting, quite stark, quite visceral. That might have a very different mood, atmosphere than a Rothko painting or a Matisse, a vivid depiction of joy. Again, what they have in common is that they are excellent but other than that they kind of afford slightly different experiences, like a French or Dutch garden is going to offer a slightly different experience to an Australian garden or an English landscape garden or a cottage garden or what ever it is. You can't determine the outcome, but I do think that some places and objects are slightly different kind of invitations. That is why things matter, because they have objective properties, they are arranged in a certain way that other things aren't. There always is this tension of you are offering a specific thing, a specific object or a specific quality, it matters that it is blue and not red, it matters that it is matt and not polished, all this stuff matters but it doesn't determine anything. And so, it strikes me that the more abstract things become the more room you have to play with. Something like nature is so abstract, it is everything. Does that make sense?*

It does in a very painful way.

*Okay.*

It is just not simple. It is not as simple as I would want it to be. It is not as simple as ‘of course, nature is good, so we need to have it everywhere’.

*No, no, no not at all. Yes, we will just put it everywhere! Yes, no. You might be able to argue that rather then shouldn’t, you just can’t. It doesn’t make any sense.*

That is where I am at! And even that is difficult for most people, that is a difficult leap, because of course the assumption is ‘in what situation would nature be not good?’

*Does that help?*

Yes absolutely, thank you so much.

*Yes, not in a good way but in a helpful way …*

Yes, it is helpful in a helpful way

*Yeah, okay.*
There is also, you know, very simplistically, something is going to be designed. Something, something will be designed. You cannot get away from that. The question is what, what will it be. What will its qualities be. You can't get away from intervention. It is just what expectations do you have of that intervention. What is the quality of that intervention. And one other thing that just occurred to me, that is entirely different. Some people go to a garden to not think it all, to just be absorbed in the practice of gardening. And so it is almost like going for a run or Rock climbing, where you are engaged in practice that enables you to forget yourself.

Yes like a flow state. Like what Csikszentmihalyi wrote about…

Exactly… Yes, I think that is another argument for gardens. Sometimes you go there to lose yourself not to find yourself. I haven’t spoken about that so much in the Philosophy in the Garden. Sometimes you just need a break from you. So you do your exercise or you do martial arts we do whatever it is and in that flow state, you

Yes you disengage with your own inner world, yourself.

And then you come back refreshed or with some perspective or whatever it is and you don’t come to any conclusions, it’s not a cognitive task, it is again an experience that is remedial somehow.

There is a bit of research on that, and it calls it attention restoration and it speaks about using nature specifically to tap that type attention restoration where you are able to disengage your metalizing, your constant mental chatter and you then are renewed in some way.

My wife talks about this, about objects and one of the chapters is about being ill in hospital and me bringing in some flowers and a stone. And it was the question of what these objects meant for her in that clinical setting. She didn’t ask for them and I wasn’t sure why I brought them but they helped.

How did they help?

Well that is the question, yes.

Is she writing about that?

Yes she has written about that. But she is also writing a chapter on this. It’s on precious things it is on why things matter.

When is that books coming out?

Next year. Next year in October. So, you know, there is the question of what is this stone. We took the stone home from Greece and it has a beautiful texture but it is not like you can say as a doctor, you need to go home and need to get a stone and that will aid her recovery by 0.3%. But it helped. And it also helped in the long term, to help her think about what it meant to be ill. So this object played an ongoing role in mediating thought. That is another dimension to it too, these places, gardens or whatever it is, it is not just one thing, you come back to it.

Yes like a touchstone.
Yes, exactly. So your relationship to it deepens, it is less like an injection and more like you form a relationship that deepens over time. And it might well be that after a certain amount of time you don't need them.

You know what, that makes me think of psychoanalysis and Winnicott. He talks about transitional objects - that is what I'm thinking about. He also speaks about intermediate areas where you are able to play with reality and how those areas and objects really allow you to try on different realities in a safe way.

So they are less a place that offer you something specific but more a place of play and dynamism.

So maybe that stone was for her something like a transitional object.

Yes, I think she even writes about transitional objects, she certainly draws on Winnicott. I can't remember because there was an original essay that she wrote for the Age quite some years ago, then there's the book chapter that is more an extensive theory. I am pretty sure Winnicott is involved.

Yes, he should be!

And also that is partly my definition of the garden itself. Is that it's open endedness allows that space to recover all kinds of different things without it being ... You know, a garden is a specific thing, it is not wild and it is not a room, it is a very specific thing that is in unity of humanity and nature. It is not just whatever we want. It can't just be anything but within that specific thing there are so many experiences you can possibly have. And I guess for you, whether it is artwork or a garden, it is trying to safeguard that richness without it being so open ended that it becomes meaningless. You know, there ought to be a genuine difference between a hospital and a garden, because a garden is a particular thing but maybe they can help each other. They can speak to each other or something.

I think what is really different in a garden and perhaps also with good artwork is that the more you engage with it the more it reveals and you never actually get it really. There is that constant change, that constant relationship building.

Yes so there's always something slightly withdrawn from you, there's always something just out of reach that you can't finalise and that makes it rich.

Also what is so interesting and it makes it again a bit of a paradox, it is something that constantly reveals but at the same time it is something that is so familiar and it is so much me as well, and I am so much part of it. So I believe there is quite a unique thing actually that happens because it is that raw material that isn't me, but that I am.

Yes, but then it is also something other than you. Yes, I agree.

And I think the clinical environment, is so much and ‘not me’ and it is unfamiliar and insensate, it doesn't change —

At the same time it is deeply personal, affecting and dangerous, you know what I mean? There is again a very interesting interplay there. When I go to a hospital it is a threatening space often. It is not nice and sweet but at the same time I need that. You can get threats in danger in a garden two but it is more open-ended.
Debriefing with cancer patient consumer representative, Peter MacCallum Cancer Centre, East Melbourne, Melbourne, 26th October 2015

| Interviewee responses in regular font, Sarah (interviewer) in italic font |

Sarah explains about her study and what has been accomplished so far, including interviews with patients about their connection with nature. Providing reason for conducting this study and how the question was constructed to investigate the role of nature into the design of healthcare settings. Briefly explains the findings so far.

*Interestingly, I found that each patient mentioned that they find their connection with nature helpful in some way*

Yeah, not surprising

Yeah but then, well, I was really excited about getting all that positive feedback and there was really something ‘happening’ and then when I sat with the interviews and I looked a little deeper, it seemed to me that what nature offered patients was a sense of normality. It was a sense of getting away from the clinical experience. It was really that contrast to what they were exposed to, to what they had to go through. There was that refuge found when going across to the park or when being able to freely spend time in nature [hm]. And then it seemed to me that in our idea with this study to create some type of intervention using nature, it suddenly seemed really paradoxical and really against what nature seemed to actually be offering. Does that make sense?

I’m not sure, but go on.

Because the idea was then somehow package up nature and in some way medicalize, bring it into the hospital setting and in some way engage patients actively with nature and make them, well it’s so abstract to me. I don’t really quite understand, I don’t know how you would do that? I guess you would sit patients in nature and ask them to use their connection to nature and I just felt like that this is so opposite to what nature seems to actually be doing for them because what nature does

Takes them out of the chaos.

Yes and it’s like nature doesn’t identify them as patients. They are just themselves.

Being in nature, being mindful, being in the moment. So when you walk out of the clinic, if you’re here and you go to the park, you leave the chaos behind you, you leave all the doctors and the nurses and all the other sick patients and you’re you. And you can be n the moment and it’s quit and still and calm and peaceful and I agree with you, I don’t know that you could bring that in to the clinical setting.

So does that sort of make sense

Yes! Yes! Absolutely! Absolutely!

I’m just sort of, first of all, I was so disappointed, because I came in with this assumption or this idea that we need to intervene or that there is some type of intervention required and that nature obviously is helpful and what situation would nature be helpful and good and I thought, of course, this must work. And when I was sitting with what patients told me, all of this just started to crumble. All of it. But not only the nature thing, just the whole assumption that “an intervention is required”. You know, that we, it just seemed like our ideas of what a lot of us in psychooncology are pushing for is based on assumptions that might not be really
helpful. You know? And I’m wondering if there is a place for just letting things be to a certain extent without wanting to intervene in every aspect of a person’s life.

Really interesting comment on that is what Matiu has done in the waiting room for the clinics. And funnily enough, he came and when first came here and he listened to my talk and he sent me an email the next day to say, what you said really resonated with me and I’ve gone home and I had all sorts of ideas and this is what resulted. The green and the puzzles and my guess in response to what you’re saying, he took what was an awful space, awful, rows and rows of chairs. Always television on but you couldn’t see or hear or do, really impersonal unpleasant, ahm, and he’s turned it into a space where people started to interact. Where they sit with a magazine, a book, whatever. It’s pleasant to be in. Now that’s I guess one of the hangovers from the old hospital, the place was awful before and the hospital design has changed and I imagine the new hospital will be quite different. But in terms of, so for me, that, that was huge. That was sort of one step towards what you are talking about. It was de-institutionalizing the experience. It was making it much more personal, much more friendly, much more relaxed. So that, that, I suppose is one step towards what you’re talking about. In terms of bringing nature in, ahm, I used nature during my treatments and recovery as a refuge. So, it was time away from the hospital. It was time away from doctors. It was time away from treatments. It was even time away from my family. It was time for me and I would sit, practiced, relaxation, meditation. I would go to the beach and sit on the beach and do a relaxation or I would go to the gardens and sit on the bench and just be but be by myself. Could you do that in the hospital? Would you want that in the hospital?

It’s interesting because it seems that those are two different things: could you? But also do you want to do that?

They are two different things. That’s why I ask that question. They are two different things.

Nature really is something that just is where it is and it should just stay that refuge and let’s have the clinical experience does what it needs to do and it does it well and it does it for a reason. I wonder if patients would come into the hospital have the expectation and the hope that they get what they need, they get the best care and then they go back to their normal lives, to whatever then seems normal and just to continue on their lives.

Yes, absolutely. And then that way the hospital experience doesn’t become the only thing in their life. It doesn’t dominate. There is still a life outside. I’m wondering how I would have felt if the hospitals that I went to and I’ve been to quite a few around the traps. If there would have been a quiet reflective garden space, a rose garden, a garden with trees something just to where the birds might come. And if I want for a treatment and I was told we’re running late, maybe you’d like to go and sit in our garden. Yeah, I probably would. So there is a space for it but it’s, I don’t know how utilized it would be. When you go to the hospital, you don’t want to be kept waiting an hour. You don’t really don’t want somebody to say go and sit in the garden or walk in the park because what you said before is absolutely correct. You really want to get in there, have everything running on time, whatever it is you need to do, get it done and leave. So. I suppose.

So maybe there is space for it in a sense that it is a space that can be offered that is in a way an aesthetic and beautiful calming space just to be in.

Like a chapel. See I would never go to a chapel but I might go and sit in a garden. Yeah. I suppose, I mean some people find going to sit in a chapel really restorative and calming and soulenriching but not me. But I enrich my soul walking in the park or going to the beach or whatever. So, yeah.
I guess if it is a space that just in a way let’s nature just be nature without it having it do something to do you.

Just be. It’s there. And without it being too contrived. Without it being too obviously designed the ‘mindful’ garden or whatever. Just that it’s there and people know that they have access. That would be the other thing. Somehow, if you did have that space, which would be possible, it’s impersonal, it’s clinical, it’s cold. I don’t think it matters what you do, it’s a hospital and it, it has a clinical function. And it needs to be designed to reflect that but if somehow in that space, like, like the new Children’s hospital has gorgeous spaces for kids so I don’t know whether they’ve got garden, but they do. But it’s a really, it’s a nice space to be in where most of the other hospitals, it’s modern but it’s still clinical and cold and you know. It’s like a hotel rather than a hospital. So, given that you have the constraints of the fact of the hospital, yeah, a space that was open and calm and people where made aware of it. See for me I wouldn’t be happy to be there with 20 other people. That would be the other difficulty too. Yeah, there is a space to it. Does it add to the need of being restorative? No. But it does help in the, it would help in the experience being in the place, the experience of being in the hospital. It wouldn’t have to be so 100% clinically focused and I suppose that’s what Matiu has done. He sort of made it a bit more like sitting in a lounge room.

Very interesting, that component of play and creativity. That does something to people, something quite necessary when you’re in a difficult situation, to keep playing. Not childishly, to remain creative in a whatever way.

Yeah, yeah, like coloring in or yeah, rather than sitting with magazines that are three years old. Waiting, killing time, which is really soul destroying when you’re undergoing a long process and you come back and back again for check ups and so on. I’ve made many experiences waiting and waiting and it’s a soul destroying place because, just it’s firstly it’s an old hospital and it really needs doing up. You go in and there’s a waiting room, the receptionist is behind glass. You’re sitting there with 15 other patients who are all as sick as you are. You know, nothing new to read, nothing to do. It is just awful and when you have a transplant, you are there regularly, two or three times a week after a transplant for months. There is nothing redeeming.

And you feel in your experience, having things in the waiting room like Matiu has provided really does make a difference?

I haven’t experienced it as a patient but I’ve been in many times and observed and the atmosphere is so different in there now. So yeah, I think so, I thin kit’s really important.

I also find it really fascinating what is happening in the waiting room. It does make me then ask, you know what actually is providing this experience? To me, like we did the green walls etc and I had this really big assumption that there is something special about nature and that if we bring in nature something special will happen but I’m actually starting to see or maybe more to ask, if it doesn’t have anything specifically to do with nature. Perhaps it’s maybe more the interaction or the care that is expressed or that freeing ...

I think it’s all those things. I think it’s how it’s been physically rearranged, facing to each other rather than rows. You might strike up a conversation. People are talking. Where before, you might be sitting with your carer or partner but the person in the row in front of you or to the side of you. Most people didn’t talk, now there’s interaction happening. And I think, I don’t know that you can necessarily isolate any of the factors and say, it’s this or this. Is it the puzzles and the various activities, is it the green? The green is brilliant, it’s made it into a pleasant place to be.
Yeah, and do you think on that point, do you think it is just the design element and the added colour and vibrancy? Or do you think it has something to do with nature? That people feel this is a more natural environment?

I think it is probably a little bit of both. Ahm. I probably primarily that it is a more pleasant place to be. It looks more attractive.

Yeah, the aesthetic.

The aesthetic yes, the aesthetic is welcoming and relaxed and easy, in stead of bare walls. It’s pretty, there somewhere to look, there’s something to see. The beneficial side effects of being in nature. I suppose in that space perhaps not, it’s because, because it’s artificial, it’s not real, ahm, I think you lose that beneficial aspect of nature. If you had a green wall that was a life green wall, absolutely, absolutely. You’d be there with something growing. The fact that it’s artificial lessens that aspect little bit but it certainly makes it a much more pleasant place to be.

And another question. Just the idea of creating an intervention with nature. I’m moving more away from the idea of intervening, there is a bit of a conflict.

Intervening in what terms? During treatment, during follow-ups? Like for instance they talk about eating and exercise, is that what you mean?

No, the idea would be that nature would be brought into the hospital, it could be some sort of virtual reality with nature or it could be some artistic thing with nature. The idea is that it would need to be something with nature. This would be brought into the clinical context.

Treatment settings, the CDU and I’m just really struggling with it because I don’t see how that what nature really gives you can be packaged up like that and brought into the setting. It’s hard to bring those things together.

There’s a danger of it seeming contrived.

But also I wonder if there is a need for that in the first place. If, if for patients, is it a little bit does it take away from them if we intervene in every possible way in the experience, like ‘oh you must be having this or that type of experience’ so we must intervene and change this.

There is a lot of assumption going into that. There is this assumption in our psychoonology world that we think we need patients to find meaning again and this thing about a ‘teachable moment’ and this idea that we can enrich their lives in every way and make everything better. And I just don’t know if that is very true or if that is very respectful coming at it with that attitude.

I used to sit in the waiting room this last time. Just sit in the waiting room of the breast surgeon and she had a big screen with jelly fish. And I swear after I’d seen it the first time I was ready to scream. It wasn’t relaxing. You don’t go to a surgeon to sit and be relaxed. You go in there for a particular reason, you, you.

Yeah, it’s disrespectful in some ways. This assumption that everybody needs to be relaxed but to create awkward situation.

I don’t know, another doctor I go to has a big fish tank. That doesn’t’ bother me so much. Different people have different attitude in the way they deal with their illness. For some people when they are diagnosed they virtually shut down and they get through their treatment and they do need interventions to bring them back to their lives again for some, and I’m one, treatment was almost like a job of work. I was diagnosed, I learned the facts. This is what needed to happen, the treatments I needed to have. It was almost like putting my head down
and getting on with my life. It’s always, I suppose, because I’ve had four experiences, I suppose what I’ve been able to do is encapsulate each one as a separate point in time. And, that was one thing that happened in my life like going away on a holiday, something else that happened in my life, like doing a course or whatever. It’s a point in time, it might take weeks or months and do I need, did I need help and support? Absolutely. Would I have benefited from supportive care. Absolutely. But did I need somebody to have plants grow in the treatment room. I probably wouldn’t have noticed. It would have looked nice and I suppose that’s about design but as an intervention? I don’t think, it seem peripheral and contrived and not necessary. Ahm, make the spaces more beautiful, have plants and flowers or paintings on the wall or something. But to contrive an experience in nature for me, for me, if I want to interact with nature, ahm, I would do it, I could do it at a hospital if there was a separate space that I could go to. Would I appreciate it in the treatment rooms where I was going to have chemo? No, because I was there to do a job. Ahm.

*It seems where its place might be in the design aspect.*

I think so.

*To use nature for its beautiful aesthetic but not confuse it with bringing in nature.*

I just don’t really understand how you could do it.

*I love that you say that it’s not even necessary.*

Yeah, have a space for people to go if they want to but to make it almost compulsory. I’m not sure. Not for me. Not for me.

*That is what I’m coming to understand or to see more and more. In the interviews, I also found something very similar to what you just said that it is so different for every cancer patient and the experience and I’m sort of creating a theory model about what happens and to me, it really is about coming back to a normal. And it seems like patients do this in very different ways. For some it is a really pragmatic thing, it is just about doing what is required and then they get back to what they were doing before. And for some it is more of a symbolizing even, it means something more and it is more a disruption and they go through it they come, perhaps, to something that is transformed life. It doesn’t happen for everything, not even close. In the psycho oncology world, we have really misunderstood this a little bit perhaps an we focus too much on this being necessarily a really major event for everybody that will transform every aspect of their life.*

It is a major event. It is a major event. And, it does transform you in many ways. Ahm, and you, I can only speak for me, I never returned to the way I was before. Physically, psychologically, each time, and when I do my talks, I talk about the new-normal that we all talk about and each time the bar in fact lowers and you have to accept that. You have to accept that you need, once you’re through your treatment that you go on with life but you’re changed and you’re accept the loss of functions that psychologically changed all of those things. It’s transformative in a physical and psychological sense for everybody, it has to be. Whether you see it as this amazing life changing experience, whether you treat it as a job. For many it is both, of course, it’s life changing. Lots of people write about it in almost euphoric way, they’ve discovered a new person inside. I discovered lots of things about myself. Of course I did, everybody does. I was maybe in the middle of that continuum form being totally euphoric to being totally pragmatic about it. I guess I was in the middle. But everybody’s life changes. Everybody’s affected by it. All sorts of reasons. Your attitudes about mortality, you’re confronted with your own mortality, the rest of your life. Your attitude to living life changes. For me, I live one day at a time. I wake up each morning and that’s a day, that’s amazing. That day is there for me. So, I suppose, I’m still trying to get my head around it.
Did you find in those experiences, four times you said you went through it, that’s a lot. Did you find that when you went through those times that you really needed or wanted something that connects you back with what was normal before or were you perhaps open to things completely changing? Did you feel like you needed those anchors?

I’m not sure. I think my anchors were my family. My husband and my three kids. When I started out my youngest was 12. So I had young children. So they were my anchors. I needed to be able to get on with life, look after my kids, activities, parties, whatever they needed to do. And I was working as well. In terms of getting back to my life, I suppose my interpretation of the ‘new-normal’ is physical and psychological it’s not actually. It doesn’t actually relate to the larger aspect of life. That was my life before I had cancer. The part that is affected by cancer, whether it’s loss of function, long-term side effects or whatever it might be. Those things are the new normal but my relationship with my family, my siblings, with my husband with my friends, all of that pretty much maintained a stability all the way through. That was my life. I guess in many ways I was very lucky. I wasn’t impacted financially. Apart from the fact that it was horrendously expensive. I didn’t struggle financially. I was able to take time when I needed to. I had an amazing support network so in terms of my regular life, that went on. So it was a matter of me stepping back into it once I was well enough. I don’t know if that answer your question.

That is absolutely something I wanted to hear about. That is that normalization thing that for me is coming through really in these interviews very strongly actually. It’s about people going back to normal and what is normal for them and I’m wondering if that has got to do if that has to do with asking about the nature topic because it seems like a proxy for ‘normal’. It seems a way to talk about what is normal to a person and therefore the theory that is coming up that I’m constructing is really this process of normalization and what that is like in different situation and it is really moving away from the question of nature and interventions and finding abstract things and more about the person.

And how you move back into life, that process.

That process yeah and it seems that for some nature plays a role and for some it doesn’t. and that was really surprising because I thought that nature is something in everybody’s life.

For some people going for a walk would be torture, others find it restful and calming. And I suppose, I think, that there is such a range of people. There is such a range of backgrounds and experience and, ahm, I come at it. I’m intelligent, English is my first language, I have a supportive family, I don’t have to do it alone, financially I’m OK, I’m confident so that if things are not going quite the way I thought they might, I’ll knock on doors and I ask questions and I’m comfortable and capable of doing that. So my experience is so different form that person and that person and their experience comes from their background and what their personality is. So many aspects, their fears, their interactions with the medical profession in the past.

Yes, I’m coming to see that. I’m wondering if people’s background has a much greater impact on the variety of experience

Absolutely. I don’t know. Because you, you want to be careful not to compartmentalize. And I suppose, the other things I talk about in the talks and it’s probably what Natalie heard me say. One of the things that I’ve experienced going through the systems many times. There is a tendency for the medical profession to compartmentalize, there is an outcomes model that. It’s almost as thought the patient is put onto a conveyer belt at the beginning of the experience. There’s your box.
Appendix 16 Waiting Room Survey Questionnaire

Questionnaire purposefully designed to capture patient, staff, and visitor responses to an environmental design intervention in an oncology waiting room as reported in Chapter 7.
What do you think about the green features?

We are looking for ways to improve time spent in the waiting room. For this reason we have installed a few ‘green plant features’ and would very much appreciate your reaction to it. We highly value your opinion and want to do our best to support you while you are at PeterMac.

This information will be used to further improve the waiting and working environment at PeterMac. The data will also be used for a PhD project that looks at the role of nature in the lives of people affected by cancer and the care setting. If you would like more information on this you can contact Sarah Blaschke at Sarah.Blaschke@petermac.org

Thank you for your time to answer these few questions.

1. Please tick which applies:
   - [ ] Patient
   - [ ] PeterMac Staff
   - [ ] Family, friend or caregiver
   - [ ] Other

2. Did you notice the green features when you first entered the waiting room?
   - [ ] Yes
   - [ ] No

   → If No, please take a look around and notice the different green plant features.

3. What was your reaction to the green features when you first saw them?
   - [ ] Dislike a lot
   - [ ] Dislike
   - [ ] Neither like nor dislike
   - [ ] Like
   - [ ] Like a lot

4. How do you feel the green features affect you while you are spending time in the waiting room?
   Tick only one.

   - [ ] Very positive
   - [ ] Positive
   - [ ] Nothing noticeable
   - [ ] Negative
   - [ ] Very negative

5. How would you rate the green features on the following pairs of descriptive words. Please compare the two words and mark X on the line according to what best describes your feeling, at this moment:

   a) dull
   - [ ] 0
   - [ ] 1
   - [ ] 2
   - [ ] 3
   - [ ] 4
   - [ ] 5
   - [ ] 6
   - [ ] 7
   - [ ] 8
   - [ ] 9
   - [ ] 10

   engaging

   b) unattractive
   - [ ] 0
   - [ ] 1
   - [ ] 2
   - [ ] 3
   - [ ] 4
   - [ ] 5
   - [ ] 6
   - [ ] 7
   - [ ] 8
   - [ ] 9
   - [ ] 10

   attractive

   c) irritating
   - [ ] 0
   - [ ] 1
   - [ ] 2
   - [ ] 3
   - [ ] 4
   - [ ] 5
   - [ ] 6
   - [ ] 7
   - [ ] 8
   - [ ] 9
   - [ ] 10

   peaceful

   d) busy
   - [ ] 0
   - [ ] 1
   - [ ] 2
   - [ ] 3
   - [ ] 4
   - [ ] 5
   - [ ] 6
   - [ ] 7
   - [ ] 8
   - [ ] 9
   - [ ] 10

   relaxing

   e) depressing
   - [ ] 0
   - [ ] 1
   - [ ] 2
   - [ ] 3
   - [ ] 4
   - [ ] 5
   - [ ] 6
   - [ ] 7
   - [ ] 8
   - [ ] 9
   - [ ] 10

   uplifting

   f) beautiful
   - [ ] 0
   - [ ] 1
   - [ ] 2
   - [ ] 3
   - [ ] 4
   - [ ] 5
   - [ ] 6
   - [ ] 7
   - [ ] 8
   - [ ] 9
   - [ ] 10

   ugly

Continues →
6. Please indicate how strongly you agree or disagree with the following. *Tick only one in each row.*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) The greenery brightens the waiting room</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b) I prefer living plants</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c) The greenery is a good distraction</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d) Life-like (not real) plants are better than no plants</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e) I prefer the waiting room without the green features</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>f) The greenery makes me feel relaxed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>g) The greenery makes the room feel less formal</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>h) The greenery makes me feel more normal</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

7. Did you notice that the plants are not real?

- Yes 1
- No 2

9. Please read each statement and then tick most appropriate box to indicate how you feel right now, at this moment. There are no right or wrong answers and you do not need to spend too much time on any one statement but give the answer which describes your present feelings best.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at</th>
<th>Somewhat</th>
<th>Moderately</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) I feel calm</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b) I am tense</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c) I feel upset</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d) I am relaxed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>e) I feel content</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>f) I am worried</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

9. Any further comments?

_________________________________________________________________________________

______________________________________________________________________________

*Please place the feedback form in the provided return box.*

Thank You!
Appendix 17 Synthesis Findings Studies 1 – 5

Supplementary material for the final synthesis study presented in Chapter 9, which aimed to consolidate findings from the overall research program. Summary and further detail of findings from Studies 1 – 5 are included (Chapter 9).
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Study 3, Chapter 6: Patient Recommendations

Opportunities
a. Animals
b. Natural design features (other than water)
c. Nature art
d. Views to nature
e. Contact with water specifically
f. Accompanying clinical procedures
g. Desired engagement (sensory and private)
h. Events, entertainment, activities
i. Healthcare service integration and expansion
j. Helpful mental activities, techniques
k. Physical activity promotion
l. Social opportunities

Barriers
a. Allergies
b. Appropriateness
c. Healthcare investment
d. Negative trigger
e. Not valued / not interested
f. Overwhelm
g. Safety
h. Sensory overstimulation

Study 5, Chapter 8: Expert Recommendations

Opportunities
a. 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)
b. Accessible outdoor settings, gardens and courtyards: Easy and effortless access, automated doors, nearby, some areas with high visibility, close proximity to clinical assistance, remove barriers and thresholds, available for patients, carers and staff
c. 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
d. Appropriate safety measures and surface materials for limited mobility: Handrails, smooth paved paths, ramps rather than steps, colour contrasting curbing along pathways
e. Educate healthcare team, management, patients, designers, policy and decision makers about value, benefits, and appropriate implementation of nature-based opportunities
f. 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)
g. Design proposal needs to address repair and maintenance requirements of nature-based features within available maintenance budgets (easy to maintain). Tasks to be carried out by skilled professionals
h. Protection from adverse weather conditions (sun, shade, high/low temperatures) and unpleasant stimulation (overpowering scents, noise, loud sounds, toxic plants, clutter)
i. Socializing: Range of seating options, gathering and communal spaces, BBQ area, children play areas, semi-private enclosures for personal conversations
j. Indoor design to maximize use of biophilic elements: Natural materials, natural colours, air flow (including windows that open safely), and natural light

Barriers
a. Building design and site constraints, missed opportunities: Layout, building orientation, surrounding views, lack of available space were not considered in planning and development phase
Study 4, Chapter 7: Cross-Sectional Survey Study

- 81% (115/142) noticed the green features when first entering the waiting room
- 67% (90/134) noticed the green features were artificial
- 81% (115/142) “like/like a lot” as first reaction to the green features
- 41% (68/143) positively affected and 23% (33/143) very positively affected
- 81% (110/135) agreed/strongly agreed that “The greenery brightens the waiting room”
- 62% (80/130) agreed/strongly agreed that they “prefer living plants”
- 76% (101/133) agreed/strongly agreed that “‘lifelike’ plants are better than no plants”
- Positive effects were stated as normalizing, relaxing, promoting conversation and softer voices, and calming, for example, “noticed a much calmer atmosphere amongst patients” (58 years old, female staff)
- Six responses (11%) were negative including one staff member who felt “very negatively” impacted by the green features and stated the waiting room has “decreased in leg space and cleanliness” (60 years old, female). Other negative responses included dislike of artificial plants, perceived messiness, and potential reduced attractiveness, for example, “(I’d) like to see that the plants do not gather the undesired and neglected look” (75 years old, female patient)

b. Decision makers, management and administration often lack knowledge and/or awareness about benefits of nature engagement
c. 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
d. Cost and resource allocation: cost for routine repair and maintenance, staff and volunteer time, acquiring indoor equipment (screens, virtual reality, A/V), lack of funding, often based on fundraising and grants
e. 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
f. Healthcare facilities design often guided by clinical functionality, efficiency, cost restrictions and/or habitual practice, not necessarily the patient perspective/experience
g. Mainstream values (decision makers) don't prioritize nature-based opportunities or “design thinking”
h. Champion (advocate) needed
i. Not prioritized in construction and development phase of healthcare projects
j. Inauthenticity of nature-based design elements: fake plants, fake scents, tokenistic, corporate design (“cutting edge” award seeking designs)
Appendix 18 Social Science & Medicine Review Letter and Author Response

Documentation of the peer-review process of the published paper included in Chapter 5. Response letter to reviewers who provided comments and feedback for the manuscript submitted to the Journal of Social Science & Medicine. The manuscript reported on findings from the Grounded Theory study (Chapter 5). The letter includes individual feedback received and the authors’ responses to the reviewers who finally approved publication of the manuscript.
Response to editor’s comments

1. Please ensure that your manuscript follows the formatting and style specified on Social Science & Medicine’s website.
   Reference formatting updated with Social Science & Medicine endnote file extension

2. Your highlights are over the limit, please condense.
   Highlights have been condensed and submitted as separate file

3. Please ensure that your paper incorporates APA Headings

4. Your manuscript is currently over the 8000-word limit; we suggest condensing the results section, perhaps using Tables or Figures.
   Word count edited down to 7998 words (including title page, highlights, tables, figures and references)

5. Limitations section: We encourage you to elaborate more on the limitations you list and how they relate to the conclusions of your study.
   The Limitations section has been expanded and the practical implications further elaborated. Importantly, the suggestion that the findings may have baring on nature experience in human life more generally has been cut because it seemed ill-fitted in the Limitations section and did not contribute to understanding the findings nor the limitations of the study. Please see page 17, lines 496-506.

6. Figure 1: Please clarify in the figure legend and/or in the Figure itself how nature’s role and the interrelationship between the two themes fit into the conceptualization.
   The caption and legend have been revised in line with Reviewer #1’s suggestions, please see more explanation in the Response to Reviewer's letter.

Response to Editorial Office Comments:

There are two areas for relatively significant consideration. The use of attachment theory reads as somewhat forced. It appears quite late in the manuscript, and as reviewer 2 comments, the connection seems a bit tenuous. Remember this is a health psychology section of SSM, and the readers will be at home with attachment theory - and this feels a bit of a stretch. Perhaps you are convinced it is crucial to your argument, in which case, some further indepth engagement and justification of it is needed. However, perhaps it is just not
needed, and the findings stand up sufficiently as you have interpreted them.

The application of attachment theory has been revised and considered an important component of the theoretical conceptualization of nature’s role as a facilitating, enabling and familiar context. I agree that Bowlby's work focuses on attachment styles as it concerns interpersonal relationships (children in particular but also mature adults); this is, however, not the core parallel drawn in this study. The theoretical position uses Bowlby's secure base as it relates to its enabling function provided by the caregiver. This aspect remains, after further reflection, relevant to this study's theory development. I would like to refer to Bowlby's own theorizing on his concept of the “secure base” where he connects with and refers to Winnicott’s idea of the “facilitating environment” (Bowlby, 1977, page 106).

In response to your concern raised I have revised the wording to better articulate these theoretical moves and present a clearer use of the “secure base” in order to avoid readers' immediate association with Bowlby's attachment styles (page 15, line 461 and page 16, line 472 – 477). To further substantiate this proposition, reference is made to relevant patient descriptions from the Result section that illustrate the inferences made (page 16, line 477 – 482).

The second area is in the implications of the study. You hint that the findings may have resonance/implications beyond the sphere of nature-interactions only, and may say something about healthcare more generally. Perhaps you could reflect on what those might be. We note that of course some of the patients’ comments refer to gardens and humanly-created or curated ‘nature experiences’, and that some of the issues identified are more about creating a non-medicalised, informal setting, which might be done by other means than 'nature'. This is not a criticism, but an invitation to consider the findings in a way that relates to a broader literature (e.g., patient experience, patient-centred care, etc.) and that reflects on the possible significance of these findings for that literature.

The Practical implications section has been revised to incorporate the aspect you point to, which I consider important and present the findings and my own reflections. Some patients’ use of nature clearly alluded to simply engaging with a more patient-centric mindset and searching ways to humanize the clinical scenario, which arguably could be achieved by other means. Please refer to page 17 – 18, lines 520 – 533.
Response to Reviewers

Reviewer #1: This is a very interesting article around the importance of nature for people with cancer. It suggests 5 types of nature interactions; embodied, allied, imaginative, humanized and novel. The authors draw upon Bowlby's (1988) attachment theory to highlight the nurturing role of (mother) nature and Winnicott's (1971) concept of the 'intermediate area' to interpret their participants' experiences of simultaneously escaping the reality of cancer and moving towards it. The results section was very clear and included salient quotes to illustrate the authors' arguments. There were sufficient quotations to suggest commonalities between the participants' experiences.

As a former cancer patient myself, the importance of nature resonates with my own experiences. I found it really interesting because it picks up on a facet of the experience that is perhaps taken for granted, but is actually very important to cancer patients in a time of uncertainty and unknown futures, and at a time when much of one's time is spent confined in unnatural settings with artificial light and no fresh air. In these circumstances nature represents the complete opposite to that and this article brings this out very successfully.

I have a few comments and suggestions which I have detailed below:

Abstract

The main issue that I would like to highlight is with the core category 'a state of new normal'. This is because recent studies* suggest that rather than being a fixed 'state', a 'new normal' is better understood as a fluid, dynamic process involving constant renegotiation. Indeed you indicate this with your phrase 'accept a shifting normality' later in the same paragraph. This is also picked up by P06 on page 13 who describes a new normal for her as 'a process of accepting what is happening to me and where I fit in the world' which is a really insightful comment. This suggests that in terms of theory development, rather than being 'towards a state of new normal' may perhaps be more accurately described as a process involving 'distancing from the cancer reality and advancing towards it' (page 14).


RESPONSE. This is a very insightful comment and I agree that there is a disconnect between this statement in the abstract and how the results are presented. The phenomenon has been interpreted and described in the results
section as a dynamic play and adjustment process, moving away and advancing towards the cancer reality, which denotes a 'dynamic process' and not a 'static experience'. In response, the abstract has been edited to better align with the findings presented in the body of the text (page 1, line 14). This has also been taken into the edits for Figure 1 as requested by the SSM editor (to better capture the interrelationship between the themes and the core category).

Introduction

Paragraph starting at the bottom of page 1: Your use of the term 'healthcare consumers' suggests a neoliberal approach to healthcare that does not necessarily apply universally. Furthermore, I am not sure that it reflects MacCormack et al.'s (2001) arguments either as they simply argue that their participants expressed a preference for talking to someone who cares for them in an individual 'human' way. Similarly it seems that your study seeks to find ways of connecting to cancer patients on a very personal level in healthcare settings. MacCormack et al.'s findings centre around the argument that basic human interaction and care account for a significant part of patients' positive experiences and perceived satisfaction with psychosocial therapeutic interventions. I agree that the term 'healthcare consumer' invokes a sense of corporate identity inconsistent with the very idea of a more 'humanized' rather than clinical approach. However, it is a term increasingly used in this research sector as well as used in the day-to-day language in the setting itself. Even MacCormack uses the term 'healthcare consumer' in the introduction of his article. While I do recognize this tension, I believe the term 'consumer' is appropriate and has been left in this paper's introduction where it relates to MacCormack's findings. The second instance where it was used has been changed from “consumers” to “patients” (page 2, line 58)

1.1 Final paragraph page 2: citation of IARC (2014) should be updated
The WHO report cited here is up-to-date, however, the reference was not formatted correctly, which has now been corrected (page 20, line 657)

Method

2.1 When were data collected?
Data collection period has been added under 'Participants and ethics approval' (page 5, line 133).

Where were the face-to-face interviews conducted?
Site of interviews added under ‘Design and data collection’ (page 4, line 114).

2.2 Did all the participants have terminal cancer? If not, were there any differences between participants whose cancer was at different stages/with differing prognoses?
Participants’ prognoses were not collected. The type of diagnosis and treatment status only (completed/in treatment) were recorded and there were no meaningful differences found in their reports based on these variables

2.3 Could you explain briefly why you used data management software for a
relatively low sample? Using data management software promised better oversight of the many codes produced, especially in the initial phase when data is reduced to a substantial amount of smaller units. It is also said to help in visualizing the categories and their possible relationships. Similar grounded theory studies with such small sample sizes* report using data management software; it appeared good practice to follow these precedents. However, reflecting on the process and the actual analysis experience, the first author (SB) does not consider the software critical to the procedure, nor found it particularly helpful in assisting analytic thinking. Following this learning, she would not use Atlas.ti (nor NVIVO) for this type of study again. Instead, Microsoft excel proves entirely sufficient and easier to use.


Results
3.1 how did the experiences reported by patients who were receiving treatment compare with those who had completed treatment?
As per response to 2.2: There were no detectable patterns / differences found between patients who received and those who had completed treatment. A statement has been added under ‘Participant demographics’ (page 7, line 193) to clarify this finding.

Table 2 is very clear about the 5 typologies identified with good illustrative quotes

3.2 See earlier comments about state of new normal
Edited to reflect reviewer’s suggestion under ‘Abstract’. Rather than describing a ‘state’ of new normal, wording has been revised to capture a more dynamic process (page 7, line 205).

Figure 1 is a clear illustration of the interrelationship between the two themes and core category

3.2.1 Second paragraph on page 8: this seems to contain a lot of complex information about P06’s situation which merits further explanation/exploration particularly because of the beautiful quote from her. This response merges with the response below (3.2.2). The ‘different type of support’ drawn from P06’s nature experiences is elaborated on in the subsequent sentences about nature’s non-denominational qualities, alluding to the possibility of accessing alternative pastoral-type care for those who identify as non-religious. Further exploration of this aspect follows in next comment below:
3.2.2 Final paragraph on page 8: do your findings suggest that nature was used instead of, or as well as, religion as a means of support? No patient mentioned separating nature from religion or pointed to an incompatibility of these two means of support. However, religious support was described as incompatible for those who do not consider themselves religious (from a religious background [P06]) and, in these instances, nature was suggested as a relatable, non-denominational alternative for consolation and reflection. However, to answer the question of using nature ‘as well as’ religion would require further exploration of this specific aspect. No patient described religious practice, per se, that involved nature aspects, nor did any patient describe a strict separation (incompatibility) between their religious practice and nature engagement. What was described and reported in the section ‘Nurturing context’ was that nature could cover for the aspects of, perhaps, “existential care” that non-religious patients cannot access through Christian pastoral and other religiously themed care and facilities (eg. hospital chapel with religious imagery) which are on offer in the hospital.

End of first paragraph on page 9: the quote does not suggest a problem with nature itself.

End of second paragraph on page 9: the quote is interesting in that flowers are no longer allowed to be kept at patients’ bedsides in UK hospitals.

Final paragraph on page 10: highlights an often neglected facet of the cancer experience - the debilitating effect of spending large amounts of time in a non-natural setting and how connecting with nature can be restorative.

3.2.3 Top of page 13: can you say a bit more about P16? It seems to be the only negative case and you state on page 5 that efforts were made to specifically include contradictory views. A sentence has been added to this paragraph further exploring P16’s different attitude about nature in his cancer experience. His view to prioritize primary care over additional and non-essential initiatives such as nature engagement is presented (page 13, line 387).

Discussion
Top of page 15: ‘which create a homey ambience’ - I am not sure that this was mentioned in the article cited, is it your interpretation? Dijkstra (2006) uses the expression ‘homely ambience’ (not ‘homey’, this was indeed a typo in the manuscript) in relation to environmental features (architectural, interior and ambient), which reduce anxiety in the hospital room. This sentence has been cut because it seemed superfluous and the manuscript had to be edited down. Please see the edit on page 15, line 455.

I hope that the authors find these suggestions for improvement to be useful. I encourage revision and resubmission of this very interesting article which adds valuable insights into ways in which the cancer experience might be made less
stressful for patients through interactions with nature.

Reviewer #2: This paper was an absolute pleasure to read. As an experienced qualitative researcher, I was impressed with your approach to the topic, and congratulate you on your analysis. I have found it increasingly rare to read a quality qualitative study where it is immediately obvious that the Author's have captured the depth and meaning underpinning participant responses. Working in the areas of psycho-oncology and psychosocial care, I could almost hear the patients speaking through your analysis. Your application of grounded theory was appropriate and the generation of theory also relevant. My only criticism here would be your decision to include 'attachment theory' in your discussion. I realise that often Reviewers will argue that you need to incorporate any existing theory in your research, but from my reading of your work, the data just doesn't fit with such an explanation. How does one’s connection or attachment with ones' parent relate to our connection to nature?
Yes, I do see that perhaps our sense of exploration may be linked with attachment, and perhaps this (might?) open the door to future research either for you or others - potentially readers of this paper.

I think there is a lot of scope to explore the benefits of interventions involving 'connecting with nature' in psycho-oncology, and generally in the area of health. I would envisage that this paper will be seminal in the area and influential for years to come. Congratulations on an exceptional piece of work.

I paste here the response given to the Editorial office who raised a similar question about the application of Attachment theory in this manuscript. I hope you will find the revision clarifies the parallel drawn between nature as a nurturing context, Winnicott’s “facilitating environment” and Bowlby’s “secure base”.

As follows:
The application of attachment theory has been revised and considered an important component of the theoretical conceptualization of nature’s role as a facilitating, enabling and familiar context. I agree that Bowlby's work focuses on attachment styles as it concerns interpersonal relationships (children in particular but also mature adults); this is, however, not the core parallel drawn in this study. The theoretical position uses Bowlby's secure base as it relates to its enabling function provided by the caregiver. This aspect remains, after further reflection, relevant to this study's theory development. I would like to refer to Bowlby's own theorizing on his concept of the “secure base” where he connects with and refers to Winnicott's idea of the “facilitating environment” (Bowlby, 1977, page 106).

In response to your concern raised I have revised the wording to better articulate these theoretical moves and present a clearer use of the “secure base” in order to avoid readers' immediate association with Bowlby's attachment styles (page 15, line 461 and page 16, line 472 – 477). To further substantiate this proposition, reference is made to relevant patient descriptions from the Result section that illustrate the inferences made (page 16, line 477 – 482).
Cover Letter

To: Flora Cornish, Ph.D., Assistant Editor, Social Science & Medicine
From: Ms Sarah Blaschke
Date: 18 October 2016
Re: Submission of revised manuscript titled ‘Cancer patients’ experiences with nature: Normalizing dichotomous realities’

Dear Ms Cornish,

Thank you for your feedback and inviting us to re-submit our manuscript with minor edits. We have considered and addressed the comments provided by the Editorial Office. Please find our detailed responses follow below.

We hope you consider our reflections and revisions appropriate and relevant and look forward to your response.

Please don’t hesitate to get in touch if you have any questions

Sincerely,

Sarah Blaschke

Ref: SSM-D-16-00589
Manuscript Title: Cancer patients' perspectives on nature: Normalizing dichotomous Social Science & Medicine

Response to SSM Editorial Office

1. Carefully read through the manuscript to ensure proper grammar and punctuation.

2. As you proofread, focus carefully on the use of the word/term "nature" through all components of your manuscript. For example, we find the title of your paper somewhat awkward, as many casual readers may not understand the meaning of "nature" or may infer meanings you did not intend (e.g., cancer occurs in nature, but is it nature or nurture?). "Experiences with nature" or "Perspectives on nature" would probably be more in keeping with your meaning. Similarly, in your abstract, you say "To explore cancer patients' subjective nature experiences" when "To explore cancer patients' subjective experiences with nature" would, to our minds, more intuitively carry the meaning. In proofreading the text in your paper, keep this concern in mind and make adjustments as necessary to avoid the problem (it is clearly an issue in your set of Highlights, the text, and Tables). In making changes, please watch your word count, as your paper is already close to our limit.

Thank you for raising this issue. After working with the topic intensively, it is challenging to consider how naïve readers could interpret the terminology used. We have changed to title to state “Experiences with nature” and have incorporated this phrase throughout the text, highlights and the two tables. Table 1 has been renamed from “Typology of nature interactions” to “Typology of nature experiences”, and the Highlights now emphasize nature “experiences”. In the text, where appropriate, “nature experiences” has been edited to "experiences with nature"
for consistency and other interchangeable terms (e.g. interactions, contact with, use of) have been changed to state “engagement with nature”, “nature engagement”, or “experiences with nature” and “nature experiences”. We found that the term “nature” used on its own retains an important notion of nature being a “context” as well as a subjective experience, therefore the single term “nature” still appears throughout the text. The phrase “contact with nature” was kept in the Introduction where it relates to literature that uses this language.

3. In the text, Tables, and Figures, italicize all statistics symbols (e.g., SD). Where you have “SD” in one instance in the text, we noticed that there was an equals sign omitted. The SD symbol has been italicized and an equals sign added in the Results section (page 6).

4. Provide a higher resolution version of Figure 1; we also would encourage you to incorporate colors (although keep in mind how the colors would look if printed in grayscale and make adjustments, accordingly). We suggest also editing your Discussion so that you reference it at times when it is highly relevant. You may wish to make small changes there so that it can be more linearly incorporated. A higher resolution version has been uploaded. We have incorporated one color (blue) to make the figure more legible and have checked for sufficient contrast when printed in b/w. However, we found that more colors are too distracting. This file is uploaded as pdf because Microsoft word otherwise automatically down-samples the image. We hope this is acceptable. The figure is now additionally referenced in the Discussion section on page 15, line 403.

5. Recent work published in our journal also appears highly relevant to your conclusions and we encourage you to incorporate these if you see fit:


Thank you for these suggestions. After reading both papers, I believe the crossovers, while they do exist, do not pin-pointedly connect with the central themes of this paper. The first study (Chaudhury) focuses primarily on physical activity and various environmental motivators that exist for older populations to remain physically active. The second focuses specifically on gardening and emphasizes the community strengthening and –building potential of gardens in urban settings. Neither study investigates clinical populations nor cancer caregivers or other cancer related groups.

The two citations will enrich our thinking and could become relevant in ongoing research, however, they don’t directly align with our central theme (cancer patients’ relationship with nature).

6. We noticed that Figure 1 uses British English whereas the text appears to be American English. In fact, your style statement permits either form, but you should use one consistently throughout the manuscript. If you are more comfortable with British English, then use it throughout. After reviewing for British/American English, we adjusted Figure 1 so that it is now presented in American English. Specifically, “manoeuvers” is now “maneuvers”.

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Appendix 19 Waiting Room Survey Approach Script

Script for approaching waiting room users in the specialist clinic waiting room for completing the questionnaire survey.
Hi my name is Sarah and I am a research student here at PeterMac.

I am currently conducting a survey study about the green features we have installed here in the waiting room. We are wanting to get feedback from patients and staff about these changes we have made so we can further improve the environment and patient waiting time. Before I continue on, would you be interested in testing this survey questionnaire today?

[If “yes”, continue; if “no”, state, “That is fine. Thank you for your time”]

This survey is also part of my Ph.D. study, which is about the role of nature in the lives of people affected by cancer. The overall rationale is to improve the healthcare environment and patient experiences by making nature accessible through design, architecture and sensory stimulation.

Do you have any questions before I go on?

I am looking for 5 patients to provide feedback about this survey so that we can make sure it is understandable and that it fulfills its purpose. It would take about 10 minutes and I would sit with you while you are filling out the survey and talk to you about how you understand the survey questions and how you feel about it.

Your survey data can be included in the study if you wish so and it will be completely anonymous. Your name and details will not be collected. I am mainly interested in your response and feedback about the survey.

If no:
This is okay. I just want to remind you that this will not impact your relationship with the hospital or staff. Thank you for your time.

If yes:
Are you comfortable staying here or would you like to go to a more private area here in the waiting room? [take action accordingly, find two chairs in close proximity to be able to hear if patient is called for appointment]

Before we start, I want to let you know that you can decide to stop at any time. If you are called for your appointment, we can take a break and continue afterwards. There are also no right or wrong answers and any thoughts and feedback you have are greatly appreciated.
Appendix 20 Study Design Proposal Phase 2 Trial following the MRC Framework for Developing and Evaluating Complex Interventions

Outline of study design for future Nature and Health intervention research that follows recommendations from the MRC Framework for Developing and Evaluating Complex Interventions.
Phase 2 Trial following the MRC Framework for developing and evaluating complex interventions

Research Questions

1. What are the psychosocial and physical effects and impact of a nature-based intervention in cancer care contexts?
   1a. What are the associations between ‘Nature-Connectedness’ and psychosocial and physical outcomes of the NBT intervention?
2. Is nature-based an acceptable and feasible psychosocial and physical intervention in cancer care contexts?
3. Is a NBT model acceptable to Designers and Landscape Architects as a tool to guide the design of therapeutically programmed OEs?

Hypotheses

Primary

H₀ 1: Cancer patients’ psychosocial and physical functioning is not affected by participating in a nature-based intervention.
H₀ 2: NB is not an acceptable and feasible intervention in cancer care context.

Secondary

P1: The NB model does not translate into design practice as a useful tool to guide the design of therapeutically programmed OEs in cancer care contexts.
P2: Cancer patients’ psychosocial and physical functioning is associated to their degree of ‘Nature Connectedness’.

Research Design

Phase 2 Trial following the MRC Framework for developing and evaluating complex interventions.
Fig 1 Phase 0-2 Flowchart
Studies

1: Effect Study  
   *RCT (pragmatic randomized wait-list controlled trial)*

2: Implementation study  
   *Process/formative evaluation*

3: Intervention Development study  
   *Theory development*

Establishing a Chain of Evidence

**Fig 2 Chain of Evidence Diagram**

MRC: [1]

Design + Evaluation of the Intervention, Phases 0-2 **PARIHS**

Framework (Implementation Theory): [2], [3]

Development of intervention
Defining + understanding ‘components’ (Evidence, Context, Facilitation)

Setting up levels of enquiry (Macro, Meso, Micro)

**Process Evaluation: [4], [5], [6]**

Programme Theory

Hypotheses testing, Logic Models

Researcher’s Internal Inquiry Protocol

**Pilot Data Collection can include: [7], [5], [8]**


(i) Focus Group schedule: defining ingredients + components, survey development, facilitation. Frameworks Analysis.


(iii) Online Survey: Built on qualitative findings, main themes from focus group + interviews.

(iv) N=1 Studies: defining active ingredients + dose intensities, user feedback, survey development, testing instruments.

(v) Stakeholder Involvement

**Methods and Data Collection**

Mixed methods and data triangulation approach to address primary and secondary units of analysis (embedded design).

Main Unit of Analysis: Effects + Impact of NBT in cancer care context

Embedded 1: Acceptability + Feasibility of NBT in cancer care contexts

Embedded 2: Feasibility of NBT to guide design

**Data Units**

Primary + Secondary Level of Enquiry

Primary: Micro: Participants

Secondary: Meso: Facilitation, Context (Setting)

Macro: Organizational, Cancer Care Providers, Design Agencies
Unit A: Literature review, evidence
Unit B: Qualitative semi-structured in-depth interviews
Unit C: Focus group
Unit D: N of 1 Studies
Unit E: Survey 1 data (interim): quantitative cross-sectional data
Unit F: Process data from exploratory trial:
   Site Evaluation
   Field Notes
   Exit Interviews
   User Feedback, Caregiver Feedback Questionnaires
   Provider Feedback, Facilitator Feedback Questionnaires
Unit G: Primary outcome:
   Battery of questionnaires pre/post
   Physical measures
Unit H: Survey 1 completed: Quant. + qual. data patient views + perceptions
Unit I: Survey 2 completed: Quant. + qual. data designer views + perceptions

Data triangulation
Testing Hypotheses
H0 1: Unit A, C, D, E, F, G, H
H0 2: Unit E, F, H
P1: Unit I
P2: Unit A, C, D, G

Intervention Success Indicators
Patients experience improved coping behavior and strategies. Unit G
Patients experience improved levels of distress + psychosocial functioning. Unit G
Patients feel more strongly connected to the natural world and experience greater appreciation of nature in their everyday lives + environments. Unit G, F
The setting is compatible with and supportive of the goals and procedures of the NBT protocol. Unit F, A
The setting is perceived as clinically + experientially appropriate by the patients. Unit F
NBT is feasible within resources of cancer care contexts (OEs). Unit H, G, F
NBT increases access to cancer care services. Unit H
Phase 2: Exploratory Trial

**Pragmatic Randomized Wait-list controlled Trial**

**Inclusion/Exclusion criteria**

1. 18 years of age or older
2. Speak and read English sufficiently to complete questionnaires
3. Women and men who have been diagnosed with any type of cancer, at any time in the past with no restriction on tumor site
4. Pre or post primary cancer treatment, up to having completed primary cancer treatment within the last 36 months (relating to group (3) Survivorship)
5. Sufficiently distressed (caution YAVIS bias)
6. Presence of major self-reported psychiatric disorder not in remission, current substance abuse/dependence, and psychotic symptoms
7. Reported heart condition (affect on physiological measurement instruments) *(if including HRV-measures)*
8. Reported respiratory condition such as asthma (affect on physiological measurement instruments) *(if including HRV-measures)*
9. Smoker *(if including HRV-measures)*

**Instruments Examples**

**Psych**

- Stress: Calgary Symptom of Stress Inventory (C-SOSI)
- 56-item of cog. behav. physiol. Symptoms of stress [12]
- Mood: POMS
- 65-item of pos. + neg. moods [12]
- Distress: Distress Thermometer (DT)
- Analog scale visual [13]
Fatigue/Pain: Fatigue + Pain Thermometer (FT/PT)
Numerical Rating Scale [13]
Use of psycho-social resources: 1 question yes/no
Mindful Attention Awareness Scale (MAAS)
15-item Likert-Scale [12]
Post Traumatic Growth Inventory (PTGI)
21-item Likert-Scale [8]
Social Support: Medical Outcome Study Social Support Survey (MOS-SSS)
19-item [14]
Active Coping Strategies: Ways of Coping Inventory by Lazarus (PTGI)

Caregivers
Caregiver Quality of Life Index-Cancer (CQOL-C) [15]
Caregiver Demand Scale (CDS) [15]
Brief COPE used in stress research, 28-item [15]

Nature-Connectedness
Connection to Nature Scale (CNS)
14-item [16] [17]
Nature Relatedness (NR)
3 sub-scales, affective, cognitive, experiential, 21-item [16]

Proposed Timeframe for NH Intervention Development and Evaluation

References


Appendix 21 Registration of Literature Review at International Prospective Register of Systematic Reviews (PROSPERO)

Documentation of registration of the systematic literature review, which included submission of study details and its search protocol. Database searches showed that the available literature (qualitative) did not meeting criteria for registration. Registration (CRD42014015291) was withdrawn in February 2016. Details of registration and withdrawal are included in this appendix.
Review title and timescale

1. Review title
   Give the working title of the review. This must be in English. Ideally it should state succinctly the interventions or exposures being reviewed and the associated health or social problem being addressed in the review.
   A Narrative Review of the physical, psycho-social and spiritual effects of 'Experiencing Nature' in populations affected by cancer

2. Original language title
   For reviews in languages other than English, this field should be used to enter the title in the language of the review. This will be displayed together with the English language title.

3. Anticipated or actual start date
   Give the date when the systematic review commenced, or is expected to commence.
   01/11/2014

4. Anticipated completion date
   Give the date by which the review is expected to be completed.
   01/02/2015

5. Stage of review at time of this submission
   Indicate the stage of progress of the review by ticking the relevant boxes. Reviews that have progressed beyond the point of completing data extraction at the time of initial registration are not eligible for inclusion in PROSPERO. This field should be updated when any amendments are made to a published record.
   The review has not yet started

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<th>Started</th>
<th>Completed</th>
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<tbody>
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<td>Preliminary searches</td>
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<td>No</td>
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<tr>
<td>Piloting of the study selection process</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Formal screening of search results against eligibility criteria</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Data extraction</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Risk of bias (quality) assessment</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Data analysis</td>
<td>No</td>
<td>No</td>
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</tbody>
</table>

   Provide any other relevant information about the stage of the review here.
   The formal screening has not been completed yet. I am seeking collaborators in order to take a dual-reviewer approach.

Review team details

6. Named contact
   The named contact acts as the guarantor for the accuracy of the information presented in the register record.
   Sarah-May Blaschke

7. Named contact email
   Enter the electronic mail address of the named contact.
   sblaschke@student.unimelb.edu.au

8. Named contact address
   Enter the full postal address for the named contact.
   18 Jacka Street Essendon 2040 VIC Australia

9. Named contact phone number
   Enter the telephone number for the named contact, including international dialing code.
   0434914185

10. Organisational affiliation of the review
Full title of the organisational affiliations for this review, and website address if available. This field may be completed as 'None' if the review is not affiliated to any organisation.

The University of Melbourne

Review team members and their organisational affiliations
Give the title, first name and last name of all members of the team working directly on the review. Give the organisational affiliations of each member of the review team.

<table>
<thead>
<tr>
<th>Title</th>
<th>First name</th>
<th>Last name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ms</td>
<td>Sarah-May</td>
<td>Blaschke</td>
<td>The University of Melbourne</td>
</tr>
</tbody>
</table>

Funding sources/sponsors
Give details of the individuals, organizations, groups or other legal entities who take responsibility for initiating, managing, sponsoring and/or financing the review. Any unique identification numbers assigned to the review by the individuals or bodies listed should be included.

The University of Melbourne, Australian Postgraduate Award (APA)

Conflicts of interest
List any conditions that could lead to actual or perceived undue influence on judgements concerning the main topic investigated in the review.

Are there any actual or potential conflicts of interest?
None known

Collaborators
Give the name, affiliation and role of any individuals or organisations who are working on the review but who are not listed as review team members.

<table>
<thead>
<tr>
<th>Title</th>
<th>First name</th>
<th>Last name</th>
<th>Organisation details</th>
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Review methods

Review question(s)
State the question(s) to be addressed / review objectives. Please complete a separate box for each question.

- Which parameters are used in the findings to report the physio-psycho-social and spiritual effects of contact with nature?
- What is the significance of the findings?
- Which research design characterizes the included studies?
- What were the research trends over the past two decades?

Searches
Give details of the sources to be searched, and any restrictions (e.g. language or publication period). The full search strategy is not required, but may be supplied as a link or attachment.

MEDLINE: MeSH (Medical Subject Headings) terms, title, abstract
COCHRANE: Title, abstract, keywords
EMBASE: No Limiters
SCOPUS: Article Title, Abstract, Keywords
CINAHL: No Limiters
PsycINFO: No Limiters

URL to search strategy
If you have one, give the link to your search strategy here. Alternatively you can e-mail this to PROSPERO and we will store and link to it.

http://www.crd.york.ac.uk/PROSPEROFILES/15291_STRATEGY_20141103.pdf

I give permission for this file to be made publicly available
No

Condition or domain being studied
Give a short description of the disease, condition or healthcare domain being studied. This could include health and wellbeing outcomes.

Psycho-social burden of cancer disease, self-care and coping strategies for patients and caregivers

19 Participants/population

Give summary criteria for the participants or populations being studied by the review. The preferred format includes details of both inclusion and exclusion criteria.

Primarily relating to populations affected by cancer: (i) across the lifespan (ii) without restrictions to cancer site (iii) any point in the cancer trajectory (iv) including survivorship (v) and including caretakers and staff. In the case of insufficient findings, the inclusion criteria will broaden to populations with ill-health as defined in the attached search protocol.

20 Intervention(s), exposure(s)

Give full and clear descriptions of the nature of the interventions or the exposures to be reviewed

Interventions include: (i) Horticultural therapy or therapeutic horticulture (ii) nature-based or nature-assisted therapies (iii) virtual simulation including audio exposure to nature imagery and sound (iv) views to nature including views from a window and viewing nature art (v) camping and wilderness experience if set within a clinical framework and structured intervention program aimed at a clinical population (vi) can be either individual or group interventions

Excluded: (i) ‘natural therapies’ such as aroma therapy, natural diets and medicinal herbs and exercise protocols (ii) interventions aimed at ecological perspectives, sustainability and environmental behavior (iii) community well-being and social development (iv) environment and crime (v) contact with animals and animal-assisted therapy.

21 Comparator(s)/control

Where relevant, give details of the alternatives against which the main subject/topic of the review will be compared (e.g. another intervention or a non-exposed control group).

Can include but not restricted to: (i) control groups: care as usual or no intervention (ii) comparison groups can include any psycho-social, physical activity, self-care, nurses-led, peer-support and creative arts interventions

22 Types of study to be included initially

Give details of the study designs to be included in the review. If there are no restrictions on the types of study design eligible for inclusion, this should be stated.

Studies of the following types are considered: (i) Systematic reviews and meta-analyses (ii) Empirical studies including observational studies (iii) Published in peer-reviewed journal articles (iv) Full text available in English or German language (v) Investigation of effects of nature contact in healthcare contexts by measuring at least one physio-psycho-social or spiritual outcome. Excluded: (i) Case studies (ii) post occupancy evaluations (POEs) (iii) self reports (iv) studies containing merely descriptions of interventions and environmental features or design guidelines, but with no empirical data on a defined study population (v) studies on non-clinical populations not receiving any form of healthcare such as ‘older populations’, ‘inmates’, ‘children’ or ‘adolescents’ nor those reporting only recreational (leisure) activities on a general population.

23 Context

Give summary details of the setting and other relevant characteristics which help define the inclusion or exclusion criteria.

For this review the term healthcare environment is used as an umbrella term to describe any setting in which the patient receives clinical care or partakes in a planned health intervention. Hence, it includes hospitals, private clinics, day centres, residential homes, sites of structured outdoor interventions and the patient’s own home. Of special interest are studies about cancer patients’ home environments considering this is where the majority of cancer patients wish to be.

24 Primary outcome(s)

Give the most important outcomes.

Physical and psychological outcomes (including cognition and attention parameters) (i) physical stress indicators (ii) psychological stress and mood indicators (iii) cognition and attention indicators

Give information on timing and effect measures, as appropriate.

Repeated time measure, pre-post testing (i) physical: salivary cortisol, heart or pulse rate, HRV, blood pressure, pain and fatigue thermometers (ii) psychological: self-rated questionnaires such as POMS, SOSI and stress thermometers (iii) cognition and attention: such as memory (computerised) tasks

25 Secondary outcomes
List any additional outcomes that will be addressed. If there are no secondary outcomes enter None.

(i) Social integration, social behaviour, social adjustment (ii) and spiritual coping behaviour, meaning seeking

Give information on timing and effect measures, as appropriate.

Primarily but not restricted to: longitudinal data, repeated, long-term follow up (i) Social: Open or closed questionnaires, Behaviour observation/mapping, clinical staff notes (ii) Spiritual: Open or closed questionnaires, interview data

26 Data extraction, (selection and coding)
Give the procedure for selecting studies for the review and extracting data, including the number of researchers involved and how discrepancies will be resolved. List the data to be extracted.

1. Existing Reviews have been identified through google scholar, expert consultation and snowballing. 16 have been identified relating to two core topics (i) 10 reviews health outcomes of 'nature experience' (ii) 6 reviews about 'healthcare environmental factors and design'. 2. The bibliographies of these 16 reviews have been merged and scanned for relevant titles and further snowballing within the selected articles. 3. Online database search with described keywords + protocol (see more details in attached .pdf) 4. Consultation with colleagues and librarian has already yielded 7 titles possible for inclusion, further consultation are possible 5. All titles and online search hits were screened at title level. If there were any uncertainties about a) study participants b) context of setting c) outcome measures d) study design, the study was included to be reviewed at abstract level 5. Studies included after screening at Abstract level were aggregated and will now be sourced at full-text. If full-text not available, enquiries will be made with authors if possible, if still not available study will be excluded. 6. All searches and data extraction will be firstly done by the the one reviewer registered. All searches will be recorded and archived and presented in accessible and understandable format to make cross-checking possible. Following lists will be generated in Microsoft word. ALA reference formatting of all titles and how the article was sourced will be clearly stated. Sources will be identified as (a) Existing Reviews Bibliographies (b) Registered scientific database searches (c) Other online database searches (d) Snowballing and Referrals by consultation (e) Grey Literature for snowballing Following Lists will be generated: (i) Articles included at Title Level (ii) Articles included at Abstract Level (iii) List of excluded articles at Abstract level with justification for exclusion (iv) List of Duplicates (v) List of Articles excluded at Full-text Level with justification for excluded (vi) List of all titles matching inclusion criteria (vii)Summary of all above mentioned lists (search hits and sources) Data extraction in spreadsheet in Microsoft word consisting of these 9 headings: Author and Date, Intervention, Risk of bias, Country, Study Design, Population, Setting, Health Domains, Endpoints/Instruments

27 Risk of bias (quality) assessment
State whether and how risk of bias will be assessed, how the quality of individual studies will be assessed, and whether and how this will influence the planned synthesis.

A dual-reviewer approach will be attempted for inter-rater reliability but at this stage it is still unclear if and who the second authors will be. The risk of bias assessment will follow the GRADE guidelines (www.gradeworkinggroup.com) for RCTs and observational studies (separate assessment according to GRADE) that matches the inclusion criteria. The risks will be reported in the spreadsheet and are intended to be included in the publication. The narrative reporting for each health dimension will pay attention to any risks when reporting on individual studies where risk was identified.

28 Strategy for data synthesis
Give the planned general approach to be used, for example whether the data to be used will be aggregate or at the level of individual participants, and whether a quantitative or narrative (descriptive) synthesis is planned. Where appropriate a brief outline of analytic approach should be given.

Narrative synthesis of findings relating to each outcome: physical, psychological, social and spiritual. Quantity and quality (strength) of evidence will be reported for each domain.

29 Analysis of subgroups or subsets
Give any planned exploration of subgroups or subsets within the review. 'None planned' is a valid response if no subgroup analyses are planned.

None planned

Review general information

30 Type of review
Select the type of review from the drop down list.

Intervention, Service_Delivery

31 Language
Select the language(s) in which the review is being written and will be made available, from the drop down list. Use the control key to select more than one language.
English

Will a summary/abstract be made available in English?

32 Country
Select the country in which the review is being carried out from the drop down list. For multi-national collaborations select all the countries involved. Use the control key to select more than one country.
Australia

33 Other registration details
List places where the systematic review title or protocol is registered (such as with the Campbell Collaboration, or The Joanna Briggs Institute). The name of the organisation and any unique identification number assigned to the review by that organization should be included.

34 Reference and/or URL for published protocol
Give the citation for the published protocol, if there is one.
Give the link to the published protocol, if there is one. This may be to an external site or to a protocol deposited with CRD in pdf format.

I give permission for this file to be made publicly available
No

35 Dissemination plans
Give brief details of plans for communicating essential messages from the review to the appropriate audiences.
I intend to publish this paper as part of my PhD thesis (thesis by publication)

Do you intend to publish the review on completion? Yes

36 Keywords
Give words or phrases that best describe the review. (One word per box, create a new box for each term)
Cancer
psycho-oncology
intervention
nature-assisted
narrative

37 Details of any existing review of the same topic by the same authors
Give details of earlier versions of the systematic review if an update of an existing review is being registered, including full bibliographic reference if possible.
none

38 Current review status
Review status should be updated when the review is completed and when it is published.
Ongoing

39 Any additional information
Provide any further information the review team consider relevant to the registration of the review.
I am registering this under one single author, however it is intended to have at least 2 or 3 authors in total. The
reason for this is that it is very early stage of my phd and I have just had a change of faculty and therefore it is not clear yet who could have interest in collaborating.

40 Details of final report/publication(s)
This field should be left empty until details of the completed review are available.
Give the full citation for the final report or publication of the systematic review.
Give the URL where available.
Dear Ms Blaschke

Thank you for submitting details of your systematic review *A narrative review of the physical, psycho-social and spiritual effects of nature experience in populations affected by cancer* to the PROSPERO register. We are pleased to confirm that the record has been published on the database.

Your registration number is: CRD42014015291

You are free to update the record at any time, all submitted changes will be displayed as the latest version with previous versions available to public view. Please also give brief details of the key changes in the Revision notes facility. You can log in to PROSPERO and access your records at http://www.crd.york.ac.uk/PROSPERO

An email reminder will be sent to you on the anticipated completion date, prompting you to update the record.

Comments and feedback on your experience of registering with PROSPERO are welcome at crd-register@york.ac.uk

Best wishes for the successful completion of your review.

Yours sincerely

Jimmy Christie

PROSPERO Administrator
Centre for Reviews and Dissemination
University of York
York YO10 5DD
t: +44 (0) 1904 321040
f: +44 (0) 1904 321041
e: CRD-register@york.ac.uk
www.york.ac.uk/inst/crd

CRD is part of the National Institute for Health Research and is a department of the University of York.

Email disclaimer: http://www.york.ac.uk/docs/disclaimer/email.htm
Dear Ms Blaschke

Thank you for updating this record CRD42014015291 on the PROSPERO register and for letting us know that your review has been abandoned.

Your record will remain permanently on PROSPERO and the reason for abandonment will be recorded.

Comments and feedback on your experience of working with PROSPERO are welcome at crd-register@york.ac.uk

Yours sincerely

Jimmy Christie

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www.york.ac.uk/inst/crd

PROSPERO is funded by the National Institute for Health Research and produced by CRD, an academic department of the University of York.

Email disclaimer: http://www.york.ac.uk/docs/disclaimer/email.htm
Appendix 22 BMC Review Letters and Author Response

Documentation of peer-review process of the published paper included in Chapter 4. Response letter to reviewers who provided comments and feedback for the manuscript submitted to BMC Cancer. The manuscript reported on the Systematic Literature review and Meta-Synthesis (Chapter 4). The letter includes individual feedback received the author’s responses to the reviewers who finally approved publication of the manuscript.
Letter to BMC Editorial Office 01/11/2016

Response to Reviewer #1:

Summary:
This research article is of importance in its field. Coherent and sound research, well composed and presented, the article provides a contribution to the scholarly literature that warrants publication. There is most certainly a dearth of research in the subject of the role of nature interventions in health care and cancer patients' lives. The findings are particular to understanding the existing qualitative knowledge - with a systematic review of the literature and meta-synthesis. The findings invite those in research and practice to consider the role of nature interventions. Minor revisions will assist in a more focused exploration of aspects of the chosen methods, some reflection on the theoretical approach (in the background section), as well as discussion and recommendations that will provided more specific examples. Thank you for this contribution. I look forward to having this work in the literature!

Final peer review: Accept after minor revisions before being published (see specific review areas below).

RESPONSE: Thank you for these generous and encouraging words!

1. The research question (a review of the finding from qualitative literature role of nature in cancer patients' lives) is evident, however a clear statement of the theoretical basis of the larger study this review emanates from (the author's doctoral work) would add clarity about the study's purpose and framework. This doctoral work is mentioned in the Methods section (2.1) and I suggest that a description of the theoretical frame and mention of the larger doctoral work's perspective could fit in the Background section. This frame is not specifically attached to the review, but does shape the choices made and this warrants some explicit mention and connection to other choices in the discussion in relation to the literature etc.

RESPONSE: The point raised here, to describe the larger theoretical frame more fully, has now been addressed in the background section (please see pages 2-3, lines 50-54). We now describe the overall aim of the larger investigation explain how the meta-synthesis contributes to, and is situated within, this larger body of work.

2. Methods (Systematic Review and Meta-synthesis of qualitative research papers) are appropriate, thorough and very clearly described. Additionally, criteria for inclusion and review and synthesis are well described and sound. The review and meta-synthesis strategies are all clearly outlined and strong rationale is provided from the literature, some more discussion of the employment of primary data is warranted (see below).

Bias is noted in the limitation section with the description of 2nd level synthesis strategies of reviewing primary data from the reviewed articles. It would be helpful to list this as part of the decision-making to employ primary data in the methods section as well. As it stands the description of drawing from the original research participants' "own words" and "patient voice" aspects is not a complete picture of the choice of this approach to synthesis. Employing primary data is not usual, however is helpful to the synthesis strategy where there is a sole reviewer (such as the work reported in this paper) and this should be explained in the methods as well as the limitations.

RESPONSE: Thank you for pointing this out; we agree that 1) the issue of sole author bias and 2) the decision to prioritize primary data are not well linked between the different sections: Methods -> Discussion -> Limitations. The Methods and Limitations sections have been revised to deal more explicitly with the issue of reporting bias due to this being a sole researcher study. Please see Section 2.1., page 4, lines 83-86 for a more detailed statement about this being a sole researcher study. We have also picked this up in the Limitations section and elaborate on the mitigation strategies (pages 25-6, lines 352-364): “Firstly, it is clearly stated in the Methods section that this study represents a sole researcher study …”

In regards to the use of primary data, please see the more in-depth response below in 3. Discussion.
3. Discussion and conclusions are balanced, trustworthy and adequately supported by the data and literature. Limitations are discussed; however the incorporation of primary data from the reviewed studies (rather than reviewing the findings/results per usual meta-synthesis approach) could be expanded upon in the methods sections as well as in the discussion of limitations. As it stands, it is somewhat unclear in the methods section as to why primary data is drawn into the analysis apart from elucidating more of the "patients' voice" which is not the intention of a meta-synthesis, rather to synthesize the reviewed findings of the collection of previous work. 

RESPONSE:
Note on the nature of data used (primary data vs reviewed findings)
As explained in Section 2.4., all data presented as ‘results’ or ‘findings’ were extracted from the included studies. This included not only primary data from patients (participant’s own words) but also interpretative work (reviewed findings) presented by the individual authors as their findings. As stated in section 3.4., where possible primary data from patient contributions (e.g. direct quotes) were prioritized due to diverse language used amongst the different authors (some examples are given in Section 3.4). It is important to clarify that both, raw patient data and authors’ findings were included in this meta-synthesis. To better describe this process, some minor re-wording has been done to section 3.4., page 12, lines 35 – 37.

In response to your comments above, you identify correctly that primary data was not only used for purposes of elucidating the “patient voice” but to also (and primarily) to remain close to original contributions, which move through a process of abstraction during interpretative analysis (developing themes) before they are finally presented as ‘findings’. This study found that researchers used diverse language to describe similar patient experiences. In these instances, primary data was read and drawn into the analysis in order to understand and capture the underlying common experiences. Therefore, the synthesis presented here contains and reflects the reviewed findings and the primary data contained in the literature. Some minor rewording has been made to the Methods section to better explain this process:

- Please the following critical sentence added to Section 2.4., page 7, lines 172-3: “This included primary data (e.g. participant quotes) as well as authors’ interpretations (e.g. thematic description).”
- Section 2.5., page 8, lines 192-3: “Once the entire dataset was scrutinized (primary data and authors’ interpretations) and no more themes could be …”.

It might be useful to discuss the results - which remain in a highly abstracted form - in more practical terms in the discussion section. This would also lend to more specific recommendations for health promotion and intervention based upon the findings re) the role of nature in cancer patients' lives. Currently recommendations remain in abstract generalities (not applying general prescriptions for nature, different questions of patients, listening carefully, delivering care)…describe more of how these interventions can specifically take place and why - as informed by the results, reflect on some of the facilitators and barriers from the literature). Overall, more specific details in the implications and recommendations will be helpful.

RESPONSE: It is relevant to inform you, at this stage, that the doctoral study progressed to investigating practical applications of the insights gained from this review. We agree that the synthesis raised its findings to a high level of abstraction during the thematic analysis. The aim here was to formulate new theoretical representations of the material. While the primary aim of this paper was theoretical, you raise an important concern about its applicability, which would be helped with more specific practical examples or recommendations. We have revised Section 4.1. (Practical Implications) to incorporate a more practical perspective, however we kept this minimal knowing that a study to specifically address the practical application of these findings is underway. Please refer to pages 24-5, lines 323-333.

4. Limitations are well stated. As mentioned above however, a fuller description of the bias of having a sole reviewer/analyst will strengthen this section, and assist in explaining the methods (and the somewhat unusual incorporation of primary data - vs. adhering to findings/results review and analysis) more clearly.

RESPONSE: The Limitations section, last paragraph, initially contained some explanation of potential bias emanating from work undertaken by a sole researcher; however, the concern you raise is important and some minor changes have been made to this paragraph (please see page 25-6, lines 352-364), which now states more clearly a potential sole author bias and elaborates on the mitigation strategies (now also mentioning that sole researcher bias is declared in the Methods section).

I hope these suggestions are helpful and believe these minor changes will strengthen the clarity and later practical application/use of this important work.
Thank you for your time to review this manuscript. We hope you find the revisions and responses relevant and sufficient, and that the paper has improved in strength and clarity based on the comments you provided.

Response to Reviewer #2:
The purpose of this systematic review and qualitative meta-synthesis is to "identify, compare and synthesize the published qualitative literature" regarding the role of nature in cancer patients' lives. This is a timely and relevant topic of inquiry giving growing interest and momentum on the associations between exposure to nature and natural environments and one's health.

The authors are to be commended on their adherence to a rigorous, systematic and transparent approach and research methodology. Thematic areas that were identified were conceptually compelling, with direction applications for clinical implementation.

RESPONSE: Thank you for your kind summary. As mentioned in the response above (4.), we have revised section 4.1. (Practical Implications) to include more practical examples to improve the applicability of this review.

The two areas the authors may wish to consider modifying or providing further justification are the following:

1. Do the authors feel that this is actually a systematic review of the literature as the title implies? There's no doubt that this is a high quality meta-synthesis of select studies that met eligibility criteria, however this did not appear to systematically review major/relevant studies. If so, this would benefit from additional justification.

RESPONSE: Thank you for this interesting question. Yes, we do believe this study represents a systematic review (and a meta-synthesis across included studies). The body of existing research was systematically searched for relevant literature. The search and retrieval strategies involved carefully constructed search strings (as initially registered with PROSPERO), and the retrieved records were systematically evaluated and sorted against eligibility criteria. We believe we were able to retrieve the major studies, which match our specific topic (nature experiences, cancer context) and contained, at minimum, a qualitative data component. We purposefully excluded studies that do not focus on cancer populations, specifically. We are aware of many large studies that investigate topics of health-nature benefits for the general population or other patient groups (dementia, Alzheimer’s are prominent), however these did not match our inclusion criteria. We are also confident that our analytic procedures were systematic and that extraction and synthesis of data from the included study, and across studies, was done systematically as outlined in the methods section.

We are not entirely confident that we picked up on the exact issue raised in your comment, but we hope that our response addresses, at least in part, your concern. We apologize if our response was off-target. Please feel free to restate your question should we have missed your point!

2. The abstract states that a purpose is to compare the published qualitative literature, and there really doesn't appear to be any explicit comparisons.

RESPONSE: It is correct that this review did not aim to compare the individual studies. The analytic procedures used in this synthesis were to extract the existent data from the included studies (their ‘results’ and ‘findings’) and to synthesize these into new theoretical understanding of the topic at hand. Unlike quantitative meta-analyses where e.g. intervention outcomes can be compared etc., qualitative data does not provide a strong basis for comparisons. (where subjective experience is the focus). The nature of the included papers was purposefully qualitative to form the basis for a qualitative synthesis, which focuses more on the bringing together of common understanding rather than making strong comparisons. The Method section of the abstract explains that that “Qualitative data from ‘results’ and ‘findings’ sections were entered into data management software NVivo in order to identify recurring themes and facilitate interpretation across studies.” We hope this response is satisfactory and clarifies the analytic procedure.
Letter to Editorial Office

Editor Comments:

1. Please list the full names, institutional addresses and email addresses for all authors on the title page. The title page has now been added to the manuscript and contains the full author name, institutional addresses and details for correspondence.

2. Please include a list of abbreviations used in the manuscript before the Declarations section. List of abbreviations has been added before the Declarations section (please see pp. 27-28, lines 374-382).

3. Please revise the competing interests section of the Declarations. In this section all financial and non-financial competing interests must be declared. If you do not have any competing interests, please state "The authors declare that they have no competing interests" in this section. This statement has been updated stating: 'The author declares no competing interests' (please see p. 28, line 391).

4. Every manuscript must contain an 'Author contributions' subsection within the Declarations section. The individual contributions of each author to the manuscript should be specified in this section. When preparing this section, please use initials instead of full names. The sentence "All authors have read and approved the final version of this manuscript" should also be included. Author contribution statement has been added: 'SB designed the search protocol; retrieved and assessed all included literature; extracted and analyzed relevant data and wrote the manuscript. The author has read and approved the final version of this manuscript' (please see p. 28, lines 392-394).

5. In the Funding section, please indicate the role of the funding body in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript. Role of the funding body has been added: 'The funding body had no role in the design of the study; collection, analysis, and interpretation of data and writing of the manuscript' (please see p.28, lines 389-390).

6. At this stage, please upload your manuscript as a single, final, clean version that does not contain any tracked changes, comments, highlights, strikethroughs or text in different colours. All relevant tables and figures should also be clean versions. A cleaned version has been uploaded.
We look forward to receiving your revised manuscript and please do not hesitate to contact us if you have any questions.

Best wishes,

Kimberly Marston on behalf of,
Catherine Rice
BMC Cancer
https://bmccancer.biomedcentral.com/

Editor Comments:
1. Please list the full names, institutional addresses and email addresses for all authors on the title page.

2. Please include a list of abbreviations used in the manuscript before the Declarations section.

3. Please revise the competing interests section of the Declarations. In this section all financial and non-financial competing interests must be declared. If you do not have any competing interests, please state "The authors declare that they have no competing interests" in this section.

4. Every manuscript must contain an 'Author contributions' subsection within the Declarations section. The individual contributions of each author to the manuscript should be specified in this section. When preparing this section, please use initials instead of full names. The sentence "All authors have read and approved the final version of this manuscript" should also be included.

5. In the Funding section, please indicate the role of the funding body in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript.

6. At this stage, please upload your manuscript as a single, final, clean version that does not contain any tracked changes, comments, highlights, strikethroughs or text in different colours. All relevant tables and figures should also be clean versions.

BMC Cancer operates a policy of open peer review, which means that you will be able to see the names of the reviewers who provided the reports via the online peer review system. We encourage you to also view the reports there, via the action links on the left-hand side of the page, to see the names of the reviewers.

Reviewer reports:
Justin Brown (Reviewer 3): This is one of the most interesting manuscripts I have read in a long time. It is well written, thoughtful, and comprehensive.

The author has been responsive to the first two reviewers. In my opinion the author has adequately addressed all reviewer comments. Reviewer 2 questioned the extent to which the search was systematic, but did not cite an article that was omitted that would have fulfilled the inclusion criteria. The systematic search criteria are provided in a detailed appendix, appear reproducible, and I have not seen any evidence that would make me think the search was not conducted in a systematic fashion.

Justin C. Brown
Dana-Farber Cancer Institute
Harvard Medical School
Appendix 23 HERD Review Letter and Author Response 1

Documentation of the peer-review process of the published paper included in Chapter 6. Response letter to reviewers who provided comments and feedback for the manuscript submitted to HERD Health Environments Research & Design. The manuscript reported on findings from the Patient-Reported Recommendation study (Chapter 6). The letter includes individual feedback received and the authors’ responses to the reviewers who finally approved publication of the manuscript.
Author Response to Reviewers:

Reviewer: 1

Literature review not quite adequate. It needs to include discussion of other research on the reaction of subjects to real and fake plants. Although the current paper is not directly doing such a comparison, consideration of this comparable research is relevant and should be included. Thank you for pointing this out; it is an important element lacking in the paper. We have expanded the literature review to include findings from various contexts (including non-healthcare) and, in particular, added reference to studies that looked at the effects of both real and artificial nature contact (Boukeboom 2012; Largo-Wight 2011).

In Table 1 it is not clear if the male and female ages recorded are averages. The table has been updated to show: Age (mean years) and numbers in brackets report standard deviation (SD).

It would be good to include a photo of the waiting room without plants so the reader can get an idea of the overall setting. Thank you for this suggestion. We decided however not to include a before photo as this was not focus of the research and we would like to keep focus on the waiting room post intervention, which the study reports on.

Otherwise, an interesting and relevant study since there may well be other windowless spaces that would benefit from a similar intervention. Thank you!

Reviewer: 2

Environmental design and intervention in healthcare setting important area of study.

Introduction

Intro is clear and concise.

But, I believe the introduction could be improved with a more comprehensive review of the literature. There are findings comparing the impact of artificial plants vs live plants in an office setting (Largo-Wight, Chen, Dodd, & Weiler, 2011), for example, that could enhance the rationale and background for this study in a healthcare setting. These findings showing a history of this examination would strengthen the review of literature. Thank you for this suggestion. We agree that connecting to this literature, even if pertaining to non-healthcare contexts, will add a stronger rationale for testing the effects of artificial nature. We have extended the introduction to include other literature realms and outline existing knowledge of real versus artificial nature contact. We have also expanded on the example originally included
(Boukeboom) that shows the effects of real versus artificial nature exposure in a radiology waiting room.

Because this area of research is emerging, it is important to review the similar and related findings in other settings (schools, workplace, homes) and relate that to current study’s context. We have included a greater range of literature at the start of the Introduction to outline relevant findings from other contexts.

Methods

In general, methods need much improvement in writing style. Authors should expand writing and further explain. Many sentences read like short hand with / etc. Example: “More than 1000 cancer outpatients are examined/treated weekly.” We have worked on improving the writing style. Many sentences have been elaborated to reduce the original ‘short had’ style.
- Also, remember to write out numbers under 10. “6 item subjective green features” Here, we have hyphenated the 6-item subjective green feature assessment.
- Reword and expand: “A purpose-built questionnaire was developed comprising: demographic characteristics (age, caring role, place of residence and frequency of outpatient visits); 6 item subjective green features assessment, with each item assessed using a visual analogue scale (100 mm), e.g., unattractive - attractive; 5-point Likert scale assessing first reaction, effect whilst waiting and nature preferences; and an open-ended question for further comments.” We have elaborated on the components of the questionnaire to fill in some more explanation.
- Reword. Confusing. What is first author? Break this into 4-5 sentences and expand: “Following cognitive testing (Collins, 2003) with five patients and modification of the items to improve clarity, the questionnaire was placed in the waiting room between 3 May and 2 July, 2015 next to a visibly marked return box. Participation was voluntary and completed questionnaires were collected weekly by “blinded for peer review” (first author). HERD requested this formatting: “blinded for peer review” (first author) in order to blind the reviewers from the identity of the first author. In the final publication, it will state, in brackets, the initials of the first author.
We have described the cognitive testing procedure in more detail and hope you find it now more clearly presented as to which steps were taken to pilot the questionnaire.

And what about the instrument? Did authors test questionnaire? Is that what is meant by “cognitive testing (Collins, 2003)”? Is the instrument valid and reliable? Did authors assess reliability (test-retest coefficient? Internal consistency with alpha?)? Did authors assess validity (content validity with expert panel? Or construct validity with PCA or similar?)? The development and testing of the questionnaire needs to fully explained.
As above, we followed a cognitive testing protocol with patients in the waiting room and followed the procedures recommended by Collins (2003). We hope that the rewording of this section will make this aspect of our research clearer. (See page ..., paragraph ....). Validity and reliability of the questionnaire were not tested due to time constraints. The design initiative (green features re-design) presented an unexpected opportunity to incorporate a research component and collect response data. Unfortunately, there was only scope to pilot-test the questionnaire with patients in the waiting room and not enough notice to further refine and test the instrument. We have expanded the limitations section to explain this aspect of the research more fully.

Results

Descriptive analysis offer very limited insight. Authors may consider future studies that include analyses of environment (or perception of environment) related to something else (e.g., self reported stress, pain perception, comfort, etc). These correlations provide much more context and information than descriptive data alone. Thank you for this suggestion. We would have also preferred to expand the research with other assessment tools and validated measures. However, as explained above, the nature of the research was opportunistic and presented challenges to design and implement the data collection on short notice. Spelling and writing issues ("per cent") throughout. Same writing style concerns described in methods. We alternate between % and per cent as well as numerals and spelling out numbers throughout the paper for the following reason: when the number and per cent is stated at the beginning of a sentence it is spelled out, mid-sentence it is expressed in numerals and symbols.

Discussion

“A waiting room with windows and views of live plants or other aesthetic features may be preferable to artificial plant features.” (again, as in the literature review, cite other literature that has examined these comparisons in other settings to support these statements). In the Introduction we how have described limited research available on the effects of different plant feature materials specifically used in oncology waiting rooms and how it remains unclear how much or what type of nature contact produces best outcomes (see page 2). In the Limitations and Future Research section we now add “Further research is warranted to study whether a waiting room with windows and views of live plants or other aesthetic features may be preferable to artificial plant features.” (see page 10, paragraph 3) Many serious limitations not mentioned: 1) the questionnaire (validity and reliability) and 2) descriptive “analysis” only. The limitations section has been expanded and these limitations are now discussed.
Reviewer: 3

Comments to the Author
This is a very valuable and intriguing piece of research. It’s practical application to the potential improvement of user satisfaction with medical real estate at comparative little capital cost is significant. The research method and findings are robust but I would suggest the following to further refine and improve the paper:
Thank you for these comments!

1. Check to ensure consistency in presentation of data and findings throughout the paper: e.g. In the “Abstract”, page 2 of 16 lines 40 to 43 it is stated, “82 % (110/135) agreed/strongly agreed that, ‘The greenery brightens the waiting room’”, but in “Results”, page 7 of 16 lines 30 to 35 it is stated, “The statement, “The greenery brightens the waiting room” produced the strongest positive response with 81 % (110/135) either agreeing or strongly agreeing.” This maybe a rounding error but notwithstanding, consistent figures need to be used throughout the paper. All data in the paper needs to be carefully checked for consistent and correct expression throughout.
Thank you for pointing this out, it has been corrected.

2. In some parts of the paper results are expressed in varying formats: “Seventy-one per cent (101/143)”; others “19 % (27)”; and yet others just “11%”. It would be best to adopt a consistent format for expression throughout the paper.
We alternate between % and per cent as well as numerals and spelling out numbers throughout the paper for the following reason: when the number and per cent is stated at the beginning of a sentence it is spelled out, mid-sentence it is expressed in numerals and symbols.

3. On page 9 of 16 at line 27/28 I could not seem to correlate the “(11%)” quoted with the data presented in Table 2 on Page 14 of 16.
This refers to the percentage of respondents who provided open-ended comments (not Table 2). This has been reworded and clarified in the Discussion section.

4. If possible it would be good to see where each of the plant installations shown in Figure 2 on page 17 of 16 are located on the waiting room layout shown in Figure 1 on page 16 of 16.
Thank you for this suggestion. We agree that this could add interest, however, we are not able to retrospectively chart the exact locations of the intervention components because we are not able to re-visit the original set-up. We will keep your suggestion in mind if we conduct similar studies.

5. On page 5 of 16 line 14/15 shown as “(Sanson_Fisher et al., 2000)” should be “(Sanson & Fisher et al., 2000)”. This has been changed to Sanson-Fisher et al., 2000: the first author’s name is hyphenated.
With these few refinements, I believe the author/s will have a paper that makes a
significant contribution to our body of knowledge.
Thank you for your kind words!

Please let me suggest some related matters they might like to explore in
advancing their research in future papers on the phenomenology of place and
how the evocation of our five senses creates the enduring value of real estate.
This future research could include the precise quality and placement of artificial
plant installations within space to create an enhanced sense of place and user
satisfaction. Whilst taste is not a sense that is usually evoked in medical waiting
rooms, the other four senses are and along with the plant installations are
impacted inter alia by air quality, temperature, pleasing smell (some hospitals
now scent their air conditioning systems with the smell of fresh linen, akin to
hotels) and the controlled moisture content in the air.
Thank you for these further reflections, we will take them onboard in our
future work!
Appendix 24 Waiting Room Survey Summary for Staff

One-page summary of results presented to staff at Peter MacCallum Cancer Center who worked in various administrative and clinical roles during the nature-based intervention study that implemented design changes to the oncology waiting room. Summary of results was distributed by the Specialist Clinic Nurse Manager.
The demand for new healthcare facilities and renovating old ones must pay attention to shifting patient values that increasingly prioritize patient experience and quality of life. Design of these environments must be driven by professional responsibility and consider how the design affects users’ well-being and the quality of care provided in and through these environments. Matiu Bush, the specialist clinic nurse manager at Peter MacCallum Cancer Centre, has made the clinic and waiting room environment a priority in delivering highest quality care. A series of environmental interventions are being tested, which aim at improving patient experience; one is the Green Features Intervention. The purpose of this initiative was to transform the waiting room into a place that reminds of a ‘living room’, imbuing a colorful sense of life and home-like qualities. The successful outcome was confirmed by positive feedback received from patients, staff and carers.

Objective. To investigate patient, staff and visitor’s responses to an environmental intervention using life-like plant features and installations in an oncology clinic waiting room and describe its impact on waiting experience and the work environment. Methods. Anonymous questionnaire–survey distributed in the clinic waiting room between 3 May to 2 July 2015. Questionnaire testing with 5 patients (cognitive testing) followed by data collection from a convenience sample of 143 cancer patients, staff and carers. Design. The questionnaire comprised 10 questions including: demographic information, closed-ended questions about first reactions and opinions, differential scale to rate 6 paired descriptors relating to the green features, 5-point Likert scale to rate 8 statements about nature preferences and perceived effects, 1 open-ended question for further comments. Results. Total sample (n=143) consisted of 73 patients, 13 staff, 52 carers and 5 ‘other’. Of 97 female respondents (68%), 80 reported noticing the green features when first entering the waiting room. Of 45 male respondents (32%), 23 reported to like the green features and 11 reported to like them a lot. 141 answered the question about how the intervention affected them, 48% reported to be positively affected and 23% were very positively affected. 134 responded to the question if they immediately noticed that the plants were not real, 90 respondents noticed and 44 did not notice. The statement “The greenery brightens the waiting room” elicited the strongest positive response with 110 out of 135 either agreeing or strongly agreeing. Interestingly, 80 out of 130 agreed / strongly agreed that they prefer living plants. However, 101 out of 133 agreed / strongly agreed that “life-like plants are better than no plants”. Conclusions. Although the green features evoked varied responses about not being real plants, the intervention was overall described as a positive change to the waiting experience and working environment. Considering health & safety restrictions of the clinical setting, which prohibit any organic matter to be brought into the waiting room, the life-like green features were successful in providing an alternative solution to real plants and injected a sense of life, colour and vibrancy into the waiting room. Some concerns were raised about the plants fading, collecting dust and appearing static over time. Comments described benefits such as lifting the mood, providing good distraction, reducing anxiety and promoting conversation.
Appendix 25 HERD Review Letter and Author Response 2

Documentation of the peer-review process of the published paper included in Chapter 7. Response letter to reviewers who provided comments and feedback for the manuscript submitted to HERD Health Environments Research & Design. The manuscript reported on findings from the Cross-Section Survey study (Chapter 7). The letter includes individual feedback received and the authors’ responses to the reviewers who finally approved publication of the manuscript.
Author response to Reviewer: 1

Comments to the Author
The paper as it stands is valuable and has much to offer. My only recommendations are to provide greater detail in the results section. I think the author(s) are relying too heavily on the table to demonstrate results. I think the table should critically analyzed and discussed as part of the results section. I also think that all of the sections between Results and Conclusions should be synthesized into one section titled discussion. As it stands I believe the paper loses cohesiveness with all of the sub headings. These latter section do not need more information, just integrate them into a thoughtful discussion.

Thank you for this feedback. We have considered your suggestion and have consolidated the various sections in the Discussion. We hope you find these elements are now more integrated.

Regarding integration of the results table, we have considered Reviewer 2’s comment about expanding the Practical implications and, in response, we have revised this section to better connect with findings in Table 3.

Author response to Reviewer: 2

Comments to the Author
Generally speaking, your paper is well-written and has few technical issues. While I appreciate your editing and attention to detail, in its present state this paper lacks a practical voice and evidence of a solid foundation of understanding the oncology care setting. I think this paper can be more useful for those seeking advice for designing oncology care settings if you thoroughly address several points of concern outlined below:

1. Background & Review of Existing Research
Your review of existing evidence felt a little light and did not speak to the oncology setting in enough detail. Elaborate on some of the studies you cited showing how natural elements in oncology care settings can be beneficial. In other words, connect more to your oncology practitioner audience. Make a case for the need for this that is specific to them (and not simply generalized from its applicability to other healthcare settings--that content is helpful and fine, but it needs to connect with the context this paper is about). Also--"nature-based care" is used a couple of times. This reads sort of strange, like it is an actual treatment technique. I would make sure your phrasing shows you are talking about design/setting and not treatment alternatives.

Thank you for pointing this out. We agree that a better connection can be established with the oncology readership by elaborating on relevant examples. We have revised the Introduction section based on your comments and describe the existing literature in more detail. Please see pages 3 – 4 where we briefly describe the relevant findings of the individual studies we reference.

In regards to the term “nature-based care.” We agree that this may be too suggestive of a treatment modality and have changed phrasing in following instances:

“The rationale was to generate translatable knowledge for nature-based enhancements of the care settings” and “Findings generated a theory model (see Table 1) explaining the ways in
which cancer patients engage with nature (Authors blinded for review, 2016). Study 2, presented here, aimed to examine cancer patients’ recommendations for nature-based experiences in their cancer care” (page 5, paragraph 1).

Further, we have also changed the title and running title accordingly:

**Title:** Cancer patients' recommendations for nature-based design and engagement in oncology contexts: qualitative research

**Running title:** Nature engagement in oncology contexts

2. Your sample

   Why did you choose to stop at 20 patients? How did you select them (the practical thoughts, not the technical approach)? Did you consider their staging or what type of treatment they were receiving (e.g. chemo, radiation therapy, surgery or a combination thereof)--this affects their experience of symptoms, length and frequency of treatment, etc. and may influence how they want to interact with any natural design features. Did you consider their baseline (are they typically a "nature" person or not)? Did you consider that the majority of your sample residing in major cities may bias their responses about preferences for "nature" in their care setting? Did you know if any of the patients interviewed were neutropenic or not (neutropenia is very common with certain types of cancer patients and would heavily influence whether or not they could be exposed to living things like plants and animals)?

   I had all these questions and more as I read your paper. Oncology patients are diverse in their experience of symptoms and may have very different experiences depending on the method of treatment. I do not see evidence that this was considered at all in your paper (at the very least it would be nice to see the method of treatment in your demographics table). If you can speak to some of the unique concerns and experiences of the oncology patient a bit more it would make your paper more credible and practical for your oncology readership.

   Your questions regarding the participant sample show that more description is needed. We have now included more information about our patient sample in the Sampling and Data Collection section as well as in Table 2. Participant Demographics. We also describe the sampling process that resulted in 20 interviews. Data was considered saturated at interview 18 when material became repetitive. Two more interviews were conducted, which confirmed that data was saturated. (page 6).

   In regards to neutropenia. None of the participating patients described themselves as neutropenic at the time of interview, however, some were aware of the risks of being exposed to natural elements (mostly soil was mentioned) when at risk of infection (some patients did know and use the term neutropenic in these instances). Their input on this issue was captured and is reflected in Table 3 in the Caution section under “Safety”.

3. Methods

   Why did you choose interviewing only as your method? Why only two questions? Did you consider combining with a survey tool? The interview method you chose did not seem to glean information about the patients normal preferences for nature (when they are not sick) which would be very important as a basis for understanding why they answered the way they did with respect to an oncology care setting. Also, how did you educate your interviewees on
your definition of "nature"? Did you give examples? While reading, I felt that I needed to know your sample a bit better to be able to put their recommendations into context.

Interviewing was chosen because the study set out to collect in-depth understanding of patients’ use of nature. This was deemed appropriate based on very limited available literature and understanding at the time of designing the study.

A quantitative survey could potentially follow-up on this study’s findings to check their applicability across different cancer care sites and a greater sample of cancer patients. As you indicate above: questions, for example, around differences in urban vs rural patients could be further explored with a survey. As a first phase, this study aimed to collect qualitative data only. We have added this as a recommendation for future research in the Discussion section (page 11)

We have also included more information about our data collection procedures for this study and expanded the Methods section to better describe the interview schedule used. In regards to “normal preferences for nature”, we now describe the interview schedule in some more detail, which included asking patients about their own nature definition as a starting point for the interview and a question around patients’ use of nature before and after diagnosis. Please find following addition on page 6: “First, participants were asked to freely describe their own definition of nature followed by questions about their use of nature before and after diagnosis. Subsequent questions asked about specific nature experiences at the time of receiving a cancer diagnosis, and about how patients engage with nature during hospital visits and when receiving cancer treatment.”

4. Practical Recommendations
Your practical recommendations section did not read as very "practical" to me. Perhaps you could revise it to include more concrete examples of what oncology care settings could consider including in their designs. A table might be sufficient. It would also be useful to see what some "natural" elements could be that are more sensitive to the patients' need to control their level of interaction with the "nature" as appropriate (to accommodate the different preferences and safety concerns). More discussion and examples would be very useful to the reader hoping to implement practical design ideas.

Thank you for this feedback and we agree that including more practical examples would be helpful. Together with Reviewer 1’s suggestion about consolidating the Discussion section (please see above), we have restructured this section to make it more cohesive. We have separated the theoretical discussion from the Practical implications and expanded on the practical examples given by participants (pages 14 - 15). We hope this will improve the applicability of our findings for readers wishing to implement nature-based elements into oncology settings.

Overall, I think this is an important topic for research to explore, and that oncology centers would be interested in hearing design recommendations. The patient involvement is particularly encouraging. Thank you for exploring the application of natural elements in oncology care. I hope you will take my comments as a challenge to improve this paper for the audience of interest (assuming oncology leaders and practitioners that may choose to renovate or build a new facility).
Thank you for your encouragement and generous comments.

Author response to Reviewer: 3

Comments to the Author
This is a very useful synthesis of pre-requisite qualitative research on the role nature can play in the treatment of cancer patients, "which affirm and enhance a sense of momentary aliveness in the face of despondency" (lines 23 to 26 on page 12 of the manuscript as submitted for review).

A structured qualitative research method is essential in research that seeks to distill and provide insights from patients with potentially terminal at worst, and significantly fear inducing, at best, medical conditions. The authors capture this critical point well when they state, "Patients consistently emphasized their highly individualized interchanges with healthcare environments and submitted compelling reason for responsive design that allows for scaling levels of engagement and, importantly, disengagement according to patients' momentary and shifting needs.", (lines 3 to 11 on page 13 of the manuscript as submitted for review).

The phenomenology of place and its role in determining human mood, outlook, and attitude of mind is a fertile area of research, and accordingly I agree with the authors' statement, "Future research is needed to determine the best solutions for translating patients' nature recommendations into practice and to evaluate its impact.", (lines 26 to 31 on page 13 of the manuscript as submitted for review). The three pre-determined categories "Features"; "Functions"; and "Cautions" have been well conceptualized and provide a strong foundation for future research that is likely to have significant practical application to human well-being and medical treatment.

The article is generally very well written but in parts tends to be a little verbose and overworks the vocabulary in an attempt to enhance its academic value and pedigree -- eg. Lines 14 to 37 on page 7 of the manuscript as submitted for review. Frankly, using simple, clear, and concise language is, to my mind, always preferable. On line 56 of page 1 of the manuscript as submitted for review, the word "maximal" was chosen when "maximum" would have provided clarity of meaning.

Thank you for this feedback about our writing style. In response, we have simplified the language in our Discussion section and hope this section more clear and succinct. We have also considered the instance you point out where we used “maximal” and revised this to state “optimal”.

In the "References" at line 34/35 on page 17 of the manuscript as submitted for review, Roger Ulrich's initial has been inadvertently not included--this needs to be corrected.
This has now been corrected.

Co-Editor's Comments:

- On p. 6, what does "constrained or unconstrained" mean? Please define in one sentence. We have added further description in the Data analysis section to explain the difference between constrained and unconstrained matrices. Please refer to page 7.
- On p. 10, you should define the "Caution" terms for readers, since these could be interpreted in many different ways.

We have edited this section to state “Participants identified eight aspects related to nature engagement in the cancer setting, which they considered with caution in order to avoid any adverse experiences (page 10).”

We have also changed the word “caution” to “cautionary advice” and hope this communicates more clearly that this information relates to patients’ advice for avoiding possible risk factors and adverse experiences related to nature.

- Please add more information about your methods for interviews. What were the two open-ended questions? And it sounded like you asked other open-ended questions but are focusing on two for this paper. If so, how many were there altogether? How did you go about asking them? What was the process for response? In general, more background and context for this qualitative research is important.

Please see response to Reviewer 2 above who raised the same concern. We have now expanded our Methods section and provide more information about the interview schedule and process used for this study.

- With Table 3, it is clear that some aspects got only one or two responses, and some got responses from almost all of the participants. It would be helpful for each response to list each number (rather than, for example, 6-10) so that the reader can get a quick idea of how many participants listed that aspect. Or alternatively, you could list the number of participants.

We agree, this is a very useful addition to the table. Please find the table edited to include number of informants for each category.

The rest of my comments are purely technical:

1. Please use the serial comma/Oxford comma throughout.

   We revised our use of serial comma throughout the manuscript.

2. Implications for Practice should be more direct and specific--if design or healthcare practitioner reads this article but doesn't know much about the subject, what are the main "takeaways" that will help them implement your findings into practice?

   Please refer to our response to Reviewer 2 regarding edits to the Practical implications section. We have revised these “takeaways” alongside rewriting the Practical implications section in the manuscript and hope you find these now more practical and applicable for the design and oncology readership.

3. I noticed some "typos" in the manuscript including missing words, incorrect punctuation, and so on. Please pay close attention as you re-read and revise.
We have done another close reading to correct typos.

Please keep in mind that the page limit, including References (but not including figures, tables, exec summary, abstract, or implications for practice) is 20 pages.
Appendix 26 Delphi Questionnaires 1 - 4

Questionnaires 1 – 4 purposefully designed for the e-Delphi study reported in Chapter 8. Questionnaires reflect the step-wise item development process and subsequent evaluation procedure, which resulted in a list of expert nature-based recommendations ranked of highest importance.
Thank you for agreeing to participate in this study.

The purpose of this questionnaire is to brainstorm and capture as many factors as possible that you think affect the provision of opportunities to engage with nature in healthcare. The aim is to gain insight into the perceptions and opinions of a range of experts about important factors when considering nature elements in cancer care setting and service design.

This questionnaire contains 2 sections and will take approximately 15 minutes to complete.

Section A includes a summary of cancer patients’ anonymized nature-related recommendations and cautions. Section B asks you to list your ideas for nature engagement opportunities and barriers to their provision.

Please read the instructions for each section carefully and be sure to answer all questions. Please complete the questionnaire as soon as possible and return to the sender’s email address: Sarah.Blaschke@petermac.org

All feedback given to the panel based on the information you provide will remain strictly anonymous. All personally identifiable information will be removed and stored separately from your Section B responses.

If you have any questions about filling in this questionnaire please don’t hesitate to get in touch.

Thank you for your time and contribution.

Contact:
Sarah Blaschke
Email: Sarah.Blaschke@petermac.org
Tel: +61 3 9656 3645 | Tel after 14 June 2016: +61 3 8559 5904
Questionnaire 1 Instructions

Please fill in your demographic information and contact details below. Your name, contact phone number, and e-mail address will be stored separately and will remain strictly anonymous. Your professional role description, years served, and country of professional residence will be presented to the panel in the next rounds along with your Section B items.

After filling in your details, please take a few minutes to familiarize yourself with the information presented in Section A. This will provide you with an overview of cancer patients’ reported recommendations for nature engagement based on their own experiences. These were extracted from previous investigations that explored cancer patients’ use of nature (article submitted).

The purpose of the Table is to assist you in brainstorming ideas in Section B. You are not required to spend a lot of time reading about patients’ recommendations, unless you wish to.

This study uses following definition of nature: "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".

Please proceed to Section B whenever you are ready to write down your ideas. [please do not circulate]

Demographic information and contact details

<table>
<thead>
<tr>
<th>Name: [type here]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact phone number:</td>
</tr>
<tr>
<td>E-mail address:</td>
</tr>
<tr>
<td>Description of professional role:</td>
</tr>
<tr>
<td>Years served in field of expertise:</td>
</tr>
<tr>
<td>Country of professional residence/affiliation:</td>
</tr>
<tr>
<td>Type</td>
</tr>
<tr>
<td>------</td>
</tr>
</tbody>
</table>
| Recommendation  
‘elements’ | Watching small animals; bird calls; fish are very peaceful; my dog … level of company and contact |
| Animals | Colours … different greens; opened up; like a glasshouse window; open windows; an outdoor space inside; big windows; open view; nature objects; sculpted sort of area; more comfortable seating; green walls; backrest; pot plants; a hospital in the park; not so ‘pretty’ but attractive; artificial plants, very good ones; glass walls; etched scenes; access arrangements for … various disabilities; covering over the top; bit more cheery; accessible; fake plants … relieve the stark atmosphere; fish tanks; greened up |
| Design features (excluding water) | Paintings … with wildlife; not tight scripted; beautiful big pictures … paintings of flowers; posters of different scenes; a tree … easy to think about; just normal, ordinary, lovely flowers |
| Nature art | [Nature] better than looking out on buildings; nice outlook; prefer just to sit and look out of the window; views are actually critical; against the window … part of therapy; treetop level; view on the real world; moonlight; mind off of what is actually happening; something of interest to look at; looking at the sky often |
| Views | Peace and tranquility of sitting by a river; running water does it; nice place for me would be water; watch water lapping over; serenity; lakes and rivers or streams are restorative visual aids; running water … gives people a better feel; space with little or no … work [maintenance] |
| Water | Looked like you had [pictures of] trees over you [during MRI]; music … a video or documentary; set up so … look out the window; look out onto a garden consumed by it; a living garden; feel the nature; feel the fresh air; breathe in deeper; aroma; everything grows, everything keeps going; pleasant environment; fresh air; greenery; a sunny day; smell the fresh air; plants give off oxygen; invigorated; contentment; more freedom; sort of therapy; in the park … I’m independent; a pause in the garden; soothing, nurturing, renewing thing; live and cycle; see the passage of time; touchstone; regardless of your religious background; reconstitute my place in the world; normalizing and emotional processing; peace and surrender; something there with you; on their feet; self-reliant as quickly as possible; own space; seeing something grow; another living being |
| Recommendation  
‘functions’ | Videos; DVDs; gardening magazines; volunteers; guide dog; butterfly enclosure; elements of real life … into the hospital; experiential activity; “Go and do it! Be part of it!”; time that you got up and out!; wheel people out |
<p>| During clinical procedures | Part of the holistic treatment process; flowers … available for people; stop the boredom … ease a lot of the problems in the wards; psychological preparation … for clinical path; this can work with them [medical staff] … as part of the process |
| Engagement (sensory and inner) | Breakfast outside; [when] wasn’t on Chemo … always go outside; being in nature; get up and go for walk; walking around … seeing what is flowering; picking flowers; go and sit in the garden; walk out to the front door |
| Events, entertainment, and activities | Visual perception or stimulus; help occupy the mind; admiration and positive thoughts; association with life; an app … rainy sound … ‘ocean’ and the ‘forest’; app with the rain; nice to reflect and think; eases your attention; get some perspective |
| Healthcare service integration | Flowers … engaged medical practitioners; different context for conversations and connections; space with other patients or professionals; working together in a garden; activities; get the communication going; patients and their … carers have somewhere; have access; easier to chat; bit of the outside world; talk to people; things that you want to say between yourselves [privacy] |
| Physical activity | Mental activities, techniques | Social opportunities |</p>
<table>
<thead>
<tr>
<th>Caucus</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allergies</td>
<td>pollens or seeding grasses, plantain; upset some people; toxic kind of plants; allergy aspect … can weaken the immune system</td>
</tr>
<tr>
<td>Appropriateness</td>
<td>[artificial plants] find them deathly … tokenistic; [modern garden design] so unnatural that it doesn’t really fulfill that peaceful respite quality; a big show;</td>
</tr>
<tr>
<td>Healthcare investment</td>
<td>[gardening] not in the hospital context … with neutropenia; [artificial plants] a little bit cheated?; [artificial plants] defeating the purpose of this being part of nature; wouldn't have a vastly fake turf; these places can start to look … pretty ordinary; wasn't very pleasant … sitting on cold concrete; don't feel nice when you're sitting next to a plastic plants; cost more than real plants</td>
</tr>
<tr>
<td>Negative trigger</td>
<td>maintained in pristine condition; cost and time; nurses should not be wasted; just be an adjunct; dollar … has to be spent, where it is going to help most; can't lose sight; any spare money … into treatment and cure; availability of space</td>
</tr>
<tr>
<td>Not valued / not interested</td>
<td>certain plants or flowers … trigger … memories for people; experience across their lifetime; tiny tinge of regret … those things that you don't do … not exposed to anymore; want to be part of it because you are lying in bed … longing to be part of it</td>
</tr>
<tr>
<td>Overwhelm</td>
<td>feel that pain come on you start to panic … time to get back to the hospital; hospital is definitely your safe haven; [animals] too much for me when I’m sick; get some shade … out of the wind … just be a bit physically overwhelming; if you are unwell, stay in bed</td>
</tr>
<tr>
<td>Safety</td>
<td>slipped on the floor when it was wet; mosquitos; bees; cuts and scratches when I’m gardening; soil bacteria and molds and fungi; reduced immunity; bacteria … subjected to that anyway; snakes; insects; small creatures; safety would be paramount … a lot of them are frail</td>
</tr>
<tr>
<td>Sensory overstimulation</td>
<td>In-your-face; needs to be thought out carefully; avoid any overpowering scents; paintings … complex worlds … requires a certain level of energy to engage; don't want to look at weird things [abstract art]</td>
</tr>
</tbody>
</table>
Section B Item generation

1. List at least six items or more, relevant to your expertise, describing design features, applications, initiatives, or care practices related to nature engagement, which healthcare and design practitioners could feasibly implement within the cancer care context. These could reflect your novel ideas or aspects from the Table.

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Item description</th>
<th>Briefly explain why you consider this item important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[type here]</td>
<td>[type here]</td>
</tr>
<tr>
<td>2</td>
<td></td>
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<td>3</td>
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<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. List at least six or more important barriers or factors that you believe affect the provision of nature opportunities in cancer care contexts. These could include, for example, physical, psychosocial, economic, or political factors.

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Item description</th>
<th>Briefly explain why you consider this item important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[type here]</td>
<td>[type here]</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Identifying opportunities for nature engagement in cancer care practice and design: a Delphi study

Questionnaire 2: Verification of items

Instruction:

This questionnaire presents a categorized listing of all items collected in Questionnaire 1. The list is sorted in alphabetical order. **You are only required to read and consider the items highlighted in blue.** These specific items were generated with your input. Please use the check boxes in the verification column to indicate whether you agree with the interpretation of your ideas or if you would like a revision. You are also able to make further comments, if you wish.

For quick access, please find your Questionnaire 1 material copied at the end of the table.

The aim of this round is to ensure we have correctly interpreted and represented your ideas in the summary statement.

*Look-ahead: In the next round you will be introduced to the panel (field of expertise, years in profession, and residence, your personal identity will remain anonymous) and you will be asked to select your top-10 items (of greatest importance in your opinion).*
## What Enables OPPORTUNITIES for Nature Engagement?

<table>
<thead>
<tr>
<th>Items</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accessibility. To enable access to nature engagement</strong></td>
<td></td>
</tr>
<tr>
<td>1 Accessible outdoor settings, gardens and courtyards: Easy and effortless access, automized doors, nearby, high visibility, close proximity to clinical assistance, remove barriers and thresholds, available for patients, carers and staff</td>
<td></td>
</tr>
<tr>
<td>2 Affordable access to nature-based activities, incentives for participation as health promotion strategy</td>
<td></td>
</tr>
<tr>
<td>3 Clear and welcoming wayfinding, signage, promotion and messaging (online, word of mouth) to raise awareness</td>
<td></td>
</tr>
<tr>
<td>4 Design and configuration of seating arrangements: Ergonomic, safe, movable (light but sturdy), at least 50% of seating with back and arm rests, cushions where possible, options to rest and lie down (chaise longues)</td>
<td></td>
</tr>
</tbody>
</table>

| Clinical appropriateness and safety. To enable clinically appropriate and safe nature engagement | |
| 1 Accessible, clinically appropriate indoor nature features and settings: Conservatories, atria, balconies, green walls, vertical gardens, water walls, various nature-based art and displays | |
| 2 Appropriate safety measures and surface materials for limited mobility: Handrails, smooth paved paths, ramps rather than steps, handrails | |

| Design. To enable optimal multisensorial connection with nature | |
| 1 Design concepts: Exploration and discovery, welcoming and familiar, home-like, pleasant and professional | |
| 2 Design for flexibility (engagement and disengagement): Adjustable seating arrangements (solitary, small groups, large groups), choice of walking paths, light and shade conditions | |
| 3 Design for privacy: Zoning, screening, semi-enclosed spaces, restful, contemplative and solitary spaces, outdoor spaces shielded from inside views, separate but nearby spaces for staff to retreat (away from patients and workplace) | |
| 4 Design principles: Appropriate use of textures (soft - hard surfaces), scale (vastness - enclosure), light (shade), sufficient plant materials and colours (including flowers and trees), soft- / hardscape ratio (suggested ratio 70:30) | |
| 5 Indoor design to maximize use of biophilic elements: Natural materials, natural colours, air flow (including windows that open), and natural light | |
| 6 Nature-based art and visual elements in clinical spaces: Artwork, posters, mobiles, screen images, sculpture, decals, ornamental, features, displays, nature colours (walls) | |
| 7 Memorizing and dedication capacity (legacy work): Benches, tree planting, remembrance wall, ceremony | |
| 8 Outdoor treatment spaces such as waiting and recovery areas | |
| 9 Prioritize living plants indoors and outdoors, especially flowers and living nature materials (minimize artificial plants) | |
| 10 Protection from adverse weather conditions (sun, shade, high/low temperatures) and unpleasant stimulation (overpowering scents, noise, loud sounds, toxic plants, clutter) | |
| 11 Water features: moving running water, fountain, sound of water masking treatment sounds, water wall | |
| 12 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 | |

| Education and awareness. To enable the context for nature engagement | |
| 1 Educate healthcare team, management, patients, designers, policy- and decision makers about value, benefits, and appropriate implementation of nature-based opportunities | |
| 2 Patient education using nature such narrated nature walks informing about medicinal use of plants, healthy eating, motivating positive health behaviour and physical exercise | |
| 3 Policies in the healthcare setting to encourage use of onsite nature-based facilities: Volunteer services, staff awareness, information campaigns | |
### Physical exercise, sensory stimulation, aesthetic experience

1. Incorporate varying levels of sensory stimulation according to patient needs and limitations: balance of scented / unscented, coloured and edible flowering and foliage plants, textural and tactile materials (feet in grass, sand), seasonal change, running water, warming fire, breeze (smell, feel), oxygen rich, sunlight, fragrant nature objects (pine, eucalyptus).

2. Physical exercise adapted to patient requirements: stroll garden, walking paths with points of interest (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, labyrinth.

### Potential nature-based activities

1. Activities tailored to male patients: Forest activities, "shed and tools".

2. Availability to purchase flowers onsite (shop).

3. Creative activities: Drawing, art therapy, leaf prints, themes on seasons.

4. Distraction and sound masking techniques during clinical treatment and procedures: Videos, nature sound recordings (water, breeze, rain, birds), virtual reality, Ipads, projection screens, mental activities.

5. Interaction with animals: bird feeders, fish tanks, contact with patients’ own pets, native wildlife, fishpond, attract native birds and butterflies, therapy dogs.

6. Legacy work: Memorializing, ceremony, ritual in nature or using nature materials.

7. Nature-based programs: Gardening indoors and outdoors, interactive group activities, horticultural therapy, social and therapeutic horticulture, vegetable gardening for older patients, psychosocial interventions in natural settings (mindfulness).

8. Socializing: Range of seating options, gathering and communal spaces, BBQ area, children play areas, semi-private enclosures for personal conversations.

9. Solitary activities for stillness, contemplation and meaning-making.

### Repair and maintenance

1. Design proposal needs to address repair and maintenance requirements of nature-based features within available maintenance budgets (easy to maintain).

2. Design team to provide User and Maintenance Manual to preserve integrity of design intent (what the design aims to achieve).

3. Non-toxic, sustainable maintenance practices: harvested and recycled materials, no chemical pesticides and fertilizers used on plants, integrated pest management, avoid the use of fossil-fuel consuming machinery.

### What are B A R R I E R S to Nature Engagement?

#### Building and site constraints

1. Building design and site constraints, missed opportunities: Layout, building orientation, surrounding views, lack of available space were not considered.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Champion unavailable</strong>&lt;br&gt;Champion (advocate) needed</td>
</tr>
<tr>
<td>2</td>
<td><strong>Cost and lack of resources</strong>&lt;br&gt;Cost and resource allocation: cost for routine repair and maintenance, staff and volunteer time, acquiring indoor equipment (screens, virtual reality, A/V), lack of funding, often based on fundraising and grants</td>
</tr>
<tr>
<td>3</td>
<td>Requires professional training in nature therapy / horticultural therapy for effective implementation</td>
</tr>
<tr>
<td>4</td>
<td>Implementation of successful nature-based programs takes time to develop (change of practice)</td>
</tr>
<tr>
<td>5</td>
<td>Short growing seasons in some countries limit use of nature spaces (not enough return on investment)</td>
</tr>
<tr>
<td></td>
<td><strong>Inaccessibility</strong>&lt;br&gt;Inaccessibility: Heavy, locked doors, barriers, thresholds, insufficient wayfinding and signage, insufficient seating, co-opted as smoking areas, access for the very sick and frail not considered</td>
</tr>
<tr>
<td>2</td>
<td>No clear wayfinding and signage for outdoor spaces</td>
</tr>
<tr>
<td></td>
<td>Lack of privacy: Patients are prohibited if no semi-secluded, private spaces available</td>
</tr>
<tr>
<td></td>
<td><strong>Inadequate knowledge and lack of awareness about existing knowledge</strong>&lt;br&gt;Decision makers, management and administration often lack knowledge and/or awareness about benefits of nature engagement</td>
</tr>
<tr>
<td>2</td>
<td>Designers: Lack of awareness about existing evidence (value and benefit) and available design guidelines</td>
</tr>
<tr>
<td>3</td>
<td>Designers: Lack of training to deliver effective and appropriate design solutions</td>
</tr>
<tr>
<td>4</td>
<td>Healthcare staff: Lack of education about appropriate use of nature-based opportunities and what their benefits are</td>
</tr>
<tr>
<td>5</td>
<td>Lack of access and/or acceptance of existing evidence (across healthcare and design disciplines)</td>
</tr>
<tr>
<td>6</td>
<td>No organisational understanding and support for nature-based initiatives</td>
</tr>
<tr>
<td>7</td>
<td>Not prioritized in construction and development phase of healthcare projects</td>
</tr>
<tr>
<td>8</td>
<td>Patients are not informed (educated) about the range of benefits</td>
</tr>
<tr>
<td>9</td>
<td>Prevailing healthcare model requires more evidence (convincing economic justification) to warrant inclusion of nature-based opportunities (only ‘soft’ evidence available)</td>
</tr>
<tr>
<td></td>
<td><strong>Inappropriate design choices and execution</strong></td>
</tr>
</tbody>
</table>

Comment:
- Accept
- Revise

---

**Limited availability of outdoor spaces (dense urban areas)**

**Refurbishments constraints: Existing facilities can present limited options for adaptations and design solutions**
| Abstract or ambiguous nature-based art and displays can cause negative reactions (tiring, demanding, confusing) |
| 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 |
| Inauthenticity of nature-based design elements: fake plants, fake scents, tokenistic, corporate design (“cutting edge” award seeking designs) |
| Poor design solutions to protect from adverse weather conditions |

**Incompatible with current healthcare paradigm**

| Mainstream values (decision makers) don't prioritize nature-based opportunities |
| Perception of reduced clinical standards and investment in primary care: portraying a place as “less expert” |

**Individual preferences - one “design” doesn’t fit all**

| Different aesthetic sensibilities: cultural, age, gender, socioeconomic, personal preferences, some people don't value nature as much |

**Negative trigger**

| Nature experiences can trigger fear, negative memories, personal trauma and loss for patients, carers and family; nature may become associated with, and become a reminder of, unwelcomed cancer experiences |

**Patient burden, limitations, and underutilization**

| Lack of consistency in providing nature-based opportunities and services (patient expectations not meet) |
| Limited use of, and need for, nature-based opportunities in acute healthcare settings |
| Maintenance should not be handled by patients, nature engagement should be focused on therapeutic outcomes |
| Patients have limited capacity to engage when too unwell, frail, or bedbound |

**Patient perspective not included**

| Healthcare facilities design bases on clinical functionality and efficiency not necessarily the patient perspective |
| "Prescription" of nature-based activities can undermine patients' wish for choice |

**Risk and safety**

| Adverse reactions and increased sensitivity due to treatment: Skin sensitivity, chemical sensitivity (artificial fragrances), photosensitivity, smell (strong flower fragrance), noise |
| Difficult weather conditions |
| Risk of infection: Reduced immunity, bacteria, allergies, pollen and pathogens, animals and indoor plants, fungal spores in soil, bacterial growth in water, stinging insects |
| Risk of vandalism and loitering in outdoor spaces |
## Opportunities

<table>
<thead>
<tr>
<th>Item description</th>
<th>Briefly explain why you consider this item important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Horticultural Therapy</td>
<td>Incorporating Horticultural Therapists in patients care plans where they are using the garden and garden activities as the tool for the therapy</td>
</tr>
<tr>
<td>2  Social and Therapeutic Horticulture</td>
<td>Have garden activity programs available for patients to attend as they feel able</td>
</tr>
<tr>
<td>3  Attract native wildlife</td>
<td>Include plants that attract the native birds, butterflies and frogs into garden areas</td>
</tr>
<tr>
<td>4  Bring in animals</td>
<td>Include spaces to bring in animals e.g fishponds, chicken coop, patients’ visiting dogs, pet therapy</td>
</tr>
<tr>
<td>5  Art Therapy</td>
<td>Enable art therapy to be undertaken outdoors or using elements from the hospital gardens</td>
</tr>
<tr>
<td>6  Sensory stimulation</td>
<td>Include a range of elements that awaken the senses e.g coloured plants, textured barks, textural materials, seasonal change, running water, scented plants</td>
</tr>
<tr>
<td>7  Socialisation</td>
<td>Incorporate a range of seating options and large and small gathering spaces to enable a patient to choose where they sit and if they want to spend time with a family group or just one person</td>
</tr>
</tbody>
</table>

## Barriers

<table>
<thead>
<tr>
<th>Item description</th>
<th>Briefly explain why you consider this item important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Location of the gardens</td>
<td>If no one knows where they are or they aren’t signposted then no one will use them. Gardens need to be put on the hospital maps so people know where they are and how to get to them</td>
</tr>
<tr>
<td>2  Closed views into the garden</td>
<td>If patients and families can’t see into the garden and can’t see what to expect then they won’t venture in</td>
</tr>
<tr>
<td>3  Lack of shade</td>
<td>Medication creates sensitivity to sun and so patients won’t go out if they aren’t able to be in the shade</td>
</tr>
<tr>
<td>4  Lack of privacy</td>
<td>Often patients feel self conscious. If there isn’t an option of semi-secluded, private spaces then this will stop them going out</td>
</tr>
<tr>
<td>5  Organisational understanding and support</td>
<td>If the organisation does not have the value of the gardens and their benefits in their corporate vision then they will not be supported.</td>
</tr>
<tr>
<td>6  Staff understanding</td>
<td>If staff are not educated on what is in the garden and what can be used as a tool for health and wellbeing then they won’t encourage or bring patients outside</td>
</tr>
</tbody>
</table>
Identifying opportunities for nature engagement in cancer care practice and design: a Delphi study

Questionnaire 3: Top-10 selection

8th August 2016

This questionnaire presents two consolidated lists (Opportunities and Barriers) reflecting all items generated by the entire panel thus far and asks each expert to choose their top-10 items.

This round also introduces panellists’ demographics (identities remain anonymous), which allows you to look up the item originators. Please find the demographics table below.

The purpose of this questionnaire is to reduce the number of items according to their importance based on panellists’ judgment.

**Instruction:**

All items are listed alphabetically. Please indicate your top-ten items for each list (Opportunities and Barriers) separately by allocating “1” to the item of highest importance, “2” to your second ranked item, “3” to your third ranked item and so on. Please use the fillable boxes next to each item in the “Top-10” column. Select one item only for each of your ranks 1 – 10 i.e., you cannot assign “1” to two or more items.

Thank you for your time and continued participation in this study.
What Enables **OPPORTUNITIES** for Nature Engagement?

<table>
<thead>
<tr>
<th>Items</th>
<th>Item Originators</th>
<th>Top-10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Accessibility. To enable access to nature engagement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Accessible outdoor settings, gardens and courtyards: Easy and effortless access, automatized doors, nearby, some areas with high visibility, close proximity to clinical assistance, remove barriers and thresholds, available for patients, carers and staff</td>
<td>6, 10, 14, 15, 18, 21, 22, 23, 31, 35, 36</td>
<td></td>
</tr>
<tr>
<td>2 Affordable access to nature-based activities e.g., easily organized, affordable transportation</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3 Clear and welcoming wayfinding, signage, promotion and messaging (online, word of mouth) to raise awareness</td>
<td>1, 36</td>
<td></td>
</tr>
<tr>
<td>4 Design and configuration of seating arrangements: Ergonomic, safe, movable (light but sturdy), if possible, all seating with back and arm rests, cushions where possible, options to rest and lie down (e.g., chaise longues)</td>
<td>1, 10, 18, 19, 29, 36</td>
<td></td>
</tr>
<tr>
<td>5 Incentives for participation as health promotion strategy, incentives for training and engagement of caregivers</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>B. Clinical appropriateness and safety. To enable clinically appropriate and safe nature engagement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Accessible, clinically appropriate indoor nature features and settings: Conservatories, atria, balconies, green walls, vertical gardens, water walls, various nature-based art and displays</td>
<td>8, 19, 21, 35</td>
<td></td>
</tr>
<tr>
<td>2 Appropriate safety measures and surface materials for limited mobility: Handrails, smooth paved paths, ramps rather than steps, colour contrasting curbing along pathways</td>
<td>1, 19</td>
<td></td>
</tr>
<tr>
<td><strong>C. Design. To enable optimal multi-sensorial connection with nature</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Design concepts: Exploration and discovery, welcoming and familiar, home-like, pleasant and professional</td>
<td>10, 14, 35</td>
<td></td>
</tr>
<tr>
<td>2 Design for flexibility (engagement and disengagement): Adjustable seating arrangements (solitary, small groups, large groups), choice of walking paths, light and shade conditions</td>
<td>4, 35, 36</td>
<td></td>
</tr>
<tr>
<td>3 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)</td>
<td>1, 7, 10, 12, 14, 18, 21, 31, 36</td>
<td></td>
</tr>
<tr>
<td>4 Design principles: Appropriate use of textures (soft - hard surfaces), scale (vastness - enclosure), light (shade), sufficient plant materials and colours (including flowers and trees), soft- / hardscape ratio (suggested ratio 70:30), variety (simplicity – complexity)</td>
<td>14, 16, 19, 21, 33, 35</td>
<td></td>
</tr>
<tr>
<td>5 Indoor design to maximize use of biophilic elements: Natural materials, natural colours, air flow (including windows that open safely), and natural light</td>
<td>24, 12, 5, 11, 17, 8, 21, 23, 26, 36, 38</td>
<td></td>
</tr>
<tr>
<td>6 Nature-based art and visual elements in clinical spaces: Artwork, posters, mobiles, screen images, sculpture, decals, ornamental, features, displays, nature colours and warm tones (walls)</td>
<td>6, 8, 9, 14, 15, 24, 26, 29, 34, 37, 38</td>
<td></td>
</tr>
<tr>
<td>7 Memorializing and dedication capacity (legacy work): Benches, tree planting, remembrance wall, ceremony</td>
<td>2, 22, 28</td>
<td></td>
</tr>
<tr>
<td>8 Outdoor treatment spaces such as waiting and recovery areas</td>
<td>2, 30</td>
<td></td>
</tr>
<tr>
<td>9 Prioritize living plants indoors and outdoors, especially flowers and living nature materials (minimize artificial plants)</td>
<td>4, 6, 11, 14, 20, 36</td>
<td></td>
</tr>
<tr>
<td>10 Protection from adverse weather conditions (sun, shade, high/low temperatures) and unpleasant stimulation (overpowering scents, noise, loud sounds, toxic plants, clutter)</td>
<td>7, 16, 18, 24, 31</td>
<td></td>
</tr>
<tr>
<td>11 Water features: moving running water, fountain, sound of water masking treatment sounds, water wall, views of water</td>
<td>7, 8, 11, 12, 23, 29, 35</td>
<td></td>
</tr>
<tr>
<td>12 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)</td>
<td>1, 3, 5, 6 10, 15, 17, 18, 22, 24, 25, 26, 27, 29, 33, 35, 36, 37</td>
<td></td>
</tr>
</tbody>
</table>
### D. Education and awareness. To enable the context for nature engagement

1. Educate healthcare team, management, patients, designers, policy- and decision makers about value, benefits, and appropriate implementation of nature-based opportunities

2. Patient education using nature such narrated nature walks informing about medicinal use of plants, healthy eating, motivating positive health behaviour and physical exercise

3. Policies in the healthcare setting to encourage use of onsite nature-based facilities: Volunteer services, staff awareness, information campaigns

### E. Physical exercise, sensory stimulation, aesthetic experience

1. Incorporate varying levels of sensory enrichment according to patient needs and limitations: balance of scented/unscented, coloured and edible flowering and foliage plants, textural and tactile materials (feet in grass, sand), seasonal change, running water, warming fire, breeze (smell, feel), oxygen rich, sunlight, fragrant nature objects (pine, eucalyptus)

2. 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

### F. Potential nature-based activities

1. Activities tailored to male patients: Forest activities, "shed and tools"

2. Availability to purchase flowers onsite (shop)

3. Creative activities: Drawing, art therapy, leaf prints, themes on seasons

4. Distraction and sound masking techniques during clinical treatment and procedures: Videos, nature sound recordings (water, breeze, rain, birds), virtual reality, iPads, projection screens, mental activities

5. Interaction with animals: integration of bird feeders and fish tanks into the overall design (not just add-ons), contact with patients' own pets, native wildlife, fishpond, attract native birds and butterflies, therapy dogs

6. Legacy work: Memorializing, ceremony, ritual in nature or using nature materials

7. Nature-based programs: Gardening indoors and outdoors, interactive group activities, horticultural therapy, social and therapeutic horticulture, vegetable gardening for older patients, psychosocial interventions in natural settings (mindfulness)

8. Socializing: Range of seating options, gathering and communal spaces, BBQ area, children play areas, semi-private enclosures for personal conversations

9. Solitary activities for stillness, contemplation and meaning-making (e.g., labyrinths)

### G. Repair and maintenance

1. Design proposal needs to address repair and maintenance requirements of nature-based features within available maintenance budgets (easy to maintain). Tasks to be carried out by skilled professionals

2. Design team to provide User and Maintenance Manual to preserve integrity of design intent (what the design aims to achieve) and ongoing care of planted elements

3. Non-toxic, sustainable maintenance practices: harvested and recycled materials, no chemical pesticides and fertilizers used on plants, integrated pest management, avoid the use of fossil-fuel consuming machinery
### What are Barriers to Nature Engagement?

<table>
<thead>
<tr>
<th><strong>A. Building and site constraints</strong></th>
<th><strong>Item Originators</strong></th>
<th><strong>Top-10</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Building design and site constraints, missed opportunities: Layout, building orientation, surrounding views, lack of available space were not considered in planning and development phase</td>
<td>8, 10, 13, 14, 15, 19, 21, 22, 24, 26, 27, 28, 35</td>
<td></td>
</tr>
<tr>
<td>2. Limited availability of outdoor spaces (dense urban areas)</td>
<td>7, 8, 33</td>
<td></td>
</tr>
<tr>
<td>3. Refurbishments constraints: Existing facilities can present limited options for adaptations and design solutions</td>
<td>2, 5, 24, 33</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>B. Champion unavailable</strong></th>
<th><strong>Item Originators</strong></th>
<th><strong>Top-10</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Champion (advocate) needed</td>
<td>2, 24</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>C. Cost and lack of resources</strong></th>
<th><strong>Item Originators</strong></th>
<th><strong>Top-10</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cost and resource allocation: cost for routine repair and maintenance, staff and volunteer time, acquiring indoor equipment (screens, virtual reality, A/V), lack of funding, often based on fundraising and grants</td>
<td>5, 6, 7, 8, 10, 11, 12, 14, 15, 16, 18, 19, 20, 21, 22, 26, 27, 28, 29, 30, 35, 37</td>
<td></td>
</tr>
<tr>
<td>2. Implementation of successful nature-based programs takes time to develop (change of practice)</td>
<td>2, 4</td>
<td></td>
</tr>
<tr>
<td>3. Requires professional training in nature therapy / horticultural therapy for effective implementation</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>4. Short growing seasons in some countries limit use of nature spaces (not enough return on investment)</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>D. Inaccessibility</strong></th>
<th><strong>Item Originators</strong></th>
<th><strong>Top-10</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 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</td>
<td>1, 7, 15, 19, 22, 25, 31, 36</td>
<td></td>
</tr>
<tr>
<td>2. Poorly located and difficult to find outdoor spaces, no clear wayfinding and signage for outdoor spaces</td>
<td>1, 7, 13, 31</td>
<td></td>
</tr>
<tr>
<td>3. Lack of privacy: Patients are prohibited if no semi-secluded, private spaces available</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>E. Inadequate knowledge and lack of awareness about existing knowledge</strong></th>
<th><strong>Item Originators</strong></th>
<th><strong>Top-10</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Decision makers, management and administration often lack knowledge and/or awareness about benefits of nature engagement</td>
<td>2, 3, 4, 5, 7, 11, 14, 18, 19, 27, 29, 30, 33</td>
<td></td>
</tr>
<tr>
<td>2. Designers: Lack of awareness about existing evidence (value and benefit) and available design guidelines</td>
<td>27, 30, 18</td>
<td></td>
</tr>
<tr>
<td>3. Designers: Lack of training to deliver effective and appropriate design solutions</td>
<td>18, 19</td>
<td></td>
</tr>
<tr>
<td>4. Healthcare staff: Lack of education about appropriate use of nature-based opportunities and what their benefits are</td>
<td>4, 13, 18, 27, 2, 19, 28, 38</td>
<td></td>
</tr>
<tr>
<td>5. Lack of access and/or acceptance of existing evidence (across healthcare and design disciplines)</td>
<td>6, 8, 14, 16, 19, 23, 30, 31</td>
<td></td>
</tr>
<tr>
<td>6. No organisational understanding and support for nature-based initiatives</td>
<td>13, 38</td>
<td></td>
</tr>
<tr>
<td>7. Not prioritized in construction and development phase of healthcare projects</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>8. Patients are not informed (educated) about the range of benefits</td>
<td>3, 28, 38</td>
<td></td>
</tr>
<tr>
<td>9. Prevailing healthcare model requires more evidence (convincing economic justification) to warrant inclusion of nature-based opportunities (only ‘soft’ evidence available)</td>
<td>3, 4, 5, 15, 18, 24</td>
<td></td>
</tr>
</tbody>
</table>
### F. Inappropriate design choices and execution

1. Abstract or ambiguous nature-based art and displays can cause negative reactions (tiring, demanding, confusing)

2. 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

3. Inauthenticity of nature-based design elements: fake plants, fake scents, tokenistic, corporate design (“cutting edge” award seeking designs)

4. Poor design solutions to protect from adverse weather conditions

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### G. Incompatible with current healthcare paradigm

1. Mainstream values (decision makers) don't prioritize nature-based opportunities or “design thinking”

2. Perception of reduced clinical standards and investment in primary care: portraying a place as “less expert”

---

### H. Individual preferences - one “design” doesn’t fit all

1. Different aesthetic sensibilities: cultural, age, gender, socioeconomic, personal preferences, some people don't value nature as much

---

### I. Negative trigger

1. Nature experiences can trigger fear, negative memories, personal trauma and loss for patients, carers and family; nature may become associated with, and become a reminder of, unwelcomed cancer experiences

---

### J. Patient burden, limitations, and underutilization

1. Lack of consistency in providing nature-based opportunities and services (patient expectations not meet)

2. Limited use of, and need for, nature-based opportunities in acute healthcare settings

3. Maintenance should not be handled by patients, nature engagement should be focused on therapeutic outcomes

4. Patients have limited capacity to engage when too unwell, frail, or bedbound

---

### K. Patient perspective not included

1. Healthcare facilities design often guided by clinical functionality, efficiency, cost restrictions and/or habitual practice, not necessarily the patient perspective/experience

2. "Prescription" of nature-based activities can undermine patients’ wish for choice

---

### L. Risk and safety

1. Adverse reactions and increased sensitivity due to treatment: Skin sensitivity, chemical sensitivity (artificial fragrances), photosensitivity, smell (strong flower fragrance), noise

2. Difficult weather conditions

3. Risk of infection: Reduced immunity, bacteria, allergies, pollen and pathogens, animals and indoor plants, fungal spores in soil, bacterial growth in water, stinging insects

4. Risk of vandalism and loitering in outdoor spaces
<table>
<thead>
<tr>
<th>ID</th>
<th>Expert Group</th>
<th>Profession</th>
<th>Years in profession</th>
<th>Residence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic, A/D*</td>
<td>Professor (Occupational therapy) and design consultant</td>
<td>10</td>
<td>USA</td>
</tr>
<tr>
<td>2</td>
<td>Academic, HP**</td>
<td>A/professor (community and mental health) and registered nurse</td>
<td>15 Professor, 25 nurse</td>
<td>Canada</td>
</tr>
<tr>
<td>3</td>
<td>Academic, HP, Management</td>
<td>Sr. Horticultural therapist and clinical A/professor, developing and executing Horticultural Therapy programming in academic medical center</td>
<td>26</td>
<td>USA</td>
</tr>
<tr>
<td>4</td>
<td>Academic</td>
<td>Professor teaching Horticultural Therapy and Biology courses, Director of Horticultural Therapy Clinic</td>
<td>8 HT, 18 biology</td>
<td>USA</td>
</tr>
<tr>
<td>5</td>
<td>Academic</td>
<td>Professor in late effects research in oncology department (850 employees) and Head of research in survivorship at a private research institution</td>
<td>30</td>
<td>Denmark</td>
</tr>
<tr>
<td>6</td>
<td>Academic, HP</td>
<td>Medical oncologist and cancer researcher</td>
<td>32</td>
<td>Australia</td>
</tr>
<tr>
<td>7</td>
<td>Academic, A/D</td>
<td>Architect, Professor and researcher</td>
<td>30</td>
<td>USA</td>
</tr>
<tr>
<td>8</td>
<td>Academic</td>
<td>A/professor</td>
<td>25</td>
<td>USA</td>
</tr>
<tr>
<td>9</td>
<td>HP</td>
<td>Art therapist including work at metropolitan comprehensive cancer centre</td>
<td>30</td>
<td>Australia</td>
</tr>
<tr>
<td>10</td>
<td>A/D</td>
<td>Architect major healthcare facilities</td>
<td>25</td>
<td>Australia</td>
</tr>
<tr>
<td>11</td>
<td>Academic, HP</td>
<td>Palliative care / psycho-oncology researcher</td>
<td>6</td>
<td>Australia</td>
</tr>
<tr>
<td>12</td>
<td>HP, A/D</td>
<td>Nurse, Social and Therapeutic Horticultural practitioner (STH), Designer of therapeutic gardens</td>
<td>Nurse 1994 (22), STH 2015 (1), designer 2010 (6)</td>
<td>Denmark</td>
</tr>
<tr>
<td>13</td>
<td>A/D</td>
<td>Landscape Architect healthcare and aged care facilities</td>
<td>15</td>
<td>Australia</td>
</tr>
<tr>
<td>14</td>
<td>HP, A/D, Management</td>
<td>Garden Project officer, Horticultural therapist, clinical nurse specialist</td>
<td>25</td>
<td>Australia</td>
</tr>
<tr>
<td>15</td>
<td>Academic</td>
<td>Professor of Neuroscience</td>
<td>25</td>
<td>Australia</td>
</tr>
<tr>
<td>16</td>
<td>A/D</td>
<td>Landscape architect and director</td>
<td>24</td>
<td>New Zealand</td>
</tr>
<tr>
<td>17</td>
<td>HP</td>
<td>Palliative care physician</td>
<td>&gt; 20</td>
<td>Australia</td>
</tr>
<tr>
<td>18</td>
<td>HP, Management</td>
<td>Director Horticultural Therapy services</td>
<td>6</td>
<td>USA</td>
</tr>
<tr>
<td>19</td>
<td>Academic, A/D</td>
<td>Landscape architect</td>
<td>33</td>
<td>UK</td>
</tr>
<tr>
<td>20</td>
<td>Academic</td>
<td>A/professor in Health Psychology, Deputy Director of Centre for Medical Psychology and Evidence-based Decision-making (CeMPED).</td>
<td>15</td>
<td>Australia</td>
</tr>
<tr>
<td>21</td>
<td>HP</td>
<td>Anaesthetist including work with colorectal cancer patients</td>
<td>27</td>
<td>Australia</td>
</tr>
<tr>
<td>22</td>
<td>Academic, HP</td>
<td>Clinical Psychologist</td>
<td>7</td>
<td>UK</td>
</tr>
<tr>
<td>23</td>
<td>Academic, Management</td>
<td>Actuary and healthcare consultant</td>
<td>22</td>
<td>New Zealand</td>
</tr>
<tr>
<td>24</td>
<td>Academic</td>
<td>Professor of Health and Human and Performance, Occupational Therapy</td>
<td>27</td>
<td>Canada</td>
</tr>
<tr>
<td>25</td>
<td>HP</td>
<td>Palliative care creative arts pastoral carer</td>
<td>2</td>
<td>Australia</td>
</tr>
<tr>
<td>26</td>
<td>HP</td>
<td>Palliative care physiotherapist</td>
<td>14</td>
<td>Australia</td>
</tr>
<tr>
<td>27</td>
<td>HP</td>
<td>Palliative care psychologist</td>
<td>2</td>
<td>Australia</td>
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</tr>
<tr>
<td>28</td>
<td>HP</td>
<td>Palliative care social worker</td>
<td>13</td>
<td>Australia</td>
</tr>
<tr>
<td>29</td>
<td>Academic</td>
<td>Researcher healthcare design</td>
<td>8</td>
<td>Australia</td>
</tr>
<tr>
<td>30</td>
<td>A/D, Academic</td>
<td>Landscape architect and PhD in health promoting natural environments</td>
<td>13</td>
<td>Denmark</td>
</tr>
<tr>
<td>31</td>
<td>Academic, HP</td>
<td>Lecturer in Healthcare architecture and caring sciences</td>
<td>25</td>
<td>Sweden</td>
</tr>
<tr>
<td>32</td>
<td>Academic</td>
<td>Professor, research in end-of-life care and health behaviour</td>
<td>30</td>
<td>UK</td>
</tr>
<tr>
<td>33</td>
<td>Management</td>
<td>Health Expertise Leader, health system design and innovation</td>
<td>25</td>
<td>Australia</td>
</tr>
<tr>
<td>34</td>
<td>HP</td>
<td>Palliative care nurse</td>
<td>26</td>
<td>Australia</td>
</tr>
<tr>
<td>35</td>
<td>Academic</td>
<td>Professor Emeritus, continued research in landscape architecture and healthcare</td>
<td>50</td>
<td>USA</td>
</tr>
<tr>
<td>36</td>
<td>Academic</td>
<td>Director, Ph.D. research in landscape architecture and healthcare</td>
<td>20</td>
<td>USA</td>
</tr>
<tr>
<td>37</td>
<td>Academic</td>
<td>Psycho-oncology Researcher</td>
<td>5</td>
<td>Australia</td>
</tr>
<tr>
<td>38</td>
<td>HP, Management</td>
<td>Oncology nurse specialist, Nurse Unit manager</td>
<td>22</td>
<td>Australia</td>
</tr>
</tbody>
</table>

*A/D = Architect or Designer  
**HP = Healthcare Practitioner*
Identifying opportunities for nature engagement in cancer care practice and design: a Delphi study

Questionnaire 4: Ranking items

29-08-2016

This is the final questionnaire and completes the Delphi study.

The purpose of this questionnaire is to elicit levels of opinion consensus about the importance of the short-listed items on the final lists (Opportunities and Barriers). 20 items were selected for each list reflecting the panel’s top-10 items of importance. The items are listed according to the total number of points allocated to them by the panel. You can find their total scoring in the right-hand column in the lists below (Points/panel).

Instruction:

Please read and consider all items listed below in the Opportunities and Barriers list. Please tick the appropriate box on the rating scales (1-10) next to each item to indicate how highly you rate each item’s importance.

Thank you for your time to complete the questionnaire!
## OPPORTUNITIES for Nature Engagement

### Items most selected by the panel

<table>
<thead>
<tr>
<th>Item</th>
<th>Points/panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Accessible outdoor settings, gardens and courtyards: Easy and effortless access, automized doors, nearby, some areas with high visibility, close proximity to clinical assistance, remove barriers and thresholds, available for patients, carers and staff</td>
<td>253</td>
</tr>
<tr>
<td>2. 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)</td>
<td>140</td>
</tr>
<tr>
<td>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</td>
<td>101</td>
</tr>
<tr>
<td>4. Nature-based programs: Gardening indoors and outdoors, interactive group activities, horticultural therapy, social and therapeutic horticulture, vegetable gardening for older patients, psychosocial interventions in natural settings (mindfulness)</td>
<td>90</td>
</tr>
<tr>
<td>5. Accessible, clinically appropriate indoor nature features and settings: Conservatories, atria, balconies, green walls, vertical gardens, water walls, various nature-based art and displays</td>
<td>88</td>
</tr>
<tr>
<td>6. Incorporate varying levels of sensory enrichment according to patient needs and limitations: balance of scented/unscented, coloured and edible flowering and foliage plants, textural and tactile materials (feet in grass, sand), seasonal change, running water, warming fire, breeze (smell, feel), oxygen rich, sunlight, fragrant nature objects (pine, eucalyptus)</td>
<td>88</td>
</tr>
</tbody>
</table>
7. 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)  

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all important</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very important</td>
</tr>
</tbody>
</table>

8. Educate healthcare team, management, patients, designers, policy- and decision makers about value, benefits, and appropriate implementation of nature-based opportunities

<table>
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9. Socializing: Range of seating options, gathering and communal spaces, BBQ area, children play areas, semi-private enclosures for personal conversations

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10. Interaction with animals: integration of bird feeders and fish tanks into the overall design (not just add-ons), contact with patients' own pets, native wildlife, fishpond, attract native birds and butterflies, therapy dogs

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11. Design proposal needs to address repair and maintenance requirements of nature-based features within available maintenance budgets (easy to maintain). Tasks to be carried out by skilled professionals

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12. Design for flexibility (engagement and disengagement): Adjustable seating arrangements (solitary, small groups, large groups), choice of walking paths, light and shade conditions

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13. Design and configuration of seating arrangements: Ergonomic, safe, movable (light but sturdy), if possible, all seating with back and arm rests, cushions where possible, options to rest and lie down (e.g., chaise longues)

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<td></td>
<td>Nature-based art and visual elements in clinical spaces: Artwork, posters, mobiles, screen images, sculpture, decals, ornamental, features, displays, nature colours and warm tones (walls)</td>
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<td>15. Indoor design to maximize use of biophilic elements: Natural materials, natural colours, air flow (including windows that open safely), and natural light</td>
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<td>16. Protection from adverse weather conditions (sun, shade, high/low temperatures) and unpleasant stimulation (overpowering scents, noise, loud sounds, toxic plants, clutter)</td>
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<td>17. Distraction and sound masking techniques during clinical treatment and procedures: Videos, nature sound recordings (water, breeze, rain, birds), virtual reality, IPads, projection screens, mental activities</td>
<td>Not at all important</td>
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<td>18. Appropriate safety measures and surface materials for limited mobility: Handrails, smooth paved paths, ramps rather than steps, colour contrasting curbing along pathways</td>
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<td>19. Design principles: Appropriate use of textures (soft - hard surfaces), scale (vastness - enclosure), light (shade), sufficient plant materials and colours (including flowers and trees), soft- / hardscape ratio (suggested ratio 70:30), variety (simplicity – complexity)</td>
<td>Not at all important</td>
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<td>20. Affordable access to nature-based activities e.g., easily organized, affordable transportation</td>
<td>Not at all important</td>
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### BARRIERS to Nature Engagement

<table>
<thead>
<tr>
<th>Items most selected by the panel</th>
<th>Points/panel</th>
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<tbody>
<tr>
<td><strong>1. Building design and site constraints, missed opportunities: Layout, building orientation, surrounding views, lack of available space were not considered in planning and development phase</strong></td>
<td>194</td>
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<tr>
<td><strong>2. Cost and resource allocation: cost for routine repair and maintenance, staff and volunteer time, acquiring indoor equipment (screens, virtual reality, A/V), lack of funding, often based on fundraising and grants</strong></td>
<td>179</td>
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<tr>
<td><strong>3. Decision makers, management and administration often lack knowledge and/or awareness about benefits of nature engagement</strong></td>
<td>175</td>
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<td><strong>4. 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</strong></td>
<td>141</td>
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<tr>
<td><strong>5. Healthcare facilities design often guided by clinical functionality, efficiency, cost restrictions and/or habitual practice, not necessarily the patient perspective/experience</strong></td>
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<td><strong>6. Risk of infection: Reduced immunity, bacteria, allergies, pollen and pathogens, animals and indoor plants, fungal spores in soil, bacterial growth in water, stinging insects</strong></td>
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<tr>
<td>7. Healthcare staff: Lack of education about appropriate use of nature-based opportunities and what their benefits are</td>
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<td>8. Inauthenticity of nature-based design elements: fake plants, fake scents, tokenistic, corporate design (“cutting edge” award seeking designs)</td>
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<td>9. 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</td>
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<td>10. Lack of access and/or acceptance of existing evidence (across healthcare and design disciplines)</td>
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<td>11. Designers: Lack of training to deliver effective and appropriate design solutions</td>
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<td>12. Poorly located and difficult to find outdoor spaces, no clear wayfinding and signage for outdoor spaces</td>
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<td>13. Refurbishments constraints: Existing facilities can present limited options for adaptations and design solutions</td>
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<td>Prevailing healthcare model requires more evidence (convincing economic justification) to warrant inclusion of nature-based opportunities (only ‘soft’ evidence available)</td>
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<td>15</td>
<td>Different aesthetic sensibilities: cultural, age, gender, socioeconomic, personal preferences, some people don't value nature as much</td>
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<td>16</td>
<td>Adverse reactions and increased sensitivity due to treatment: Skin sensitivity, chemical sensitivity (artificial fragrances), photosensitivity, smell (strong flower fragrance), noise</td>
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<td>Champion (advocate) needed</td>
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<td>18</td>
<td>Limited availability of outdoor spaces (dense urban areas)</td>
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<td>Not prioritized in construction and development phase of healthcare projects</td>
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<td>20</td>
<td>Mainstream values (decision makers) don't prioritize nature-based opportunities or “design thinking”</td>
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Appendix 27 Delphi Participant Letter of Invitation

Participant letter of invitation (email) used for the e-Delphi study reported in Chapter 8.
Invitation to participate in research study ‘Identifying opportunities for nature engagement in cancer care practice and design: a Delphi study’

Dear XX,

You are invited to participate in a research study undertaken by PhD student Sarah Blaschke at the Peter MacCallum Cancer Centre, Faculty of Medicine, Dentistry and Health Sciences, The University of Melbourne, Department of Cancer Experiences Research.

You are being invited because you have been identified as a relevant healthcare practitioner, management representative, designer, or researcher who can provide valuable input about aspects of healthcare setting and service design.

This study includes a series of 4 questionnaires aimed to collect expert knowledge and opinion in order to determine opportunities for, and barriers to, nature engagement in cancer care settings. The study outcome will provide preliminary recommendations for current and future healthcare design and supportive cancer care practice, and form part of the investigator’s dissertation.

Please see the attached Participant Information Sheet to learn more about the study and what your participation would involve. If you wish to participate, return of the attached first questionnaire will be considered consent. If you have any further questions about the project, please use the contact details provided below to get in touch with Sarah Blaschke.

Your participation would be a valuable contribution and I hope you will consider taking part in this study.

With kind regards,

Sarah Blaschke
Email: Sarah.Blaschke@petermac.org
Tel: +61 3 9656 3645 | Fax: +61 3 9656 350
Appendix 28 BMJ (Protocol) Review Letter and Author Response

Documentation of the peer-review process of the first published paper included in Chapter 8. Response letter to reviewers who provided comments and feedback for the manuscript submitted to BMJ Open. The manuscript reported on the protocol outlining Delphi methodology development for the e-Delphi study (Chapter 8). The letter includes individual feedback received and the authors’ responses to the reviewers who finally approved publication of the manuscript.
**Response to Reviewer 1**

1. Unclear aims. The manuscript describes a project plan for a research project examining expert opinions of implementing nature elements in health institutions using a Delphi-method. Thus the manuscript does not describe any empirical data of the subject matter,

RESPONSE: The manuscript comes under the BMJ OPEN’s article submission category of “study protocol”. We suggest that the description of “study protocol” on the website reflects our submission. No empirical data is presented because “Protocol manuscripts should report planned or ongoing research studies”. http://bmjopen.bmj.com/site/about/guidelines.xhtml#studyprotocols

Our article is comparable to other protocols reported in BMJ open, for example Merlin et al. (2016), Page et al. (2015) and Schneider et al. (2016).

2. ... nor can it be said to be a method article digging into a particular method as compared to other methods for gaining knowledge of a phenomenon.

RESPONSE: The purpose of this protocol was to present the design of our planned study. This article was not intended as a methods article.

3. Simultaneously, in the abstract, as well as in the text it is said that the aim of the study is to “solicit knowledge from relevant experts drawn from a range of healthcare practitioners......” The formulation of the aims indicate that the study will describe an empirical study. However, the manuscript does not describe an empirical study, so the described aims cannot be said to be fulfilled. On the other hand, if the aim is to describe and discuss the appropriateness of a certain method for gaining knowledge about a phenomenon, the aim needs to be reframed.

RESPONSE: Please see our response to 1 and 2 above.

4. The background section
   The background section is rather thin. Given the interest in implementation of nature based interventions in health care institutions I would expect a literature review on how and why nature-based interventions could be of interest for the target group. Further, I would expect a literature review of what we know so far about expert opinions related to the issue. Further I would like to see a rationale for who can be regarded as experts in this context, and what do we know so far about opinions in the different expert groups.

RESPONSE: Thank you for these suggestions. The Background has been amended accordingly, where the literature is available. Additional text includes a brief outline of existing nature-health benefits from research with cancer populations (see page 1, section Background). To our best knowledge, no cross-sectorial expert opinion exists as we suggest is necessary for safely delivering nature-based engagement. We now state this on page 2, under ‘Rationale’.
5. You use terms such as “healthcare practitioners”, “management representatives”, “designers” and “researcher”. I would like this to be elaborated a bit more. E.g. what kind of designers are you talking about, and researchers in what area? Would you be interested in experts having experience in the related field, and how would you recruit them? Another thing when you say it would be appropriate to collect data from different groups, I would be interested in an elaboration of possible conflicts between interests. In the formulation of the term experts through the text, the definition seems to vary. E.g. you talk about “experts from professional and academic background” one place and “selection of national and international experts” another place. A clearer definition of what you mean by experts, and a more stringent framing of the terms throughout the text would be warranted.

RESPONSE: In response to your comments we have distinguished what we mean by experts with professional backgrounds (e.g. oncology and allied healthcare practitioners, management representatives working in healthcare planning and development, and healthcare setting architects and designers) and academic backgrounds (taught subjects on health-nature and related healthcare design topics or have published and presented related research articles in academic forums). We have expanded the ‘Selection of experts’ section to include our working definition of an “expert”, which was originally stated in the ‘Discussion’ section on page 9. We suggest that we have now provided a comprehensive enough explanation of “experts” for our study context. We note that the term "expert" is only briefly described in Taylor et al. (2016) as “any healthcare professional working in TYA cancer care for a minimum of 12 months” and not described at all in Rodgers et al. (2016), which are both BMJ Open publications.

6. Ethics – is the study approved or recommended by a data protection / privacy ombudsman? This should be described explicitly.

RESPONSE: As stated in the Abstract and in the text in the ‘Ethics’ section on page 7, ethics approval to conduct the research outlined in this protocol was received from the “Institution’s Human Research Ethics Committee”. Please note, the institution’s name has been omitted for blinding purposes during the peer-review process and will be added for final publication. Research procedures are in accordance with the Australian National Statement on Ethical Conduct in Human Research 2007 [Updated May, 2007] (National Statement, 2015), including those related to protecting participants’ privacy and study data.

7. The method section

Regarding the participants and recruitment procedure, noting is said about inclusion and exclusion criterions. This needs to be included. It is also said that 200 will be contacted with the aim of recruiting 40 – which would represent a rather low response rate, something that would considerably reduce the validity and reliability of the study. If a study like this should be conducted I would therefore suggest a
more direct and strategic recruitment procedure – where experts are recruited more directly.

RESPONSE: Please find the inclusion criteria described in section ‘Selection of experts’ on page 3-4, which is now expanded as described above. We would like to point out that a low initial response rate is common in Delphi studies, for example a 24% response rate was reported in Rodgers et al. (2016). A recognized concern in regards to reliability and validity of the study outcome is the retention of panelists through the Delphi rounds (Page 2016), which we have taken into account by increasing the minimum recruitment target per group (n=7, as described in Mullen, 2003) to 10 experts per group (see page 4). To minimize attrition, we mention in the ‘Methods and Design’ section on page 2 that email reminders will be sent to panelists in each round: “including reminder emails prior to the round closing deadline to maintain a high response rate”.

8. Since the aim in this study is to use different expert groups, the reader would need more information as to how the different groups are recruited to be able to evaluate the validity of any results.

RESPONSE: Our strategies for identifying and recruiting experts is now explained in more detail on pages 3-4 under ‘Selection of experts’.

9. Discussion section. The discussion is a rather normative and not very scientific discussion of the advantages of the described Delphi method. If the manuscript should work as a method paper, I would expect a much more thorough discussion of the different advantages and disadvantages.

RESPONSE: We suggest that our protocol is comprehensive enough in relation to the requirements for BMJ open. It is more detailed than a number of protocols recently published in the Journal. For example, we outlined the appropriateness of method and the key advantages of the particular Delphi method chosen and refer to relevant examples in the literature (page 8). This level of detail is not found in Page et al. (2016) or Merlin et al. (2016). We also report advantages/disadvantages of our Delphi method such as the level of anonymity provided (page 10, ‘Level of anonymity’) and the ability to bring together diverse groups of experts (page 9, ‘Composing the expert panel’). We note that other protocol papers published in BMJ Open scantly discuss advantages/disadvantages for adopting the Delphi method in their study (Schneider 2016; Page 2016).

Response to Reviewer 2
1. Please expand on the limitations of the Delphi approach.

RESPONSE: The manuscript comes under the BMJ OPEN’s article submission category of “study protocol” and we would like to refer to other recent Delphi protocols published in the BMJ open, which don’t outline limitations but rather describe the rationale and justification for employing the method. We mention the method’s major criticism about defining and identifying experts (page 9, ‘Definition of an “expert”’) and we describe the challenge of participants’ common time constraints, which can impact on the participant sample. Following your second comment (how including patients’ views may impact
findings), we also add comment about this limitation in the ‘Discussion’ section. Please see more detail in our response to 2. below. However, our focus, as in other Delphi protocol examples, is on describing the characteristics of, and the rationale for choosing the modified 4-round e-Delphi.

2. Also, while justification as to why patients are not included has been integrated, it would be useful to add in how this choice may impact recommendations and/or findings.

RESPONSE: The strategy of using cancer patients’ own nature experiences and recommendations for opportunities to engage with nature in oncology contexts, to form the basis for this investigation, provides experts with the opportunity of considering cancer patients’ perspectives when developing their own views about opportunities for, and barriers to, providing helpful nature engagement in cancer care settings. Their agreement or disagreement with patients’ perspectives may affect their own recommendations and the findings. This is now explained in the ‘Discussion’ section under ‘Composing the expert panel’ on page 10.

References


National Statement on Ethical Conduct in Human Research 2007 (Updated May 2015). The National Health and Medical Research Council, the Australian Research Council and the Australian Vice-Chancellors’ Committee. Commonwealh of Australia, Canberra


Rodgers, M., Booth, A., Norman, G., & Sowden, A. (2016). Research priorities relating to the debate on assisted dying: what do we still need to know? Results of a modified Delphi technique. BMJ open, 6(6), e012213.


Appendix 29 BMJ (Outcome Paper) Review Letter and Author Response

Documentation of the peer-review process of the second published paper included in Chapter 8. Response letter to reviewers who provided comments and feedback for the manuscript submitted to BMJ Open. The manuscript reported on findings from the e-Delphi study (Chapter 7). The letter includes individual feedback received and the authors’ responses to the reviewers who finally approved publication of the manuscript.
To: BMJ Open Editorial Office
From: Ms Sarah Blaschke
Date: 05/07/2017
Re: Response to reviewer comments for research paper titled ‘Modified international e-Delphi survey to determine feasible nature-based care opportunities in oncology settings’

Letter to Reviewers:

Reviewer 1

REVIEWERS GENERAL COMMENTS
This is an interesting paper, in that it addresses nature-based contexts and activities as feasible therapeutic environment for cancer patients in an oncological context. The paper has several qualities: The design and research strategies are complex, comprehensive and solid and it addresses important issues. There is however, several incoherencies in the manuscript between title, objective, background, findings and conclusions. There should be complete coherency in the study objectives throughout the complete manuscript, the title included. The reviewer will in the following address and elaborate on this incoherency in the more detailed comments.

REVIEWER DETAILED COMMENTS
Title: The reviewer suggests you change the title to ‘Nature-based care opportunities and barriers in oncology contexts: A modified international e-Delphi survey.’ This title is more in line in what is the actual content of the study, and is in line with concepts used elsewhere in the manuscript as the use of oncology context instead of setting, and the combination of opportunities and barriers.

Thank you for this suggestion. We agree that the suggested title more closely reflects language used in the manuscript and are happy to consider this change.

Comments on abstract and keywords
Abstract: 1. The abstract is comprehensive, and gives some condensed useful information. The reviewer judgement is however, that the objective is somehow not the objective addressed elsewhere in the study. 2. Likewise, the use of online national study is somehow strange, as the reviewer understands here that setting is to reflect research setting. What is actually the research setting in this study? 3. Concerning the result part, there is little that actually reflects what the findings in relation to the objective. The presented reported findings seem to be more reflecting samples and response rates. The reviewer suggests that the readers are better informed of the opportunities and the barriers to nature-based feasabilities in oncology contexts for cancer patients. 4. Additionally, the conclusions do not tell us anything about the overall conclusions that might be drawn from these findings.

1. Thank you for these comments. Following from your suggestion above to improve the title, we consider some rewording in order to align title, objective, and manuscript linguistically. We have included the following re-wording: ‘To develop recommendations regarding opportunities and barriers for nature-based care in oncology contexts using a structured knowledge generation process involving relevant healthcare and design experts.’

2. ‘Setting’ was used here because BMJ Open asks for this to be included in the abstract. However, we agree that ‘Setting’ is not the optimal word here and we have changed it to ‘Context’, which reduces the sense of physical location, since online surveys do not use physical research settings. This change to standard subtitles may need to be reviewed by BMJ Open editors.

3. The results section in the abstract has been reworked to reduce statistical information and include more description of the recommendations.

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4. The conclusions section has been reworded:

‘... These recommendations elucidate as yet unexplored healthcare responses that utilize the care setting itself, its context, and ambient features to improve patient outcomes. Reflecting patient and expert perspectives, these nature-based care recommendations have particular relevance for healthcare, but importantly, they advocate for often unvoiced healthcare needs and human experiences, which can add great value to oncology patient experiences. ...’

**Strengths and Limitations** (Page 2): The reviewer has difficulties agreeing in the following strengths:
- The study produced expert recommendations for nature-based care in oncology contexts and presents novel healthcare design solutions.

• How is this considered a study strength or study limitation?
- This study represents the first international cross-disciplinary collaboration between healthcare and design experts to generate new understanding about helpful nature engagement in oncology contexts.
- The e-Delphi structures a collaborative feedback process allowing experts across disciplines and geographic locations to anonymously input knowledge and experience.

• How is this considered a study strength or study limitation??
- The findings represent contributions from a specific expert sample, which may differ when involving other experts.

The reviewer recommend that the authors in elaborating on study strengths and limitations more strictly stick to reliability and validity issues concerning recruiting, sample qualities, response rates, transparency, findings in relation to theories or relevant research as well as the study design.

Thank you for reflecting on the relevance of our listed strengths and limitations. We agree that the study has a set of methodological strengths and limitations, which are better placed here. We have revised this section and hope you find our changes appropriate.

Included:
- An integrated validation process gave panellists opportunity to request revision of their input as required for correctness and reliability of interpretations.

- The international and cross-disciplinary Delphi panel contributed breadth of expert input to inform new understanding about helpful nature engagement in oncology contexts.

- The e-Delphi structures a collaborative feedback process allowing experts across different geographic locations to anonymously input knowledge and experience.

- The findings represent contributions from a specific expert sample and may not be reproducible when involving other experts.

**Keywords**: The reviewer finds the use of keywords inappropriate, and recommends that the authors use key words that more explicitly cover the scope and the content of the study. It is recommended that you at least use: e-Delphi survey (or study), nature-based therapeutic environment or nature based care, or similar key words used in this research field.

Thank you for this suggestion. We agree and have amended the string of keywords as follows: Oncology, Nature-based Care, Therapeutic Environments, Mixed Methods, e-Delphi survey, Healthcare Design

**Other comments**: Why do you call it only qualitative research? As this is also a quantitative study.
Comments on different parts of the manuscript

Introduction: The reviewer finds that this introduction somehow lack an overall ide and a sound theoretical rationale for why it is important to address nature-base care as therapeutic opportunities for cancer patients in an oncology context.

The introduction should relate research and theory to the following issues/questions:

• What is it with the extreme life situation, the crisis, the pain, the anxiety, the despair and depression, the fatigue, the treatment, the insecurity, the experienced distress etc. etc., that these seriously ill patients and their relatives experience that might be alleviated through the opportunities of nature-based care and a nature-based context?

We appreciate your comments and agree that our Introduction is lacking. We have expanded the Introduction to include more of the dimensions you mention. Please refer to page 3.

We would also like to offer the perspective that we find there are many dimensions of cancer experiences and it is not only the extreme negative that give reasons to engage and potentially benefit from nature engagement. These can include, for example, rehabilitation, prevention, social enhancement, aesthetic enrichment in states of recovery. These other dimensions connect also with perspectives offered by public health and prevention research. These dimension are included in the Introduction.

• What is the theoretical underpinning that such an environment might help? What is relevant reported research? Is it so that in this research field there is a lack of research based knowledge on the benefits of nature based therapeutic environments for patients with challenges for cancer patients or for patients with comparable challenges?

We suggest that the following section in our Introduction provides a theoretical underpinning for why nature based care might help in oncology: ‘Preliminary research has shown various bio-psycho-social benefits from exposure to, and engagement with, nature in oncology contexts, including: improved quality of life [8], increased positive health behaviour such as physical exercise and fruit and vegetable consumption [9], restored attention [10] and increased social engagement [11]. Furthermore, cancer patients value opportunities to engage with nature when navigating the ongoing challenges of cancer diagnosis and treatment [12] (page 3).’ We acknowledge that we need to emphasise that there is a lack of research based knowledge on the benefits of nature-based therapeutic modalities, that is, healthcare environments for patients with cancer diagnoses. This is now highlighted on page 3: ‘While there is interest in nature’s role in supporting cancer patients from a preventative and rehabilitative perspective, there is a gap in research on nature’s role in clinical settings, which provide patient care.’

Additionally, the argumentation and the rationale for the need of this comprehensive research study addressing the nature-based environment to a specific cancer population within an oncology context, is somehow vague.

Please see answer above.

The reviewer also finds the focus on public health perspectives inappropriate, as it is anticipated that it is the hospital context for seriously ill cancer patients in life-threatening situations often experiencing extreme distress that is the relevant context for this study and yet should be addressed.

Please see answer above.

This could also involve a sentence or two that addresses how hospital gardens historically has had an important role, but nowadays seem to be replaced by traffic, parking places, helicopter landing possibilities, etc.
Theoretically we consider the shift to health-centric care strategies to be a noticeable and relevant development in healthcare, which we present as one rationale to consider nature engagement for oncology patients since this affords opportunities for focusing on positive health behaviour and self-managing aspects of illness and recovery. We would like to refer to these sections in our introduction: ‘Access to health-centric care strategies, which promote positive health behavior and prevent poor lifestyle choices, can alleviate growing healthcare burden and support those affected by cancer.’ And ‘health-centric strategies engage a person’s own capacity to self-manage health and disease [7], which is relevant for oncology patients who may be exposed to unavoidable bio-psycho-social stressors in clinical as well as in daily living environments.’ (page 3) And ‘This shift towards patient-centred care demands more comprehensive regard of patients’ personal challenges and experiences related to health and recovery. Refining our understanding about what patients value becomes relevant for healthcare policy if the aim is to maintain or even improve patient wellbeing and quality of life during and beyond cancer treatment.’ (page 3)

While we agree that in some hospitals contexts, garden space has been replaced by the items mentioned, we are unaware of literature we can use to support this statement. Theoretically, we have also expanded on the reference explaining cancer patients’ reported use of nature for psychological restoration processes: ‘value opportunities to engage with nature when navigating the ongoing challenges of cancer diagnosis and treatment by using nature as a physical and psychological resource for restorative processes and normalization (page 3)’

Objective: The reviewer recommends that the authors strive to achieve coherency in the objective as well as use of concepts throughout the complete manuscript.

As addressed above, we have revised the wording here as well as throughout the manuscript to reflect the use of ‘oncology contexts’ and have clarified the word ‘recommendations’ to represent both the adoption of ‘opportunities’, and the mitigation of barriers.

Study design: The reviewer recommends that you say some words of what is it you actually aimed for in this study that made you choose the Delphi design or methodology, and what are your modifications that deviate from the original Delphi design. That is somehow unclear.

Thank you for this comment. We agree that it is relevant to describe the study design and method in clear and comprehensive terms and to explain the rationale for choosing a particular method as the most suitable to address the research question. Here we would like to refer to the published study protocol that outlines this in greater detail. We have included clearer reference to the published protocol in the manuscript: ‘The full study protocol has been published elsewhere [17] and describes in detail the Delphi methodology adopted in this research project. The main method modification made to suit the present study was to use ... (see pages 4 and 6).’ We believe that the study design and method have been sufficiently re-stated in the manuscript and believe that the now added Protocol reference improve clarity and validation of the study method.

In regards to modification, we refer again to the study protocol, however, we would also like to point out that the major modification is stated in the Study Design section (page 4). We have reworded this sentence to firstly include reference to the protocol and to also draw out more clearly that a 3-phase Delphi sequence with pre-determined number of questionnaires was used rather than using as many questionnaires as needed for strict consensus.

Concerning the choice of the Delphi strategy:
1. Was the strategy hosen in order to clarify a concept – and if so, which concept (s)?
2. Was it to develop a questionnaire – and if so, for measuring what?

3. Was it to establish an expert consensus on the opportunities and barriers of engaging with nature – and if so, for what clinical purpose?

4. Was it to outline guidelines for the overall indoors and outdoors environments in oncology contexts when addressing in a nature-based perspective (from window-views till activities outdoors)?

There is a need to clarify more explicit the research questions that legitimize the need for the comprehensive Delphi strategy as a research strategy.

We would like to draw these questions back to the overall objective stated in the manuscript ‘The objective was to develop recommendations regarding opportunities and barriers for nature-based care in oncology contexts using a structured knowledge generation process involving relevant healthcare and design experts.’

To the third question above ‘to establish an expert consensus on the opportunities and barriers of engaging with nature – and if so, for what clinical purpose’: We suggest that the clinical purpose does not require separate elaboration. The introduction outlines potential and known benefits of nature engagement and informs the reader that the study connects with research around various health benefits (e.g., recovery, wellbeing, prevention). In regards to concept and questionnaire development (reviewer questions 1 & 2 above), we have revised the Methods section to state ‘The present study aimed to elicit and synthesize diverse disciplinary viewpoints to guide the development of expert recommendations’ rather than ‘concept development’ (page 6).

**Sample:** Could you be more specific on what is meant by health care practitioners (HP). This informant group is quite large, and it would be informative if you could give some more information of professional backgrounds.

Thank you for raising this point. We believe this detail is important and adds to better appraising the expert knowledge contributed to the study. We have included the specific backgrounds (de-identified) for the HP subgroup as well as for the Academic subgroup, please refer to this revision in Table 1.

**Data collection:** How did you actually collected data? First: What was the written information given to all informants on all rounds in order to achieve and secure that the data addressed the same issues. There is a well described information on how you put the various groups and samples together for each round, but what did the data collecting survey strategies actually look like? How was the information given, and how were they informed on what the researchers meant by nature-based care and opportunities and barriers to engage in these environments? This needs to be clarified. The reviewers experience that normally it is quite unclear to most health professionals either experts and non-experts on nature based therapeutic environments.

We would like to refer to the published study protocol, which outlines each Delphi round in detail and provides illustrations of the questionnaire formatting for each round to ensure systematic data collection. We agree that it is challenging to form and operate from commonly understood terms and definitions when it comes to nature-based environments/opportunities. We also describe in the protocol, and now in the article, the inclusion in Questionnaire 1 of the patient-reported nature-based recommendations, which offered material to assist panellist’s brainstorming, and also provided a more common basis from which they could offer their own ideas. This is briefly restated in the current manuscript under Limitations ‘the panel’s exposure to patients’ own recommendations created a common basis for this investigation and helped to define its topical parameters and stimulated their novel thinking on the topic.

We have added a clarifying sentence under Procedure and data analysis to guide the reader to the protocol for more detail ‘A brief description of each questionnaire follows, however for detailed overview’
including illustration of the administered questionnaires, please refer to the published study protocol (page 6).

**Results:** The reviewer refers to the following on Page 7 under Panellists: Two hundred potential panellists were identified and sent an invitation to participate, which included Q1. Thirty-eight questionnaires were returned. The reviewer comment here is that the authors has computed the response percentages throughout the manuscript, but not here. The reviewer recommends that the response percentage should also be revealed here, despite the fact that thirty eight (n=38) of 200 addressed implies a weak response and R/R. The authors should make this more transparent. Thank you for raising this point. We have now included R/R (19%) for round 1 in the abstract as well as in the results section and Table heading.

There is further a mismatch between Q2: 31 (82%) in this paragraph and the Q2 (n=33, 87%) in next paragraph. Thank you for pointing this out. We have checked the data and have corrected.

**Discussion:** The reviewer recommend that the discussion somehow follows key findings related to opportunities and barriers to nature based care opportunities, and that these key findings are discussed against of relevant research, relevant the on nature, and relevant nature based hospital design recommendations. The authors are obviously well informed on relevant research. The reviewer recommends however that the discussion leads up to answering the objective or the research questions. This will also make it more easy to answer the Conclusion part.

We agree that this section should discuss key findings in relations to existing literature. We would like to offer our view that our current Discussion fulfils this recommendation. The Discussion centres around appraising key findings from the final list of recommendations (top-10 opportunities, top-10 barriers provided in Table 3) and connects these with other literature in order to discuss their relevance. We suggest, for example, that this section, does this: ‘Amongst these were patients’ need for connection with the outside world (1C), accessible retreat from clinical scenarios (2A), physical exercise opportunities (3E), contemplative and solitary experiences (6C) as well as socially engaging and communal experiences (9F), and aesthetically and sensory enriching (10C) yet climatically comfortable and safely maneuverable environments (8C and 4B). These findings connect with existing literature confirming a similar broad range of desired patient experiences when dealing with cancer diagnosis; they include, for example, contact with the outside world through window views [8]; social experiences and engaging in peer activities [27]; seeking respite from clinical reality [28]; adopting new physical activities for improving fitness and wellbeing [29]; stimulating and aesthetic experiences that enliven the physical senses [28, 30]; contemplating and connecting meaningfully with oneself and notions of spirituality [31, 32] (page 9).’

**Practical implications:** In regard to the objective and the presented results, the reviewer does not find the presented recommendations appropriate. We are unsure what the reviewer is referring to here in terms of appropriate recommendations. We assume the 4 bullet points listed under ‘Practical implications’. We believe that each of these 4 listings point to potential practical outcomes resulting from the findings. The findings constitute 10 top-rated opportunities and 10 top-rated barriers (Table 3) for nature-based oncology care and these are believed to potentially 1) guide designers & architects; 2) inform HP about helpful and safe use of nature-based elements; 3) enable use of existing nature-based resources, and 4) bench mark items to assess existing healthcare settings that aim to implement nature-based care.
We are happy to revise these statements if the reviewer disagrees. If so, could the Reviewer please provide some further clarification on the points of disagreement.

**Conclusion:** There is a mismatch between the conclusions and the study objective. This has to be worked on. If the final result was developed guidelines(??), then why are they not presented in the results as the final outcome of the study? The conclusion should mirror key findings after having been discussed against other reported findings, and in terms of the study strengths and limitations.

We have made some minor linguistic revisions here e.g. replaced ‘guidelines’ with ‘recommendations’ to ensure consistency of phrases. However, we believe that the Conclusions connect the study strengths (e.g. ‘international, cross-disciplinary effort to investigate …’ and ‘Reflecting patient and expert perspectives …’) with the findings (‘expert recommendations related to the integration of nature-based care opportunities in oncology contexts’) and other existing literature referred to in the Discussion section (e.g. ‘unvoiced healthcare needs and human experiences’). As mentioned in the Discussion: e.g. ‘Psycho-oncology literature further corroborates the psychological importance of oncology environment design [38, 39]. Such contextual features powerfully communicate symbols of care and caring and may impact meaningfully on patients’ lived healthcare experiences and perceptions [33] (page 10).’

**Reviewer: 2**

This Delphi study is well conceived and Table 3 provides a helpful list of factors to be considered in nature-based design in oncological care. There are a few conceptual issues that should be addressed, and some minor issues that may be improved.

**Major**

- The Introduction refers to findings of a systematic review, on which the Delphi study was based. Please either provide a reference to the systematic literature review, or explain the methods and results of the systematic review.

  Please find the published literature review now cited on page 4. This was not initially included because the paper was still under review at the time this manuscript was submitted.

- It is unclear what “opportunity” entails. In the discussion, the opportunities are framed as recommendations, which seems a more suitable conceptual framing. Also, barriers seem to be issues that need to be considered in design.

  For this study “opportunity” is meant to include ideas that are conducive to engaging with nature and support contact points for patients to engage with nature. The list of recommendations constitutes both opportunities and barriers. These are collated in order to draw out what experts (and patients) believe is valuable in these interactions and present opportunities (examples and ideas) which can be translated into design or therapeutic practice. Barriers are considerations that flag safety issues around nature engagement and draw attention to potential opportunities for healthcare organizations to address challenges around the health system, logistics, attitudes, funding etc, that can hinder initiatives to implement nature-based care (at the start of a development project or in existing ones).

- Why do the themes combine typical process and outcome indicators as a process is fundamentally different from an experience. For example, physical exercise is very different from aesthetic experience. Thank you for this helpful insight. We have now clarified in a footnote to Table 2 (see page 16) how participants, in some instances, connected process with outcomes: ‘Some categories reflect how panellists connected process and outcome, for example, educating stakeholders about available nature-based modalities and benefits (Opportunity D, process) may mitigate inadequate knowledge and awareness (Barrier E, outcome).’
-Please discuss the usefulness of the approach of distinguishing opportunities and barriers when in fact they refer to a single theme. For example, “educate health care team...” (5D in Table 3) and “...often lack knowledge...” (2E in Table 3)

This question is in part addressed in our response above about how our data reflects they way participants connecting process with outcome. In further response to this question:

- The aim of this Delphi was to understand their recommendations regarding nature based care. We aimed to develop understanding through examining their views about opportunities for engaging nature ..., and barriers to enable that. Through considering the research topic from both these angles, we consider that the experts could be prompted to think deeply about the research topic.

- The research design was such that we decided to report what experts characterised as categories of opportunities and barriers. We do not consider that further condensing the categories into themes would strengthen the findings, rather, this would reduce our capacity to report on the number of items grouped within each category.

**Minor**

- The initial response rate is not mentioned while the response rates in subsequent rounds are mentioned multiple times using the denominator of the first round. This masks the low initial response rate. While a Delphi study need not be representative of the targeted expert groups, it will be informative to know why people declined, and if people from certain countries or with certain expertise were more responsive than others. Could you provide such a simple non-response analysis and reflect upon it in the Discussion?

Thank you for this comment. We did consider including such an analysis, however, invitees did not explain reasons for not participating. They simply did not respond to the email invitation. We agree that this would be an interesting point to add to the discussion, however, our recruitment did not include enough information to comment on this meaningfully. We have now included this in our limitations section as a consideration for future research.

Lastly, while the study achieved a panel of mixed experts, the sample included a greater number of academics and healthcare practitioners than healthcare management and architects and designers. The type of expert input needs to be considered when appraising the findings. Future research may further investigate reasons for non-participation of certain expert groups and evaluate the significance of their contributions or lack thereof (page 11).

-This article uses the term “anonymous” where the protocol article rightly used “quasi-anonymous” because coded data were being used, and participants were identifiable by means of a key. This point has been reworded in the Recruitment section: ‘Experts were assured of confidentiality and that their identities were only known to the research team throughout the study period and that no identifiable information would be presented in final reporting of the study (page 5).’

- The basis for the estimated response rate of about only 20% is not provided in the article, nor in the protocol article. The estimate in the protocol article was very close to the final response rate which is not being acknowledged. As addressed above, we have now added this response rate (19%) in the appropriate sections.

- The period of data collection is not stated (in abstract or Methods). This way, it is also not possible to evaluate if the protocol paper was submitted ahead of data collection (revised 20 October 2016). The data collection period has now been added in the ‘Methods’ section under ‘Procedure and data analysis.’

- The name of the institution that provided ethics approval should be inserted. It was also not included in
the protocol article (Blaschke et al., BMJ Open 2107, page 6 “Human Research Ethics Committee (blinded for review)

The name of the institution was omitted here to blind the associated institution. We have now added the institution name and ethics project ID after checking the BMJ guidelines.

-Please explain uncommon abbreviations. For example, I have not seen Mdn for median before We have now spelled out median in the text and tables.

-Although a mean plus median indicate whether distributions were skewed or not, it is unusual to provide two measures of centrality and no measure of variation. A mean goes with an SD, not with a median, and a median goes with measures such as an (interquartile) range.
Thank you for this comment. In response, we have changed our reporting to include median only and IQR.

-In the Discussion, the authors may refer to work in design in dementia at the end of life, which included an online Delphi study among Australian and UK experts (Fleming et al., BMC Palliat Care 2015). There may be similarities in design for people in the terminal phase, in addition to disease-specific issues.
Thank you for this suggestion and reference. This is a very well-conceived and reported study. At this stage we would like to remain within cancer-specific literature and evidence base. While Fleming (2015) connects with similar ideas and concepts presented by nature engagement (comfort through engagement, feeling at home and familiar, calm environment etc), we would like to keep our study focus firmly on nature- and cancer-specific issues and avoid mixing with other groups (dementia) or narrowing in on specific stages of cancer (end-of-life).

-How does the work accommodate palliative care as individual care by definition, allowing for highly personal tastes? If palliative care was not included in the oncological context, please explain.
Palliative care perspectives were contributed by both Healthcare practitioner (HP) and Academics on the Delphi panel. This detail about practitioner backgrounds and academic fields have been added into the Demographics table to allow the reader better appraisal of the expert contributions.

-Do you feel that the results can be generalized to areas with colder climates with limited opportunities to connect with outdoor scenery or activities? Half of the participants were from Australia, and there were fewer participants from Scandinavian countries. Please consider in reference to the cut off for consensus if three-quarters of the experts agreed.
We think that the results can be generalized to some extent and may apply to oncology settings in varying climate zones. In particular recommendations such as ‘Window views’, ‘Accessibility’, ‘Physical activity’ are applicable to, for example indoor courtyards, window views from the patient bed or even indoor horticultural activities (planting, harvesting etc). Therefore, the findings are not necessarily geographically specific.
To your second point, we are not sure if you mean consensus for all items in the recommendations or ones that relate to climatic conditions? In regards to the cut-off for consensus (we sought 75% agreement), the items included in the final round, which were subjected to importance-ranking (prioritizing) had achieved agreement amongst the panel to be considered of great enough importance to be included for the final round. We hope this clarifies your question. Please feel free to clarify if we misunderstood the nature of your question here.
To: BMJ Open Editorial Office
From: Ms Sarah Blaschke
Date: 31/07/2017
Re: Response to reviewer comments for research paper titled ‘Modified international e-Delphi survey to determine feasible nature-based care opportunities in oncology settings’

Letter to Reviewer:
Reviewer 2: The revised version has improved compared to the first submitted version. For further clarification and improvement, I invite the authors to add to the manuscript more of the responses to the comments of reviewer 2, especially in regards to the key choices made in classifying of contents.

Author response to Reviewer 2:
Our intention in formulating the recommendations as a collation of opportunities and barriers was to capture as much nuance as possible in the material contributed by participants, and to provide a synthesis that remains faithful to participants’ conceptualizations of the research topic.

We invited participants to think about opportunities and barriers in the same round of questionnaires and therefore received, in some instances, the same ideas presented from either an opportunity or a ‘Barrier’ perspective by different participants.

The example you mention in your first comments illustrates this: Educating the health care team about available nature-based opportunities and their benefits can promote its uptake (5D), while lack of this knowledge can be regarded a barrier (2E).

The value we see in reporting the data in this way is the level of detail we are able to provide and the opportunity to remain faithful to participants’ accounts. For example, participants’ contributions regarding ‘Accessibility’ as an opportunity amounted to: Easy and effortless access, automated doors, nearby, some areas with high visibility, close proximity to clinical assistance, remove barriers and thresholds, available for patients, carers and staff (2A). Meanwhile participants’ words around ‘Inaccessibility’ as a barrier (the flipside) included following descriptions: 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 (3D).

We hope this clarifies our decisions around data presentation and hope to have explained the value we found representing the breadth of participants’ conceptualizations of the research topic in this format.

I disagree that citing similar work in other populations results in “mixing” or narrowing. In contrast, theory is being built up most efficiently if researchers have the courage to cross borders and when researchers show a good understanding of what is specific for their population and what is not.

Thank you for prompting us to connect with additional literature in our Discussion. We have found a particularly relevant study that looks at nature-based nurse interventions in ICU settings and have brought this into our Discussion. We now connect our findings to this related research and have also chosen to incorporate the paper you suggested in your first comments (Fleming et al.). Please refer to pages 9 – 10:

“In related research, it was found that ICU patients, in particular long-stay patients, can benefit from nurse facilitated nature-based interventions to enhance the clinical environment for better patient outcomes and to avoid unnecessary environmental stressors [37]. Examples of recommended nature-based opportunities available in ICU nursing include: positioning patient beds to view the outside world, appropriate natural light exposure, taking patients to outside areas when able to mobilize and, providing nature-based soundtracks and pictures of nature in the patient room [37]. Our findings further connect with research investigating other vulnerable patient groups such as patients with advanced dementia. Fleming and colleagues [38] confirm the impactful role of environmental design in the care of this patient...
group. Their survey study shows strong agreement among healthcare experts about the importance of certain characteristics of care environments, which include: access to the outdoors and indoor nature (plants, natural light, fresh air), design that promotes sensory and social engagement and, opportunities for privacy, safety and security [38].”

Finally, clarifying the last comment, the 75% cut off for agreement is potentially problematic. If 75% of respondents are from countries with warm climates, it is possible that items are agreed upon that apply to those climates only. This warrants a comment in the discussion section.

Thank you for asking to further clarify this. We have revised the statement in the Limitations section to raise greater attention to this potential bias. In response to your comment, we have taken another closer look and reviewed the list of recommendations with your question in mind and find that the list mostly reflects ideas, which do not strongly depend on climate. They include: Window views, Accessible outdoor environments (including for colder climates), Physical exercise, Safe design materials, Zones for privacy, Repair and Maintenance, Protection from adverse weather, Socializing and, Indoor biophilic design.

We recognize the strong representation of Australian participants in our study (and 2 from New Zealand), and recognize that our data could therefore be susceptible to Australian nuances resulting from cultural as well as environmental and climatic factors. We hope that you find our revision sufficient to draw the readers attention to this issue.

Please find our revision on page 11, paragraph 2, under ‘Limitations’:

“Furthermore, participants’ geographic locations in regards to their native, natural environments and climatic conditions, may have influenced input in this study. It bears mention that more than half of the participants originated from Oceania [Australia (19) and New Zealand (2)], which may have resulted in biased recommendations. The appropriateness and adoption of nature-based care scenarios need to be assessed based on country- and patient-specific standards and guidelines to guarantee safe practices and best outcomes.”
Appendix 30 Victorian Integrated Cancer Services Conference 2017
Abstract

Abstract accepted for poster presentation at the Victorian Integrated Cancer Services Conference 2017, Melbourne, Australia.
Cancer patients' perspectives on nature: normalizing dichotomous realities

Sarah Blaschke1, Clare C O'Callaghan2, Penelope Schofield3, Paer Salander4

1Peter MacCallum Cancer Centre, Department Cancer Experiences Research, The University of Melbourne, 2St. Vincent's Hospital, The University of Melbourne and Palliative Care, Cabrini Health, 3Swinburne University of Technology, 4Umeå University

Aims To explore cancer patients' subjective nature experiences in order to examine the relevance of nature-based care opportunities in cancer care contexts. The rationale was to describe the underlying mechanisms of this interaction and produce translatable knowledge.

Methods Qualitative research design informed by grounded theory. Sampling was initially convenience and then theoretical. Competent adults with any cancer diagnosis were eligible to participate in a semi-structured interview exploring views about the role of nature in their lives. Audio-recorded and transcribed interviews were analysed using inductive, cyclic, and constant comparative analysis.

Results Twenty cancer patients (9 female) reported detailed description about their nature experiences from which a typology of five common nature interactions emerged. A theory model was generated constituting a core category and two inter-related themes explaining a normalization process in which patients negotiate their shifting realities (Core Category). Nature functioned as a support structure and nurtured patients' inner and outer capacities to respond and connect more effectively (Theme A). Once enabled and comforted, patients could engage survival and reconstructive manoeuvres and explore the consequences of cancer (Theme B). A dynamic relationship was evident between moving away while, simultaneously, advancing towards the cancer reality in order to accept a shifting normality. From a place of comfort and safety, patients felt supported to deal differently and more creatively with the threat and demands of cancer diagnosis, treatment and outlook.

Conclusions New understanding about nature's role in cancer patients' lives calls attention to recognizing additional forms of psychosocial care that encourage patients' own coping and creative processes to deal with their strain and, in some cases, reconstruct everyday lives. Further research is required to determine how nature opportunities can be feasibly delivered in the cancer care setting.
Abstract accepted for oral presentation at the Australian Palliative Care Conference 2017, Adelaide, Australia.
Title Nature-based cancer care opportunities: A conceptual framework

Objective To consolidate findings from a research program investigating nature-based oncology care opportunities and discern relevant applications in oncology and palliative care contexts.

Background: Human health and nature is an emerging research field exploring nature’s impact on health and wellbeing. Given preliminary evidence for positive health outcomes related to nature engagement in cancer populations, research is warranted to ascertain strategies for incorporating nature-based care opportunities as additional healthcare strategies for addressing multi-dimensional aspects of patients’ health and recovery needs.

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 oncology design. Concept analysis methodology generated new insight into underlying patient needs by extracting and synthesizing patients’ nature experiences reports. Patient-reported and healthcare expert-developed recommendations for nature-based care in oncology are incorporated into the framework.

Results Five theoretical concepts were formulated describing patients’ reasons for engaging with nature and the underlying needs these interactions address. These included: meaningful connections, distancing from the cancer experience, meaning-making, 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 recommendations attend to important experiential qualities of patients’ nature-based engagement.

Conclusions The proposed framework outlines salient findings about helpful nature-based care opportunities for ready access by healthcare practitioners, designers, researchers and patients themselves. Research collaboration is critical for bringing together expert and patient perspectives to guide successful design and delivery of nature-based healthcare solutions.

120: Collaborative research investigating nature-based care opportunities for applications in oncology and palliative care contexts

Bio
Sarah Blaschke is a PhD Candidate at the University of Melbourne, Sir Peter MacCallum Department of Oncology placed in the office of Cancer Experiences Research. Her background is in Architecture with a special interest and focus on Landscape Architecture. She completed her postgraduate degree in Health Design for Landscape Architecture at the University of Copenhagen focusing on therapeutic landscape design for cancer care settings. Her PhD project uses mixed methods to investigate the role of nature in cancer patients’ experiences of health and recovery with the aim to determine patient-driven solutions for nature-based healthcare and setting design.
Appendix 32 5th Australian Palliative Care Research Colloquium Abstract

Abstract accepted for poster presentation at 5th Australian Palliative Care Research Colloquium 2017, Melbourne, Australia.
Title Nature-based cancer care opportunities: A conceptual framework

Objective To consolidate findings from a research program investigating nature-based oncology care opportunities and discern relevant applications in oncology and palliative care contexts.

Background: Human health and nature is an emerging research field exploring nature’s impact on health and wellbeing. Given preliminary evidence for positive health outcomes related to nature engagement in cancer populations, research is warranted to ascertain strategies for incorporating nature-based care opportunities as additional healthcare strategies for addressing multi-dimensional aspects of patients’ health and recovery needs.

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 oncology design. Concept analysis methodology generated new insight into underlying patient needs by extracting and synthesizing patients’ nature experiences reports. Patient-reported and healthcare expert-developed recommendations for nature-based care in oncology are incorporated into the framework.

Key Learnings Critical health and safety factors need consideration to ensure safe application of nature-based care opportunities in oncology contexts. Healthcare designers and practitioners require evidence-based information about how cancer patients wish to engage with nature in their recovery experiences in order to improve existing design and patient experience through adding nature-based elements into the oncology setting. Various forms of nature engagement exist, which can improve cancer experiences and benefit patients’ lives. Cancer patients report multiple opportunities for such nature-based engagement that may result in positive physical and psychosocial health outcomes.

Results Five theoretical concepts were formulated describing patients’ reasons for engaging with nature and the underlying needs these interactions address. These included: meaningful connections, distancing from the cancer experience, meaning-making, 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 recommendations attend to important experiential qualities of patients’ nature-based engagement.

Conclusions The proposed framework outlines salient findings about helpful nature-based care opportunities for ready access by healthcare practitioners, designers, researchers and patients themselves. Research collaboration is critical for bringing together expert and patient perspectives to guide successful design and delivery of nature-based healthcare solutions.

Bio
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