

Architecture for Nurses: A Salutogenic Re-Imagining of Hospital Infrastructure

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Abstract

Purpose: The purpose of this inquiry was to explore how nurses envision and benefit from restorative built environments in acute care hospitals. **Background:** The Covid-19 pandemic has resulted in alarming rates of occupational stress and attrition in front-line clinicians, which has made inquiry into how to promote well-being in nurses particularly timely, and salient. Much of the existing design literature is functionalist in tenor, foregrounding how to improve the efficiency and productivity of staff. Provided this, little is known about how nurses experience hospital environments and what restorative features they imagine within these spaces to attenuate stress. This insight is necessary for an improved articulation of supportive and restorative architectural affordances. **Methods:** Informed by interpretive description, a qualitative study using photo-elicitation was employed to solicit the experiences of 4 frontline registered nurses working in acute care hospitals in Canada. Data was triangulated from three sources; (1) Photographs; (2) Narrative notes; (3) Semi-structured interviews. **Results:** Iterative and thematic analysis revealed that nurses recognize the power of good design to promote staff retention and promote well-being, although participants largely regard their present work environments as pathogenic and perpetuating harm. Nurses visually and narratively envisioned enriched environments through the use of adaptable space, visual and associative references to nature, a creative atmosphere, inclusive spaces, a civic presence, and the provision of spaces to enable rituals of (self)care. **Conclusions:** Nurses have considerable tacit and embodied knowledge which can improve the hospital built environment, but further research is needed to capture and solicit these holistic experiences.

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Dedication

For Kirpal

... maybe he is that flower that suddenly bloomed on the rhododendron bush I thought had died long ago; maybe he is that cloud, that wave, that rain, that mist...and so I try to be kind to everything I see, and in everything I see, I see him.

-Hanya Yanagihara

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Chapter 1: Introduction

Architecture is ubiquitous and has the potential to elicit well-being or promote illness (Goldhagen, 2017). It does this by influencing an individual's behavioural, neural, and endocrine systems, and as a result, a growing body of research demonstrates that architecture can profoundly influence health (Elf et al., 2020; Golembiewski, 2017; Mittelmark et al., 2016; Stevens et al., 2019). Our premodern ancestors constructed their habitats in natural settings, but research suggests that most individuals now spend about 90% of their time either within, or around, man-made built environments (Goldhagen, 2017). While this constructed world provides us with a deceptive sense of benevolence and neutrality, growing bodies of scholarship suggest that these environments actively enhance or delimit our state of well-being (Mittelmark et al., 2017; Renalds et al., 2010). As global trends of urbanization continue to sustain our interactions with the built environment, it has become increasingly important to unite health and design professionals to construct healthy habitats for present and future generations (Jackson et al., 2013; Kaelin & Okland, 2018). Lifestyle related chronic illnesses now impart significant challenges to health systems worldwide, which has allowed for built environments to emerge as an important foci of health inquiry, and architects and health care professionals as partners in health research (Perdue et al., 2003; Stichler & Okland, 2015).

This thesis will largely serve to create a discursive space examining architecture and health, by privileging a nursing perspective, which is all too often absent from built environment narratives. It remains humbling to preface that this concept of 'healing architecture' was widely embraced in antiquity. The ancient Greeks journeyed to the Asclepius shrines to be healed, while half a world away in India, buildings designed with strict geometric ordering - the Vastu Shastras - corresponded to harmonize bodily humours (Prasad, 2017). The idea that the material world

can influence health, (re)introduces us to the presumption that there is a relation between health and architecture that has largely evaded scientific inquiry (Simonsen & Duff, 2020). So, while this scholastic journey aims to advance knowledge for contemporary application, the idea that our health is spatially mediated, is in fact, one that has been contemplated since time immemorial.

Rigorous and cogent bodies of research indicating relationships between patient outcomes and architectural affordances have enabled a paradigmatic shift in re-examining austere hospital architecture, thereby, (re)considering restorative environments in relevancy both within architecture and nursing (Dendaas, 2011; Nejati et al., 2016; Pink et al., 2020). This has largely confirmed what the ancients intuited; that our individual and collective well-being is at least in part, spatially influenced (Collins, 2020; Prasad, 2017). Emerging research is changing the normative assumption that space is neutral, and architectural teams are increasingly challenged to adroitly design for a diverse group of stakeholders (Verderber et al., 2020). This sustained and growing scholarship of interdisciplinary knowledge is demonstrating the vast potential for influencing positive health outcomes, however, further critical discourse is required to advance this field, as inquiry remains in relative infancy (Nejati et al., 2016; Pink et al., 2020; Trau et al., 2015).

The nursing profession is presently in a critical state of *dis-ease*, as evidenced by a robust body of empirical evidence demonstrating high rates of moral injury, job dissatisfaction, and occupational stress (Stelnicki et al., 2020). Pervasive occupational stress contributes to nursing attrition, which further compounds the dire shortage of qualified nurses (Dendaas, 2011; Stelnicki et al., 2020). The Covid-19 pandemic has resulted in additional accounts of occupational stress for front-line clinicians, which has made inquiry into how to promote well-

being in nurses particularly timely, and salient (Doolittle et al., 2020; Galanis et al., 2021; Stelnicki et al., 2020). While the factors that comprise occupational stress in nursing are complex, there is also emerging evidence that chaotic and inefficient built environments further contribute to nursing dissatisfaction, increased turnover, and diminished ability to deliver optimal care (Applebaum et al., 2010; Dendaas, 2011; Hozak et al., 2016; Sadatsafavi et al., 2015).

Contemporary hospital work environments are complex and multi-dimensional, with social, organizational, and physical facets (Dendaas, 2011). Existing nursing research on work environments is framed nearly exclusively on the social and organizational aspects, which has eclipsed the importance of the physical environment (Dendaas, 2011; Donetto et al., 2017). This unintended exclusion of the physical dimension is particularly problematic provided the body of knowledge demonstrating the impact of the built environment on well-being (Applebaum et al., 2010b; Sternberg, 2009). By virtue of this exclusion, there is a ‘structural missingness’ of the nursing voice, and considerations for the spatial aspects of nursing environments are largely absent in the body of evidence-based design reconfiguring the transformation of healthcare facilities (Hopkins Walsh & Dillard-Wright, 2020; Nejati et al., 2016). Understanding the experiences of nurses and what elements they envision in these spaces will greatly contribute to the articulation of supportive and restorative built environments attuned to the needs of nurses.

Researcher Positioning

I have spent the entirety of my organizational life as a registered nurse (RN) within the confines of complex health environments. I lay witness to how lives are irreversibly altered, and cease, within hospitals. This perspective has affirmed my belief that hospitals are far more than about occupying space; they are about the human experience. My insight working within chaotic

environments void of architectural compassion has shaped my interest in this topic. Spatially speaking, I consider that care and concern can be expressed by how materials, light, form, and colour are crafted within a space. If architecture elicits an experience, then I believe the question becomes how can we harness its expansive influence to elevate the well-being of occupants? I believe that empathy, interdisciplinary collaboration, and a forward-facing ethos are required to create intentional and inclusive spaces that enrich the experience of all users – patients, families, and staff alike. This belief informs and guides my inquiry. There is considerable recognition that poorly designed clinical spaces impact staff, but very little existing research has explicitly sought how to create actively restorative spaces for nurses based on their experiences and needs (Carmel-Gilfilen & Portillo, 2016; Pink et al., 2020; Zhang et al., 2019). The proposed inquiry seeks to address this knowledge gap.

Problem Statement

Hospitals have traditionally been constructed with a utilitarian ethos, and while an important consideration, heightened stress in relation to the built environment is revelatory that there is a need to responsively design and humanize surroundings that support the holistic well-being of nurses (Bates, 2018; Dendaas, 2011; Pink et al., 2020; Verderber et al., 2020). Previous studies have found that workplace stressors, error rates, and turnover intention are amplified in chaotic, poorly designed spaces, and it has been postulated that improving the built environment may help organizations meet the dual demand of retaining nurses and ensuring patient safety (Applebaum et al., 2010; Cardoso et al., 2015; Dendaas, 2011; Plough et al., 2019). Considerable bodies of scholarship have demonstrated that restorative spaces are beneficial to patient health indicators such as anxiety, mood, blood pressure, hospital length of stay, and diminished analgesic use (Dijkstra et al., 2006; Huisman et al., 2012; Ulrich, 1984; Weerasuriya et al.,

2019). According to Korpela and colleagues (2015), restorative built environments are conceptualized as spaces that “permit but also promote restoration and recovery from an inability to concentrate and from the elevated physiological arousal and negative emotions characteristics of acute stress and fatigue” (pg. 216). While considerable academic attention has been directed to how restorative built environments and design quality can improve patient outcomes, there is a paucity of research on how they can engender well-being in staff (Nejati et al., 2016; Pink et al., 2020; Sadatsafavi et al., 2015; Zhang et al., 2019).

Research Purpose & Objectives

The purpose of this study is to explore how nurses envision and benefit from restorative built environments. The overall objectives are: (1) To better understand and communicate the architectural needs of acute care nurses in hopes of informing the future (re)design of hospital built environments (2) To describe how hospital built environments can enhance nurse well-being.

Research Question

The question guiding this inquiry is: *How do nurses experience and envision restorative built environments in acute care hospitals?*

Organization of the Thesis

The following two chapters (*Chapter 2: Review of Pertinent Literature and Chapter 3: Theoretical and Methodological Considerations*) will serve as the foundation and theoretical scaffolding for this inquiry. Chapter 2 will begin by sensitizing the reader to salient terminology and concepts as well as a historical overview of healthcare infrastructure. This will lend to a thematic literary review and critical appraisal of the pertinent literature. Chapter 3 will discuss theoretical and methodological considerations including epistemic positioning, ontological

orientation, and theoretical forestructure. This chapter will also introduce a discussion on the procedural steps with depth and granularity. Chapter 4 (*Findings*) will offer a thematic and visual account of the findings as they relate to articulating how nurses experience and envision restorative environments. Lastly, in Chapter 5 (*Discussion*), I will map how my findings are situated within the greater constellation of extant literature, as well as how they relate to my theoretical scaffold. This chapter will also detail study limitations, and recommendations for future practice, research, and education.

Chapter 2: Review of Pertinent Literature

The literature review is the foundation upon which this inquiry will be built. It serves to create a space for dialogical engagement, appraisal, and synthesis of the scholarship surrounding this topic. Iterative and sustained exploration of the literature has sensitized me to the complexity and nuances related to the inquiry of interest, and the following review will allow me to critically reflect upon the discursual voice, while deepening my own insight and articulating a nursing perspective. Most importantly, this foundation is essential to situate the presented research within a greater community of work. As a living document, the corpus of this review will continue to grow and evolve as new insights are revealed. As such, engagement with the literature will be ongoing and dynamic throughout the completion of this thesis. This will serve to strengthen the theoretical and conceptual foundations upon which this research is built and present recent design-health connections emerging in the empirical literature. The selection of research in this review was obtained through a systematic search of various nursing and interdisciplinary databases and was supported by a health sciences librarian (*See Appendix A for Search Strategy*). This broad systematic search was supplemented with an extensive hand search of selected references for additional peer-reviewed publications. Nursing literature was explicitly sought but given the dearth of nursing research in this area, much of the literature discussing clinical spaces and the impact on nursing was represented by voices in architecture and engineering.

This literature review will begin by conceptualizing key terminology such as ‘*architecture*,’ ‘*built environment*,’ and most importantly ‘*space*.’ This will be followed with enumerating four thematically organized sections: first, a historical chronology of healthcare architecture; second, nursing work environments; third, the influence of architecture; and fourth, I will conclude with an examination of the potential of architecture to enhance health, and the

criticality of this research in order to better understand the physical environment on the nursing profession.

Architecture and Built Environments: Key Terminology

While seemingly dichotomous in professional nature, architecture and nursing both involve complex processes, problem-solving, and intuitive knowledge. Architecture, much like nursing, is both an art and a science (Kaelin & Okland, 2018). Examination of the literature found that architecture repels a simplistic definition, and research reveals diverse conceptualizations. Defining architecture is as much of a technical as it is a philosophical exercise. First conceptualized by the ancient Roman architect Vitruvius Pollio in his classic treatise entitled ‘De Architectura,’ architecture was characterized as providing “firmness, commodity, and delight¹” (Pollio & Gwilt, 1826). Architects Jelić and colleagues (2016) poetically claim that architecture is an existential art “... that scaffolds human life” (p. 2). While Stevens et al., (2019) pragmatically define architecture as a discipline and practice (Stevens et al., 2019). The Royal Architectural Institute of Canada [RAIC] (2016), eloquently and comprehensively describe architecture as the following:

Architecture is a passion, a vocation, a calling - as well as a science and a business. It has been described as a social art and also an artful science... Architecture provides a sense of place and support of all types of human activity. Architecture helps the man-made fit in

¹*Firmness* - refers to the structural durability and integrity of the building.

Commodity - refers to the “spatial functionality” or whether a building is able to function for its intended purpose

Delight - refers to a building that is “not only aesthetically and visually pleasing, but also lifts the spirits and stimulates the senses” (RAIC, 2016, para 5.)

harmony with the environment while promoting health and well-being, enriching lives aesthetically and spiritually, providing economic opportunities, and creating a legacy that reflects and symbolizes cultures and traditions (para 1).

While architecture may be diverse in conceptualization, there is widespread acknowledgement that interacting with architecture is part of the art of living (Goldhagen, 2017). Its ubiquitous presence permeates people's lives and inflects how individuals feel, think, and act (Golembiewski, 2017; Mourshed & Zhao, 2012; Vasilski, 2016). Increasingly recognized as more than an aesthetic or functional backdrop, growing research acknowledges architecture's ability to impact planetary and human health (Applebaum et al., 2010; Cardoso et al., 2015; Ghaffarianhoseini et al., 2018; Goldhagen, 2017; Nejati et al., 2016; Sadatsafavi et al., 2015). Examining architecture through a health orientation is a compelling way to improve the design of our constructed world (Beatley et al., 2018; Goldhagen, 2017). Resultingly, this has corresponded with increased attention - in both research and industry - on the architectural design of healthcare facilities (Mourshed & Zhao, 2012). It has been suggested that optimal architectural outcomes are achieved when architects better understand healthcare, and nurses better understand design (Kaelin & Okland, 2018; Stichler & Okland, 2015).

The concept of the built environment was more consistently defined in the literature, and public health researchers Schulz and colleagues (2016) demarcate the concept of 'environment' into both social and built environments. Social environments involve social cohesion, social support networks, and social capital. Contrastingly, built environments are human-made, constructed surroundings such as the layout of communities, buildings, transportation systems, and green spaces (Schulz et al., 2016). Stichler and Okland (2015) endorse a similar view and simplistically accept the built environment as "man-made surroundings where human activity

occurs” (Stichler & Okland, 2015, pg. 216). The built environment which encapsulates so much of human life, is increasingly regarded as a creative antecedent to individual and community well-being (Gehl, 2010; Perdue et al., 2003; Renalds et al., 2010).

A Brief Meditation on Space and Place

The concept of space is essential to the conceptual understanding of this work. Space is often referenced in a metaphorical manner (Lawson, 2001), but this research is largely focused on better understanding the use of architecture to create *material* space to promote health. Thus, to disrupt metaphorical connotations, and create delineations between various definitions of space, a more operational understanding is required. There is a peripheral body of nursing and sociological research on how nursing relates to clinical geographies and how nurses interact with spaces (Andrews, 2006; Andrews & Shaw, 2008; Halford & Leonard, 2003; Roxberg et al., 2020). While seemingly high in abstraction and obscure in nature, space and all that encloses it is central to our lives, and arguably, central to the delivery of nursing (Andrews & Shaw, 2008; Roxberg et al., 2020). Architect Bryan Lawson (2001), states that architecture is a process that creates, structures, and organizes space for us (Lawson, 2001). Two conceptions often characterize what we refer to as space (Tryselius et al., 2018). Space may be expressed as ‘absolute space’ in which space is purely technical, objective, and mathematical. That which can be constructed and metrically quantified. This positivistic paradigm to spatial understanding has largely been reinforced and perpetuated by Cartesian duality which privileges the mind over the body and the material world (Tryselius et al., 2018). While increasingly challenged by emerging neuroscience research which indicates that humans have a more embodied and holistic experience of space, it remains heavily influential in design (Jelić et al., 2016; Roxberg et al., 2020). This definition has guided significant bodies of quantitative research in evidence-based

design which has largely guided the construction of healthcare infrastructure (Lundin, 2021). The proposed inquiry rejects this arithmetic definition of space.

Contemporary theorizing on space increasingly speaks to its active and participative role in the delivery of healthcare (Grignoli, 2021; Halford & Leonard, 2003; Roxberg et al., 2020; Tvedebrink & Jelić, 2021). It has been suggested that greater exploration of physical space in nursing offers a rich avenue to better understand the influence between space and clinical practice - including interprofessional relationships, professional-patient relationships, and working conditions (Andrews & Shaw, 2008; Donetto et al., 2017; Malone, 2003). Nursing scholar Ruth Malone (2003) articulates that nursing has spatial aspects, and that clinicians are not “disembodied subjects set over against a separate background or environment, but persons-in-place, that proximity and distance have relevance in our relations with others” (pg. 2318). Space, therefore, impacts all aspects of care (Kaelin & Okland, 2018; Roxberg et al., 2020; Tryselius et al., 2018). A spatial orientation allows nursing research to expand its disciplinary boundaries and (re)focus on the meta-concept of the nursing environment (Andrews & Shaw, 2008). ‘Relational space’ aligns with a relativist ontology and is conceptualized as space which is topological in nature, and is continuously made and re-made through a dynamic by-product of social, environmental, cultural, and temporal relations (Tryselius et al., 2018; Tvedebrink & Jelić, 2021). Quite simply, it refutes the notion that space is static and objective and regards it as a holistically conceived experience.

This relational definition mirrors the architectural literature, which delineates the nuances between a space and a place (Pérez-Gómez, 2016). Architectural theorist Alberto Pérez-Gomez (2016) explains that a place has deep emotional and narrative aspects, and is crafted and conceived with harmony between the architecture and social, environmental, and cultural

characteristics. While respecting the body of architectural literature on places (and recognizing that the aforementioned succinct definition is by no means nuanced or exhaustive), architectural definitions of place align with what is regarded as relational space outlined in the sociological and nursing literature (Martin et al., 2015; Roxberg et al., 2020; Tryselius et al., 2018). Both ‘place’ and ‘relational space’ are conceptualizations that regard architecture as more than a 3-dimensional matrix, and instead as an active element in co-creating experiences, behaviour, and encounters thus, making it “participative in the very making of health and care” (Roxberg et al., 2020, pg. 1). To facilitate ease and consistency, I will refer to ‘space’ henceforth within this thesis, but with the disclosure that it is aligned with this relational conceptualization.

Modern Hospitals: A History of the Present

The Past

Re-appraisal and reflection of healthcare architecture through a brief chronology allows us to better understand the present state of hospitals, while contemplating how a historical precedent may inform the future design of these spaces (Verderber, 2010). The relationship between our built environment and its influence on well-being was widely acknowledged in antiquity (Collins, 2020; Verderber, 2010). Hippocrates asserted that physicians must possess the ability to comprehend how environmental determinants influence health (Verderber, 2010). Indeed, architecture was a preeminent prescription for health before the advancement of pharmaceuticals and biomedicine (Collins, 2020). However, while the power of design was acknowledged in antiquity, this knowledge was subsequently lost during the Middle Ages. Religious orders introduced monastic hospitals with minimal apertures of daylight and views of nature, which singularly emphasized faith as the redemptive power over illness. This belief

diminished the emphasis on architecture and the environment as credible treatments for the ill (Verderber, 2010).

The importance of built environments on health indices was re-discovered in the mid-19th century by founder of modern nursing, Florence Nightingale (1820-1910), and subsequently integrated into nursing's disciplinary lexicon. This spark of insight created the transposition of nursing principles into architectural form (Verderber, 2010). It is the premise of Nightingale's philosophy – that the physical environment can be harnessed to restore health – which has inspired the inquiry of how built environments can support health (Gaminiesfahani et al., 2020). Nightingale herself was actively involved in the design of wards which were modernist in expression, placing emphasis on colour, daylight, and ventilation (Verderber, 2010). Despite Nightingale's conviction to further this architectural discourse, it was dismissed in the mid-20th century by hospital designers who privileged dominant biomedical advances and aseptic theories, which championed the hospital's ability to facilitate medical treatment, instead of its therapeutic milieu (Kisacky, 2017). During this time, previous hospital designs were made redundant by this divergence in values, which emphasized biomedical and pharmaceutical approaches to care (Collins, 2020). Consequently, architecture is understood as a cultural artifact; a material archeology shaped by the priorities and beliefs of decision-makers during specific time periods (Heresies, 1981). This aseptic approach to design and corrosion of values allowed for hospitals to become renowned as hermetically sealed, sterile spaces. This trajectory of dismal design was disrupted by the seminal research of Dr. Roger Ulrich (1984), who demonstrated positive correlations between views of nature and post-operative recovery. His novel research provoked a spirit of inquiry among various disciplines, including nursing, and renewed interest into the therapeutic benefit of restorative architecture (Dijkstra et al., 2006; Huisman et al., 2012; Seidel

et al., 2012; Stevens et al., 2019). Most importantly, this work inspired an academic dialogue to emerge, and helped restore a creative transliteration between architecture and health.

The Present

Historically, hospitals were viewed as neutral, charitable institutions, but have now evolved into complex organizations that are structured on business standards and hierarchical oligarchies (Verderber, 2010). This is represented in architectural form with the prominence of unsustainable, modern ‘high-rise’ hospitals (Kisacky, 2017). Stakeholders in hospital infrastructure often place value on functional efficiencies, and may have antipathy to change over what may be viewed as innovative new forms (Goldhagen, 2017, Harty et al., 2015). When designing within fiscal restraints and deadlines, it can be difficult for project managers to resist the enormous inertia of conventional design (Verderber, 2010). Infrastructure is highly contingent upon economic conditions, municipal ordinances, and the time horizon set to complete these projects (Goldhagen, 2017). The process of constructing hospitals is often driven by marketplace exigencies, and design decisions are often left to those who have little understanding of their consequence on end-users (Keddy, 2009; Mittelmark et al., 2016). Despite best intentions, designers often relate tangentially with those who will spend significant time within these spaces (Carmel-Gilfilen & Portillo, 2016; Elf et al., 2020; Pink et al., 2020; Stevens et al., 2019). Consequently, this has produced a disillusioning division between the design intention and its lived reality for end-users (Kisacky, 2017).

Approximately 60% of nurses spend their organizational lives in hospitals, and yet, these nurses are often not consulted in the design of these spaces, and as such, there is a critical stakeholder perspective that has been excluded (Canadian Nurses Association [CNA], 2021; Stichler & Okland, 2015). The omission of the nursing perspective at the design table has

resulted in a disciplinary dissatisfaction with hospital built environments (Dendaas, 2011). Consequently, nurses have become masters of ‘workarounds’ to accommodate the rhythms of temporally changing and complex care within spaces that fail to understand nurses, and nursing (Dendaas, 2011). The built environment has not been reconfigured as nursing has evolved and consequently, the design of the hospital amplifies the stress of clinicians and constrains their ability to provide optimal care (Stichler & Oakland, 2015). Further complicating the matter, this literary review found that nursing research rarely engages to better understand how nursing is spatially or materially organized (Applebaum et al., 2010; Dendaas, 2011; Keddy, 2009) and nurses themselves rarely consider their clinical geographies (Andrews, 2006; Donetto et al., 2017; Halford & Leonard, 2003).

Nursing Work Environments

Organizational Environments

Hospitals may be regarded as places for patients, but for nurses, hospitals are workplaces (Dendaas, 2011; Kaelin & Okland, 2018; Keddy, 2009; Taylor, 2017). A nuanced entanglement exists between the social, organizational, and physical aspects of nursing work environments and healthcare environments contain a multiplicity of “actors, actants and activities” (Nettleton et al., 2018, pg. 1157). There has been unprecedented organizational change within healthcare organizations as a result of neoliberal agendas resulting in fiscal restraint and restructuring efforts (Kaelin & Okland, 2018; McMillan, 2016; McMillan & Perron, 2020; Roberts et al., 2016; Weberg, 2012). As articulated by McMillan and Perron (2020) “rapid and continuous organizational change challenges healthcare providers in a variety of ways because it restructures how and when patient care delivery is provided, changing ways in which nurses carry out their work” (pg. 2628). This managerial ideology has placed nurses at the praxis of organizational

demands and patient care, which has resulted in critical rates of moral injury, disillusionment, and attrition from the profession (McMillan & Perron, 2020; Stelnicki et al., 2020). Medical sociologist Sarah Nettleton (2018) articulates that a better understanding of hospital space is a creative way to comprehend the micro and macro politics of healthcare organizations, and the way in which institutions encode ideas about care (Nettleton et al., 2018). Furthermore, neoliberal agendas and rapid organizational change have implications for increasing the demand to replace and renovate existing healthcare infrastructure (Taylor, 2017; VanHeuvelen, 2019).

While good architecture is often referenced in its ability to unify ‘form and function’ researchers have increasingly questioned: functional for whom? (Annemans et al., 2017; Nejadi et al., 2016; Pink et al., 2020; VanHeuvelen, 2019). The impact of physical organizational change is rarely examined from staff perspectives and assumes that healthcare providers will robotically adapt to their new clinical setting (VanHeuvelen, 2019). Sociologist Jane VanHeuvelen (2019) states that physical renovation and remodelling is dissimilar to policy or technical changes in that nurses “do not have the option of ignoring or only ceremonially complying” because the physical restructuring of the clinical setting requires all individuals to adjust and establish their work routines to fit the environment (pg. 695). Engineers Annemans and colleagues (2018) state that an improved understanding of how nurses adapt to these spatial changes is important as it may reveal how to improve patient care (Annemans et al., 2018).

A mixed methods study conducted by nursing researchers Donetto and colleagues (2017) drew on the experiences of 25 patients and nurses to better understand the working conditions, safety, and patient experiences after transferring from an open surgical ward with 9-12 beds, into a new single-room facility (Donetto et al., 2017). Interviews with patients and nurses illuminated surprising changes in relational practices with single-occupancy rooms. Patients articulated

increased comfort with having conversations with staff because of the enhanced privacy and confidentiality afforded by private space. However, as a result of this privacy, patients also became less cognizant that nurses may be occupied with other patients and resultingly conveyed feelings of neglect (Donetto et al., 2017). Interestingly, nurses articulated that occupancy of single rooms resulted in fewer conversations with colleagues and diminished teamwork. This is problematic as these (in)formal interactions matter deeply to enhance nursing morale, reduce stress, and facilitate critical communication about patients (Donetto et al., 2017). So, while changing organizational ideologies are increasingly emphasizing the construction of single-occupancy rooms, this research contributes to the understanding that hospital spaces are highly nuanced and improved affordances in privacy and dignity may impoverish other essential aspects of care such as teamwork and communication (Donetto et al., 2017). Research has consistently demonstrated that nurses are highly supportive of improving the therapeutic milieu of hospital spaces for patients and families (Annemans et al., 2018; Gharaveis et al., 2020; Jouppila & Tiainen, 2020; Sadatsafavi et al., 2015). However, spaces for patients and families are often prioritized in both research and square footage, and it has been suggested that increased research on staff perspectives will allow for the prioritization and allocation of staff spaces in future hospital infrastructure, as well as provide insight into how to improve workflow (Mroczek et al., 2005; Nejati et al., 2016; Sadatsafavi et al., 2015).

Social Environments

Healthcare environments may be intended for supporting illness and healing, but they are replete with stressors (Dyess et al., 2018). Professional nurses face a complex barrage of demands from depleted resources, and intensification of nursing work resulting in increased workload and reduced recuperative time (Henshall et al., 2020; McMillan & Perron, 2020).

Hospitals consistently rank among the most stressful work environments and the nursing profession is presently facing unprecedented rates of burnout and attrition (Nejati, et al., 2016; Stelnicki et al., 2020). Paradoxically, nurses are expected to advocate for health promoting behaviours in patients, while “doing without” and sacrificing personal needs (Ciezar-Andersen & King-Shier, 2021, pg. 234). The culture of nursing has not always been receptive to the practice of self-care, as it has often been minimized as a sign of weakness or fallibility (Henshall et al., 2020). Dominant discourses on clinician resilience are often problematically framed in that they situate individuals as sovereign over their ability to deflect burnout (Henshall et al., 2020). While individual self-care and resilience interventions may be moderately helpful to mitigate stress and burnout (Duarte & Pinto-Gouveia, 2016; Vivian et al., 2019; West et al., 2016; Zhao et al., 2019), there is indisputable and increasing recognition that burnout is a result of repeatedly navigating challenging work environments (West et al., 2018).

Despite an increase in research relating the poor physical work environment and occupational stress in nurses (Applebaum et al., 2010; Dendaas, 2011; Nejati et al., 2016), environmental modifications for clinical spaces are afforded little attention in the greater discourse surrounding how to mitigate clinician stress and burnout (Dendaas, 2004). In interviews conducted by architectural researchers Nejati and colleagues (2016), nurses remarked that facility design contributes to overall job satisfaction and that organizations who commit to thoughtfully designing and providing appropriate spaces for nurses materially articulate feelings of value and respect for the profession. Nurses also articulated that well-designed and equipped spaces would be emblematic of a cultural shift within healthcare, and that good design is symbolic of a commitment to nurse well-being (Nejati et al., 2016). This sentiment is corroborated by engineering researchers Sadatsafavi & Walewski (2013), who shared that the

built environment tells employees a “great deal” about organizational concern for them and concluded that thoughtful design should be employed as a component of human resource management to support staff retention in healthcare (pg. 103).

Physical Environments

Previous research has reported high incidences of illness related to sick-building syndrome (SBS) within hospitals, and nurses constitute the most prevalent users of these spaces (Cardoso et al., 2015; Sadatsafavi et al., 2015). Sick building syndrome constitutes a collection of non-specific symptoms including mucosal irritation, fatigue, headaches, nausea, dizziness, and skin irritations, which have been noted to occur in occupants of modern buildings (Ghaffarianhoseini et al., 2018). Illness has been correlated with disempowerment, and critical rates of stress and burnout within the nursing profession have begun to receive widespread recognition during the Covid-19 pandemic (Stelnicki et al., 2020). Healthcare capacity is directly contingent upon a healthy and empowered nursing workforce, which is currently threatened by unsustainable rates of stress and turnover intention within the profession (Cardoso et al., 2015; Duchscher & Myrick, 2008; Gharaveis et al., 2020; Stelnicki et al., 2020). A societal tolerance for dispirited design and a lack of understanding of the architectural mechanisms that can influence our health has led to the proliferation of stultifying, austere hospitals (Beatley et al., 2018; Pink et al., 2020; Trau et al., 2015; Verderber, 2010). Misinformed perspectives that view nurse consultation to improve healthcare infrastructure as increasing project costs often fail to acknowledge the significant, recurring post-occupancy related costs associated with poor design (Kaelin & Okland, 2018; Pink et al., 2020; Trau et al., 2015). Despite this, harnessing architecture to create spaces that promote health and improve working conditions is increasingly

recognized in the literature as important for the delivery of high-quality healthcare (Anåker et al., 2017; Clark, 2014; Kaelin & Okland, 2018; Zborowsky & Bunker-Hellmich, 2010).

Designing for Humans: The Influence of Architecture

Non-Neutrality of Space

Our surroundings are not neutral - they hold the ability to shape our emotions, behaviours, sociability, and even serve as guardians to our identity (de Botton, 2006; Goldhagen, 2017; Sadek & Willis, 2019). Emerging research in neuro-cognition indicates that a number of neurotransmitters such as acetylcholine, serotonin, and dopamine directly respond to environmental stimuli in our surroundings, and thereby, architecture can directly influence both our brain and body (Golembiewski, 2017). Consequently, there is increasing awareness that our surroundings have the capacity to directly enrich or impoverish our lives in pervasive and concrete ways (Beatley et al., 2018; Reid, 2019). One of the most compelling arguments to (re)design considered and restorative hospitals amidst competing market influences is to understand the significant impacts of the built environment on the well-being of occupants (Goldhagen, 2017). Research is instrumental in informing a radical re-imagining of our surroundings to support our emotional, physical, and social faculties (Lunden et al., 2021). The American Institute of Architects (2021) has publicly stated that architects are uniquely positioned to address the multitude of health challenges plaguing our society through the designed environment (American Institute of Architects [AIA], 2021). Yet, despite this increasing awareness, well-designed architecture is rarely afforded a priority in public health policy (Goldhagen, 2017).

In relation to this lack of considered design for humans, Judith Heerwagen (1995), researcher and program expert at the U.S. Office of Federal High Performance Green Buildings

articulates a compelling perspective. Through her research, she noted the creation of enriched habitats for zoo animals receives notably more attention than spaces for humans. The creation of environments for captive animals involves a collaborative effort from biologists, psychologists, architects, and landscape designers to create socially and psychologically healthy spaces (Heerwagen et al., 1995). Yet, as a species, humans still rarely consider how to design optimal spaces for our own well-being, despite spending significant amounts of time in and around the built environment (Beatley et al., 2018; Heerwagen et al., 1995). Resultingly, there has been some critiques that building codes used to govern the design and construction of buildings should be concerned with providing a framework to design with both safety, *and* well-being in mind (Chauvin et al., 2016).

The non-neutrality of our surroundings extends beyond the neuro-cognitive influence of design. Architecture is the visible manifestation of dominant and normative societal perceptions and values, and can therefore perpetuate implicit biases (Beatley et al., 2018; Heresies, 1981; Kisacky, 2017). Hospitals in particular comprise a ‘layered space’ in which biomedical values are transposed into spatial arrangements which reinforce a professional hierarchy and bifurcation between clinicians and patients (Martin et al., 2015). Hospital spaces, such as patient rooms, are often subject to contestation and require a balance between the needs of practitioners and those of patients (Annemans et al., 2018; Gharaveis et al., 2020; Sadatsafavi et al., 2015). Consequently, these spaces are uniquely nuanced, and deeply relational (Martin et al., 2015).

Space and Power

Unlike some other artistic mediums, architecture does not solely exist for a passive audience. It is occupied and inhabited and has therefore been articulated as a social art; it crafts an environmental backdrop that can perpetuate and reinforce transgressive social orders and

construct material biases within spaces (Fisher, 2018; Heresies, 1981). Architecture has been criticized for being complicit in reinforcing professional and social hierarchies (Fisher, 2018; Martin et al., 2015; Ward, 1996). As a gendered and oppressed profession, nursing persistently battles a subservient and enfeebled image, and in this regard, the appropriation and allotment of space is seen as a political act (Duchscher & Myrick, 2008; Heresies, 1981). It has been documented that women have been historically excluded from making spatial decisions that impact their lives (Heresies, 1981; Dendaas, 2004), and there exists a complex entanglement between power and the ability to control space (Findley, 2005). The organizational spaces that one is provided or denied has the ability to empower or disempower, and therefore, has the potential to further inscribe oppression (Duchscher & Myrick, 2008).

Hospitals often contain a diversity of areas such as lounges, research centers, and libraries, but previous research has indicated that nurses have the least access to these spaces, and often remain confined to wards (Halford & Leonard, 2003). It has been postulated that this organizational confinement has consequences on the professional identity of nurses, and consequently, the built environment is not simply a passive backdrop for the organizational lives of nurses, but active in constructing (and constricting) their roles within healthcare organizations (Halford & Leonard, 2003). From a Foucauldian perspective, this is revelatory of the biopolitics within hospitals, in which space is an expression of increasing medical dominance and power dynamics within institutions (Foucault, 2007; Kisacky, 2017; Martin et al., 2015).

As hospitals evolved within the confines of urban settings, the design template to construct generic, high-rise hospitals to maximize efficiency while eschewing reference to vernacular architecture resulted in considerable savings (Kisacky, 2017). Aligned with this biomedical dominance, the hospital design partitioned into various specialties, and fractured

patients and their ailments into an assemblage of parts (Prasad, 2017). This displaced and dehumanized design ethos focused on efficiency while aggressively minimizing expenditures and according to Foucault, is the literal rendering of the political economy in architectural form (Foucault, 2007; Martin et al., 2015). Constructed within these hospitals are the embedded institutional values of efficiency and functionality (Kisacky, 2017), arguably at the expense of staff well-being. Poor design contributes insidiously to a culture that devalues what nurses do, and how they work (Nejati et al., 2016). In an interview with nurse managers, participants reported that the built environment is an avenue to reduce stress and enhance well-being, yet despite this awareness, they acknowledged that staff are often provided minimal space and amenities, often relegated to “small little cramped rooms, converted patient rooms, and converted offices” (Nejati et al., 2016, pg. 20). One interviewee explicitly noted that many of the pernicious problems inflicting nursing will be difficult to solve without a better understanding of the physical environment and recognition of its role in supporting nurses, and nursing (Nejati et al., 2016).

It has been posited that improving the built environment may improve indices of satisfaction, motivation, improved communication, and diminished turnover intention among nurses (Mroczek et al., 2005; Pink et al., 2020; Sadatsafavi et al., 2015; Trau et al., 2016). In retribution to cultures of efficiency and civic austerity, there is research to suggest that ergonomic, and thoughtfully designed spaces that support staff may provide significant long-term cost savings (Mourshed & Zhao, 2012; Pink et al., 2020; Trau et al., 2015). Engineers Mourshed & Zhao (2012) note that poor work environments are commonly associated with turnover, and poor physical nursing environments are associated with increased injury rates, stress, and medical errors, all of which result in considerable costs. The estimated expenditure to

replace a single RN is estimated between \$25,000 to \$88,000 (Weninger Henderson, 2020). This is in addition to the significant operational cost burden associated with inadequate RN staffing, which is correlated with higher patient readmission rates and increased nosocomial infections resulting in a longer hospital length of stay (Weninger Henderson, 2020). With an aging population, costs associated with both nursing turnover and inadequate staffing are poised to increase even more dramatically (Weninger Henderson, 2020). Similarly, this sentiment is shared by healthcare architect Tye Farrow, who remarked that the primary budgetary concern for healthcare executives is sick days for nursing staff, which subsequently results in millions of dollars in annual expenditures. Yet, upon his assessment of the physical nursing work environment, he notes that many of the spaces nurses work in are chaotic, display poor ergonomics, and lack coherence to support their work and well-being (Canadian Medical Association Journal [CMAJ], 2010). With healthcare expenditures increasing, designing spaces that support an employee's socio-emotional needs has been recognized as an emerging cost-containment strategy and the built environment plays a role in achieving this objective (Sadatsafavi & Walewski, 2013).

Utilitarian Spaces

Nurses conveyed a serious deficit in environmental congruence to support the complexity of contemporary nursing work and some nurses articulated to researchers a lack of designated nursing space away from the institutional gaze (Dendaas, 2011; Donetto et al., 2017; Jouppila & Tiainen, 2020; Nejati et al., 2016). There is an increasing technological locus in healthcare, and in settings such as intensive care, this requires considerable spatial attention to allow nurses to orchestrate clinical endeavours (Jouppila & Tiainen, 2020). Designers and architects have consistently privileged designing hospitals that have maximized productivity and efficiency,

often at the expense of non-clinical areas for staff (Gharaveis et al., 2020; Nejati et al., 2016; Pink et al., 2020; Sadatsafavi et al., 2015). A study by healthcare design researchers Hozak and colleagues (2016) found that 19 out of 27 hospital wards did not have a private breakroom for staff. Nurses revealed they improvised in an ad-hoc manner by using the bathroom as a quiet space to decompress (Hozak et al., 2016). Increasingly emphasized in the built environment literature since the Covid-19 pandemic is the necessity for providing physical breakroom space for nurses to decompress, and allow nurses to step away from continuous sensory assaults and the institutional gaze in order to recalibrate their equanimity (Bogaert, 2021; Gregory, 2021). As noted previously, the absence of attuned workspaces and break areas in nursing has been attributed to larger socio-cultural issues. Feminist architects have articulated that women's needs for space and resources have been historically neglected and marginalized (Dendaas, 2011).

Architect Karen Keddy (2009) explored the relationship between the physical nature of nursing work and nursing space, and noted that there is considerably less research on hospitals as physical workplaces for nurses (Keddy, 2009). A constellation of studies examining the hospital built environment from an institutional lens attend to features that contribute to the productivity of staff (Gharaveis et al., 2020; Hozak et al., 2016; Jouppila & Tiainen, 2020; Sadatsafavi et al., 2015; Tanja-Dijkstra & Pieterse, 2011). However, reducing design into functional and productive vignettes that privilege task-based efficiencies offers a restricted outlook on how to fully optimize nursing work environment to engender well-being (Applebaum et al., 2010; Nejati et al., 2016; Pink et al., 2020). Furthermore, increasing staff 'productivity' is an abstract concept and is not defined or clarified in countless studies (Gharaveis et al., 2020; Hozak et al., 2016; Sadatsafavi et al., 2015; Tanja-Dijkstra & Pieterse, 2011). It is particularly notable and concerning that nursing voices remain largely marginalized in the healthcare design literature

(Keddy, 2009). Engineering and architectural perspectives which are dominant in the discourse often have little understanding of the complexity of the nursing profession and the embodied experiences of nurses within these spaces (Kaelin & Okland, 2018; Keddy, 2009). In order to move forward in a meaningful and inclusive manner, clinical nurses and nurse researchers must partake in the multidisciplinary research of physical nursing workspaces (Clark, 2014; Keddy, 2009; Stichler, 2007).

Spaces as Ethical Environments

Architecture and the built environment are components of a complex whole involving various stakeholders, thereby precluding the possibility of a single solution for complex design problems. As such, design problems often involve normative choices between incompatible ends (Schrijver, 2013). While there is some philosophical debate as to whether a building can communicate a moral position (Schrijver, 2013), architects Shah & Kesan (2007), endorse that many buildings have been intentionally designed to elicit certain values. A simplistic example of this includes that historically many banks stewarded durable materials such as stone to express values of trust, security, and reliability. They argue that through manipulation of form, light, and materiality, buildings communicate their values through a subliminal language (Shah & Kesan, 2007).

Architect Thomas Fisher (2018) articulates that designing a building with an ethical imperative should be as relevant to architects as “form and function” (pg. 5). Architecture is regarded both as a product of human activity, and also a component of the environment which shapes human activity (Harries, 1975). Issues of social inequality and environmental degradation have refocused the complicity of architecture in reinforcing and perpetuating such problems (Verderber et al., 2020). The ethical function of architecture has been frequently eclipsed and

this has been viewed as a consequence on the emphasis on objectivity and reason within the profession (Harries, 1975). Fisher (2018) further articulates an ethical vision for architecture stating:

Physical space, in other words, has more than a coincidental relationship to our behavior; it creates the opportunities to do right or wrong and as such, we need to take ethics into account when we design spaces... The ethical implications of what architects create – the spaces in which we spend our days – rarely gets discussed and hardly gets mentioned in architects' code of ethics. The same seems true of ethics as a branch of philosophy: space rarely gets mentioned in the ethical literature and ethics has remained largely a-spatial over most of its history, even though ethical dilemmas have a clear spatial aspect (pg. 5).

Provided the prevalent impact of the built environment on the well-being of individuals, designing spaces in which health is promoted is ethically justified (Sainsbury, 2013). Hospitals in particular exemplify a building in which ethical aims such as error prevention can - and should be - supported through the design of the built environment (Bolton & Berlinger, 2011).

There remains a notable absence of discourse on the ethical implications of unsupportive built environments for nurses as they navigate complex technical, intellectual, and relational work. Shah & Kesan (2007) note that gendered spaces in which nurses work are often 'open' in the sense that nurses seldom have control over their space and privacy (Shah & Kesan, 2007). Keddy (2009) noted that nurses often expressed uncertainty whether they were entitled to use certain spaces such as lounges and questioned whether areas such as the nursing station were public or private space (Keddy, 2009). This contested spatial geography often lends to what Peter and Liaschenko (2004) have coined a 'sustained proximity' to patients, both in geographical and a moral sense. This spatiotemporal positioning of nurses 'at the bedside' has served to solidify

nursing's identity and engender a moral sensitivity to patients. However, the peril of this sustained proximity to patients also results in intensified moral responsibility to patients (Peter & Liaschenko, 2004). This physical proximity to patients covertly abrogates healthcare institutions from their corporate decisions which impact care, and also places nurses at risk for moral injury (Peter & Liaschenko, 2004). Sustained physical proximity is necessary and valuable to allow nurses to practice from an ethically grounded place (Malone, 2003). However, it is also essential that there are restorative spaces distal to patients and away from the institutional gaze to facilitate decompression and ethical sensemaking (Gregory, 2021). In sum, nurses need spaces proximate and distal from patients to facilitate ethical practice and decompression.

Spaces as Sensory Environments

Architectural experiences are based on the senses (Mroczek et al., 2005). It is within our surroundings that swirls of sensory cues permeate and shape our experience of the built environment (Goldhagen, 2017). Research has demonstrated positive correlations between architectural elements, such as access to views of nature, and stress reduction (Gharaveis et al., 2020; Sadatsafavi et al., 2015; Tavakkoli et al., 2015). An integrative review by designers Zhang and colleagues (2019), synthesized 127 studies and concluded that there is an abundance of scholarship that has been directed to examining singular design parameters such as light, noise, and private rooms in relation to patient outcomes, however, many other architectural parameters remain under-examined (Zhang et al., 2019). A lack of holistic and dynamic examination on how these elements interact has made dissemination to inform complex design solutions challenging for architects and design teams (Carmel-Gilfilen & Portillo, 2016; DuBose et al., 2018; Lundin, 2021; Zhang et al., 2019). Translating quantitative research may not be within the *métier* of many architects, and there is a salient need to present accessible and relevant research through

user-friendly, narrative information to eliminate communication barriers (Lundin, 2021; Stevens et al., 2019; Tvedebrink & Jelić, 2021; Van der Linden et al., 2016). While remaining pragmatic in tenor, qualitative studies are critical for soliciting insight into a range of environmental perceptions, emotions, and experiences (Bogaert, 2021; Sadek & Willis, 2020). Previous literature has demonstrated that there is a need to holistically examine the impacts of the built environment on physical, mental, and emotional facets - particularly from staff perspectives - and how these may impact well-being (Pink et al., 2020; Sadatsafavi et al., 2015; Zhang et al., 2019).

Previous nursing research has found that levels of harsh light, noxious odours, and noise were correlated with increased nurse stress and nursing turnover intention (Applebaum et al., 2010). These findings were echoed by nursing researcher Dendaas (2011), who illuminated that 65% of 471 registered nurses (RNs) surveyed reported the contribution of the physical environment to their work stress as moderate, while 23% of RN's rated the contribution of the physical environment to their work stress as extreme (Dendaas, 2011). There is considerable evidence recognizing that poorly designed nursing environments are antecedents to staff stress, burnout, fatigue, and turnover intention yet, little remains known on how to improve these spaces to engender well-being and resilience in staff (Dendaas, 2011; Gharaveis et al., 2020; Nejati et al., 2016; Pink et al., 2020; Sadatsafavi et al., 2015).

Restorative Architecture: The Untapped Potential

Creating hospitals to be actively restorative spaces should not be viewed in diametric opposition to cultures of efficiency and productivity, but rather, complementary. Well-designed, thoughtful architecture will not repair the systemic failings impacting the profession of nursing, but it certainly has an important contribution to make. Healthcare designer Erin Clark (2014)

conducted 13 qualitative interviews to elicit information from nurses, architects, and healthcare design consultants regarding nurse involvement in the healthcare design process. Analysis revealed that all disciplines favourably responded to nursing involvement to inform the design process, but some notable obstacles were present in this collaborative effort. Different disciplinary parlances between nurses and architects sometimes led these professionals to feel susceptible to miscommunication. A vision for more collaboration and shared education to foster a greater understanding of each other's profession was suggested to rectify this challenge (Clark, 2014). Nurses who work in healthcare design such as Stichler and Okland (2015) have noted that in the absence of this disciplinary understanding, nursing perspectives are vulnerable to be circumvented in the design process (Stichler & Okland, 2015). When successfully navigated, the disciplinary divide between nurses and architects can result in greater creativity and innovation (Stichler, 2007). Collaborative practice, shared vision, and creative problems solving are the alchemy needed to design successful healthcare environments (Annemans et al., 2017; Beatley et al., 2018; Hozak et al., 2016; Stichler & Okland, 2015). Accessible and easily translatable research fosters a critical dialogue to improve the design process (Lundin, 2021). A number of researchers noted the importance of nursing research as essential to guide the design process and enable the translation of user perspective into the built environment (Clark, 2014; Stichler, 2007; Stichler & Okland, 2015).

Following the seminal research of Roger Ulrich (1984), associating views of nature to post-operative recovery, there has been considerable scholarly interest in examining the impact of restorative environments and design elements, albeit as noted in this literary review, the scholarship has overwhelmingly examined patient outcomes (Mroczek et al., 2005; Pink et al., 2020; Zhang et al., 2019). There continues to be considerable investment and demand for

healthcare infrastructure, and provided the longevity of these spaces, there is an opportunity to materialize aspirations of enriched environments that actively promote health into visible form, which can manifest itself in higher nurse retention rates (Cardoso et al., 2015; Gharaveis et al., 2020; Verderber, 2010). This offers an economic solution to the significant organizational costs associated with nurse turnover, as well as benefits to patients who receive care orchestrated by committed professionals who are working within stable, fully-staffed teams (Cardoso et al., 2015; Dendaas, 2011; Mroczek et al., 2005). By advancing the dialogue and challenging convention, there is an opportunity to construct hospitals that dynamically support well-being, and cultivate value for present and future health systems, patients, and staff (Mroczek et al., 2005).

Summary of Literature Review

Overall, this literature review provided the necessary foundation to understand the complexity of hospital built environments. Evidenced-based design is conceptualized as design that has been guided on credible research to inform the construction of hospitals, however, it has largely remained biased in a quantitative approach (Shannon et al., 2020; Zhang et al., 2019). While offering important insights, I challenge the reductive discourses of these quantitative studies that have underscored the complex and emotionally sensitive ways in which nurses occupy the built environment. Scholars have proclaimed a need for more rigorous and controlled studies examining the impact of healthcare architecture on staff (Mroczek et al., 2005; Sadatsafavi et al., 2015; Tanja-Dijkstra & Pieterse, 2011). Yet, this aspiration for rigour is inherently difficult in naturalistic settings due to multiple confounding variables, and I concur with the suggestions that future scholarship should be directed to examining holistic experiences (Annemans et al., 2018; Bogaert, 2021; Carmel-Gilfilen & Portillo, 2016; Lundin, 2021; Zhang

et al., 2019). Multiple studies suggested that future research should be directed to better understand staff needs and to integrate those needs into the built environment (Carmel-Gilfilen & Portillo, 2016; Nejati et al., 2016; Pink et al., 2020; Zhang et al., 2019). Furthermore, there is a salient need to move beyond designing for functionality and towards a more fruitful impetus to design to enhance well-being (Applebaum et al., 2010; Nejati et al., 2016; Pink et al., 2020; Sadatsafavi et al., 2015; Zhang et al., 2019).

Chapter 3: Theoretical and Methodological Considerations

The following chapter will present my theoretical and methodological approach. In order to enhance my understanding of restorative built environments for acute care nurses, I will draw upon an interpretive description qualitative approach designed to advance practice-relevant knowledge within the discipline of nursing (Thorne et al., 2004). This chapter will provide an overview of the theoretical forestructure, epistemological orientation, and discuss aspects of the study design such as sampling, process for data collection and analysis with depth and granularity. Lastly, this chapter will conclude with the ethical considerations guiding this research study.

Research Design: Interpretive Description

Interpretive description (ID) is a qualitative research method with epistemological roots in the discipline of nursing (Thompson Burdine et al., 2021). It has been articulated as a non-categorical qualitative method relevant for understanding contextually embedded clinical realities (Thorne et al., 2004). Using an inductive approach to generate meaningful disciplinary knowledge, the aim of interpretive description is to illuminate themes and patterns from the phenomena in foci, in a manner that can inform clinical understanding (Thorne, 2016). It provokes researchers to consider meanings and explanations through reflective examination and informed questioning (Thorne et al., 2004). Interpretive description is amendable to various data collection and analytic processes as long as they display philosophical coherence and a clear logic congruent to the purpose of the inquiry. It often involves multiple data collection approaches to produce rich, meaningful results (Thompson Burdine et al., 2021; Thorne et al., 2004).

Thorne (2016) established this contemporary method from an understanding of the ‘exquisite complexity’ of nursing and the methodological limitations within established qualitative traditions arising from the social sciences (Thompson Burdine et al., 2021; Thorne, 2016). Noting the increase in methodological eclecticism from health scholars attempting to capture nuanced clinical experiences, Thorne (2016) crafted an approach to enable “the kinds of understandings of complex experiential clinical phenomena that would be relevant and useful to the practice of nursing” (pg. 29). Nursing’s disciplinary wisdom lies in dialectical knowledge and comfort “within the world of complexity and contradiction” (Thorne, 2016, pg. 29), thus, illuminating a genuine need for generating nursing knowledge pertaining to clinical contexts (Thorne et al., 1997).

Methodological Assumption

Interpretive description was selected as an appropriate method to guide this study as it offers creative flexibility and latitude to design research informed by clinical realities (Thorne, 2016). Epistemologically, the interpretive description approach is grounded in a constructivist orientation in which reality is “complex, contextual, constructed, and ultimately subjective” (Thorne et al., 2004, pg. 3). Constructivism has a long epistemological history originating with Plato and then advanced by philosophers Giambattista Vico (1668 - 1744), Immanuel Kant (1724-1804), and John Dewey (1859-1952). Collectively, they asserted that the mind is a vehicle capable of generating meaning (Damico & Ball, 2019). Jean Piaget refined this proposition by articulating that knowledge is acquired through a dynamic cognitive interplay of experiences filtered through an individual’s system of logic (Damico & Ball, 2019). The ascent of this constructivist philosophy was advanced by the Kuhnian discourse who perceived an intellectual poverty with the objective nature of reality championed by the traditional scientific method.

Accordingly, a constructivist paradigm emerged to equilibrate this perspective and account for the subjective nature of reality (Guba & Lincoln, 2013; Scotland, 2012).

Constructivism has been primarily accepted as diametric to positivism in the manner in which knowledge is generated, and how scholarship is directed (Weaver & Olson, 2006).

Constructivism is underpinned by an ontological position of relativism, which emphasizes intersubjectivity and context (Scotland, 2012). This approach facilitates a holistic understanding of phenomena, as it allows for the examination of complex human experiences (Appleton & King, 2002). Human beings are dynamic, multisensorial beings, and this research approach appreciates the plurality of perspectives (Colorafi & Evans, 2016; Guba & Lincoln, 2013). While nursing research from this perspective may not contribute to a nomothetic body of knowledge, it can be complimentary in illuminating subjective knowledge and exploring human behaviour too complex to adhere to generalizable theories (Appleton & King, 2002; Bender & Holmes, 2019).

The constructivist assertion of relativism corroborates that our respective realities are mediated by our senses, and that reality is constructed as a result of consciousness engaging with the world (Scotland, 2012). Constructivism, therefore, lends itself to this area of inquiry because it has been articulated that individuals occupy the built environment in ways that are complex, dynamic, and emotionally sensitive (Pink et al., 2020). This has important implications when addressing the research question because it attends to how nurses engage with the built environment, and how this engagement can create experiences of well-being, while also deepening our understanding of physical stressors (Colorafi & Evans, 2016; Trau et al., 2015). Accordingly, this lens allows us to better understand the reciprocal relationship between design elements in the built environment and the meaning and experiences generated by nurses (Nejati et al., 2016). By exploring the perspective of nurses, this research can be translated into

responsibly designed built environments that are attuned to the needs of the end-user (Malagon-Maldonado, 2014).

Theoretical Scaffold

Interpretive description retains methodological integrity by emphasizing an explicit organizing design logic and framework (Thorne, 2016). Thorne (2016) explains that an essential component of designing a credible research study involves the development of a theoretical scaffold. A theoretical scaffold is constructed with two paramount activities; first, the literature review, which serves to examine the discursal voice for the phenomena of interest and secondly, the intellectual positioning of the researcher. This latter component involves disclosure of disciplinary influences, personal positioning, and theoretical allegiances that will shape the course of study (Thorne, 2016). Personal disclosure helps illuminate the interior logic of how preconceptions have influenced the design and outcome of the research process (Hunt, 2009). Interpretive description acknowledges the researcher as an instrument of inquiry, and technical knowledge and experiences as rich sources of insight (Hunt, 2009; Thompson Burdine et al., 2021; Thorne, 2016).

Disciplinary Influences

Thorne and colleagues (2002), articulate that a disciplinary lens in qualitative research can profoundly shape the way that a research problem is viewed, the manner in which the research question(s) are posed, and subsequently, the findings produced. Consequently, ignoring disciplinary influences in qualitative research can corrode its credibility (Thorne et al., 2002). Research inquiries arising from nursing's disciplinary epistemology are conceived from critical reflection, and an informed perspective on the need for increased knowledge for the profession (Thorne et al., 2016). As a registered nurse, I have spent considerable amounts of time within the

built environment of the hospital and have long appreciated and recognized the built environment as an essential and underappreciated extension of the care I provide to patients. While my professional education is outside the confines of traditional design or architectural training, my disciplinary compass orients me towards a holistic view of health and galvanizes me towards interdisciplinarity and problem-solving. My disciplinary experiences have allowed me to witness that nurses hold significant amounts of clinical insight and intuitive knowledge that could improve the built environment, yet this knowledge is often overlooked and remains largely uncaptured in scholarship.

Personal Positioning

Thorne (2016) articulates that research is an extension of an individual's personhood (Thorne, 2016). Bentz and Shapiro (1998) expand upon this and state that all inquiry is conducted by an individual "with a life and a lifeworld, a personality, a social context, and various personal and practical challenges and conflicts, all of which affect the research" (pg. 4). My interest in architecture for health promotion reflects my professional experiences, as well as my own sensitivity and awareness for how certain spaces evoke my own emotions. It is perhaps not incidental for this research to be a reflection of my desire to fuse soul to scholarship. I have recognized that many clinical spaces proffer a sense of discomfort for both patients and staff. I have witnessed how dignity and empathy are materially corroded in spaces that have been designed by those who have spent so very little time in them. I am frequently irritated and occasionally distressed by how purported healthcare organizational values of 'care' are discordant with the built environment, which communicates a sort of, spatial insensitivity. I believe that much like other artistic mediums, architecture is the deep expression of our humanity, and that space is an extension of the self, imbued with meaning and values. For this

reason, I believe the spaces that we inhabit are far from a marginal backdrop, but the very foundation of our self-identity and our relations with one another. A sensitivity to the built environment and an emic nursing lens has led me to seek ways in which to augment the need for restorative spaces for clinicians. This view shapes and guides my inquiry.

Theoretical Forestructure

Interpretive description has methodological ancestry in the social sciences; however, Thorne (2016) endorses that interpretive description does not require research to be located within formal theorization (Thorne, 2016). Interpretive description has an epistemic disposition towards practical research for clinical application, and consequently, it is not intended to generate theory (Thorne, 2016). While academic debate exists about the role of theory in qualitative research (Collins & Stockton, 2018; Sandelowski, 1993), I would argue that theory provides a framework through which a researcher can elucidate complex phenomena and illuminate findings. Even locating the word ‘theory’ etymologically reveals its Greek origins in the word ‘*theoria*’ which roughly translates ‘to see.’ (Fawcett et al., 2001; Nguyen et al., 2022). In essence, this acknowledges that the function of theory is to “reveal phenomena previously hidden from awareness and attention” (Fawcett et al., 2001, pg. 117). Theoretical sensitivity has guided the inception of the research question for this inquiry and will continue to guide the research findings and discussion in the following chapters.

Salutogenic Theory

Etymologically, the word ‘salutogenic’ derives from the Latin word ‘*salus*’ which translates to health, and ‘*genesis*’ originating from the Greek word for origin (Dilani, 2009). Initially invoked by medical sociologist Aaron Antonovsky (1996), the salutogenic theory transpired from a rejection of the dominant pathogenic orientation found pervasive in health

promotion research (Antonovsky, 1996; Fries, 2020). Antonovsky argued that there is significantly more scholarship directed towards the cause and cure of disease than the cause of health. In this manner, he proposed that a pathogenic paradigm reinforces and promotes medicalization and medical dominance under the professional control of physicians (Fries, 2019). As proposed in this theory, a pathogenic orientation is instructive to understand the etiology of disease and understand why some individuals become ill, but does little to assist our understanding of why some individuals remain healthy despite severe hardships and pervasive stressors (Antonovsky, 1996). This is of particular importance provided that while healthcare arose in response to infectious disease, many diseases that plague our present are chronic illnesses that are attributed to lifestyle and environmental factors (Fries, 2019). Consequently, biophysical causes of disease and biomedically focused interventions are inadequate to address the complexity of environmental and societal causes of disease. In rejection of the normative pathogenic stance, postulating the origin of health is ambitious and extends to examining not only individual, but societal well-being (Dilani, 2009; Fries, 2020; Ruohomäki et al., 2015).

While this theory has evolutionary roots in medical sociology, it has sparked a spirit of scientific inquiry from a multitude of disciplines – namely those in medicine, nursing, and architecture (Mittelmark & Bull, 2013; Roskams & Haynes, 2019; Sullivan, 1989). A salutogenic orientation assists to inform the theoretical, conceptual, and value-based core of health promotion (Ruohomäki et al., 2015). It has been postulated that while nursing's disciplinary narrative has been philosophically and ideologically committed to health, it has focused exclusively on problems associated with illness and disease (Sullivan, 1989). The salutogenic theory is adaptable to the nursing milieu and is an instructive way to (re)orient health research and develop nursing theory (Sullivan, 1989). Salutogenic theory has been widely accepted as a

middle-range systems theory, with strengths in its description ability to explain phenomena (Shannon et al., 2020). Antonovsky's philosophical underpinnings are not made explicit in his original work but one can infer a constructivist view from his advocacy to examine the causes of health through holistic probing, and subsequently, has informed the theoretical foundation of many qualitative studies from a multiplicity of disciplines (Sullivan, 1989).

Antonovsky (1996), proposed that an individual's ability to manage stressors was significantly determined by the quality of their environment (Antonovsky, 1996; Lyon, 2017). He asserted that in order for humans to flourish there is a need for physically and cognitively supportive environments that foster meaning and enable coping against daily stressors (Verderber et al., 2020). Salutogenic theory does not view health and illness as dichotomous, but rather, a continuum. Where an individual falls on this continuum is a reflection of whether they feel a 'sense of coherence' to their environment (Dilani, 2009). A sense of coherence is comprised of how an individual finds their environment comprehensible, manageable, and meaningful, which provides a sense of resilience and allows them to better manage stressors (Antonovsky, 1996). Stressors are defined as "something that causes a state of strain or tension" (Oxford dictionary, n.d.). Environmental stressors erode the ability to cope and push an individual towards ill health (Antonovsky, 1996).

Salutogenic Architecture

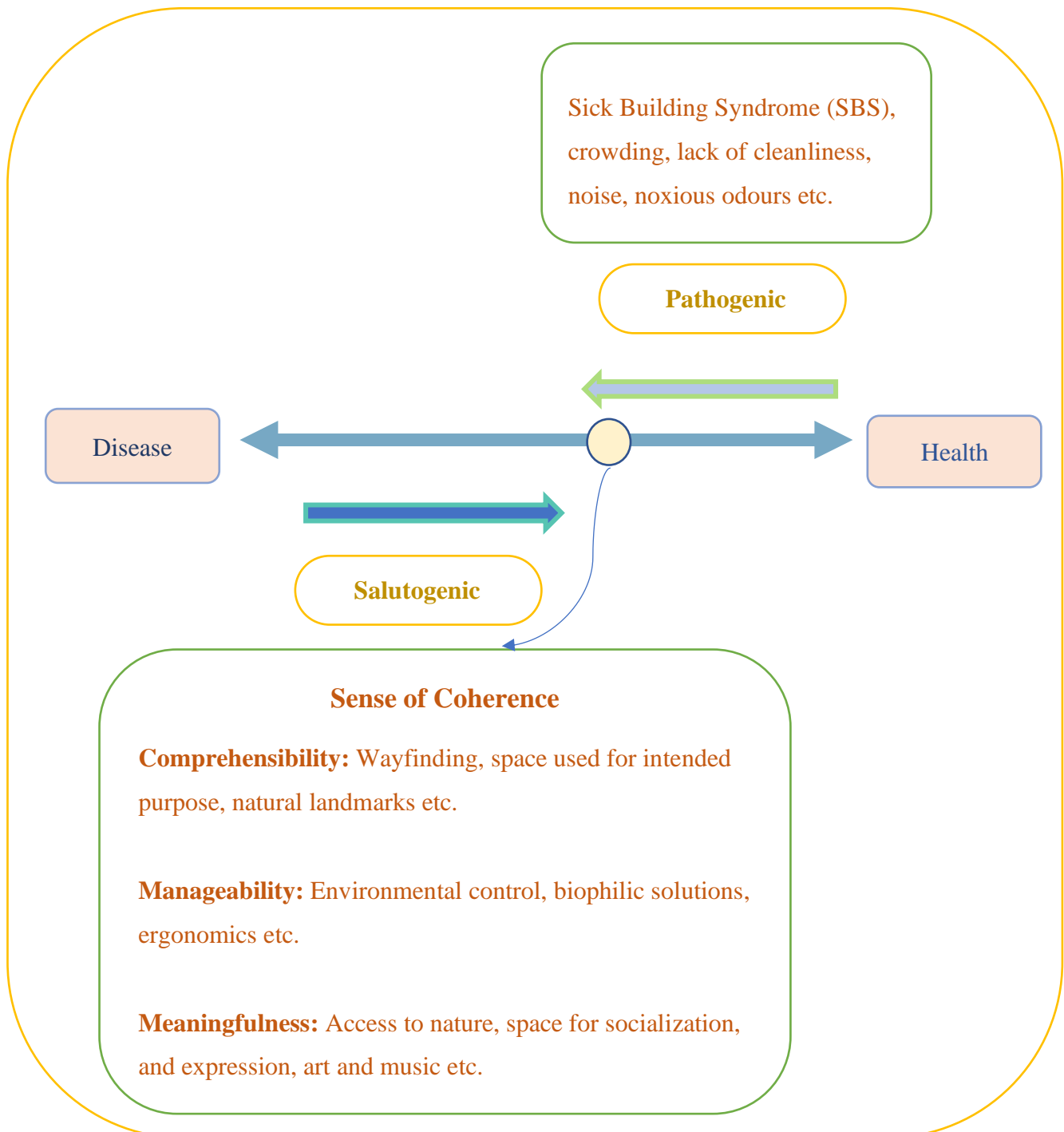
It has been noted that a significant amount of environmental design research to improve the workplace has been atheoretical (Roskams & Haynes, 2019). Perhaps one of the most perceptible and unique aspects of the salutogenic theory is that it has been used to directly inform salutogenic architecture (Dilani, 2009). Alan Dilani (2009), is widely regarded as the pioneering architect to adopt the integration of the salutogenic theory to inform holistic workplace designs

that move beyond functional efficiencies and emphasize optimal well-being (Dilani, 2009). Salutogenic architecture is the visible expression of the salutogenic theory in constructing environments that aim to respond to an individual's environmental needs (Abdelaal & Soebarto, 2019). Salutogenic spaces are distinguished in form from their homogenous predecessors by their elements such as architectural use of daylight and features such as water and plants (Dijkstra et al., 2008). Notably, salutogenic spaces use qualitative engagement with end-users to co-create spaces which may encourage restoration and connection to place (Heerwagen, 2009; Ruohomäki et al., 2015). This architectural approach closely mirrors the constructivist assertion of the co-creation of knowledge between researcher and participant (Scotland, 2012). It recognizes that human minds and bodies evolved in a sensory-rich world which continues to be essential for human emotional, spiritual, and cognitive well-being (Kellert et al., 2008; Minton & Batten, 2016).

The application of salutogenic design research is to better understand what architectural elements foster feelings of well-being, which can then be integrated into the design of the hospital to create a better sense of coherence with the built environment (Golembiewski, 2010; Lyon, 2017). This is guided by classifying research findings that contribute to a sense of comprehensibility, meaning and manageability (*See Figure 1*). There is also a consideration for how stressors can be eliminated, or reduced through the built design, thereby improving the quality of the environment (Dilani, 2009). Previous application of this theory to inform salutogenic architecture has greatly improved the quality of workplace designs for functionality and well-being (Dilani, 2009; Golembiewski, 2010; Ruohomäki et al., 2015). A salutogenic approach to inform the (re)design of hospital infrastructure from the qualitative perspective of nurses is a particularly novel area of inquiry that holds the potential to reveal the unmet needs of

nurses and unveil their experiences. The application of a salutogenic framework provides a spirited counternarrative to the prevailing biomedical dominance in healthcare, and an exhortation to decision-makers to commit to thoughtful design.

Figure 1: Salutogenic framework applied to architectural design



Methodological Considerations

An interpretive description study using participant-driven photo-elicitation and narrative interviews was utilized to convey the complexity, depth, and range of experiences relevant to the design of the built environment. Many individuals find it challenging to express their spatial experiences, and thereby, photographs served as a conduit to which the researcher could access a rich, thoughtful, and deliberate narrative (Annemans et al., 2018; van Hoof et al., 2015).

Photography permits addressing the complex relationships and interactions between elements of the built environment (Annemans et al., 2018), and the capturing of photos enabled participants to reflect on their clinical geography. This approach was selected to best answer the objectives of this inquiry and is epistemologically aligned with a constructivist paradigm since the selection of photographs provides insights into the context and meaning-making process of participants (Alvariza et al., 2020).

Sample

Participants were purposively chosen for this study using homogenous sampling. According to Thorne (2016), samples are purposively generated to solicit information from knowledgeable research participants, whose accounts reveal elements of what we are trying to better understand (Thorne, 2016; Polit & Beck, 2020). The goal of this sampling in relation to the purpose of this study was to select participants with diverse clinical backgrounds in acute care who could share insights into the built environment, reflect on their clinical geography, and articulate what elements they deem restorative. While this sample is small and by no means sizable enough to make sweeping and transversal claims, soliciting the experiences of nurses from diverse locations and specializations enabled me to make some inferences about restorative characteristics.

Sample Size

Thorne (2016) states that interpretive description research can be conducted on samples of nearly all sizes. As noted by Sandelowski (1995), sample size is relative, and the quality of the data determines the sample size of participants. In qualitative research, the sample size should be large enough to solicit rich and diverse experiences, while also being small enough to provide a detailed and comprehensive analysis (Sandelowski, 1995). Due to the richness of triangulating pictorial and narrative data from each participant, recruitment was ceased at five participants. One participant who met with me and consented to the study was unable to proceed with the interview due to work-related demands. Therefore, the final sample for this study was four participants.

Eligibility Criteria

In order to be eligible participants of this study, only Canadian registered nurses who currently practiced in acute care hospitals were invited to participate. Provided the unique context of public healthcare in Canada, it was important to garner information within this homogenous setting (Polit and Beck, 2021), before including other (international) settings. Provided the time constraints with the current study, feasibility also limited international recruitment. As previously noted, registered nurses in acute care are exposed to high levels of stress and burnout, in part due to repeated navigation of built environments replete with stressors (Dendaas, 2011). High levels of burnout contribute to lower levels of well-being in this population (Dyess et al., 2018; Stelnicki et al., 2020). Eligible registered nurses were employed either part-time or full-time with a rotating shift-work schedule, had a personal smartphone with the ability to capture photographs, internet connection, and were able to communicate in English. It was important to recruit regular rotating staff, as previous research has indicated that staff who

work shift work - particularly evening and night shifts - have a higher susceptibility to environmental stressors (Sadatsafavi et al., 2015). Regular staff members also repeatedly navigate the same environment which allows for contextual insight into environmental features that foster tension or restoration (Sadatsafavi et al., 2015).

Recruitment

In keeping with a qualitative tradition, recruitment focused on individuals who had first-hand experience of the phenomena (Thorne et al., 2004), and Canadian RNs were the foci of recruitment to better understand the phenomena of interest. According to Polit and Beck (2021), it is important to approach conceptual exploration within nursing research with a homogenous sample and setting, which provides a foundation for subsequent heterogenous inquiry once more is known about the concept (Polit and Beck, 2021). Provided the anemic nursing scholarship relating to the proposed area of inquiry, only registered nurses who had current clinical experience working in hospitals were recruited. Recruitment occurred after receiving ethics approval from the University of Ottawa Health Sciences and Science Research Ethics Board (REB). Recruitment first occurred through the researchers' personal, professional, and academic networks, and due to low response, was further supported through the thesis supervisors' professional and academic networks. Recruitment material was shared through email and social media (i.e., LinkedIn, Facebook, and Twitter), and interested participants contacted the researcher via the contact information provided on the recruitment material (See Appendix D). These networks did not involve using former student listservs or listservs from hospitals, therefore REB approval from institutions beyond the University of Ottawa was not required. The project was conducted independently from the organizations and agencies from which participants were recruited.

Interested participants contacted the researcher and were electronically provided a copy of the consent form (See Appendix C) that outlined the research purpose, associated risks and benefits, as well as the time commitment associated with the study. All participants were also provided with a photographic instruction form explicitly outlining that all photographs must be conducted in an ethical manner to review prior to the initial meeting (See Appendix E). A virtual meeting via Zoom was scheduled with each participant at a time that was convenient for them where they were provided time to ask any questions regarding the study, their participation, or the procedures surrounding photography and reflective notes. During this meeting, I also ensured that participants understood that they were to refrain from taking photographs of their workplace and of individuals not in the study. Once all questions were answered by the researcher, consent was obtained. The participants were made aware that I was always available to answer any questions should they arise during the photographic period. Each participant was then assigned a numeric code to preserve anonymity.

Participants

All participants in this study were registered nurses with current practicing licences and were geographically located in Ontario (n= 2), Manitoba (n= 1), and British Columbia (n= 1). All participants reported working in urban, tertiary hospitals. Publicly available records reveal that the hospitals these participants work in were founded in the years between 1870's – 2010's, some with subsequent expansions and renovations occurring since the initial construction. Participants in this study had clinical specialities that included the Neonatal Intensive Care Unit (n= 1), Oncology (n= 2), and the Pediatric Emergency Room (n= 1), with all participants reporting that they worked shifts of eight and twelve hours inclusive of days, nights, and evenings. Across all specialties, participants reported their primary role as direct patient care. In

relation to clinical experience, participants had worked within acute care settings between 4 to 35 years. Three participants noted that they work part-time, and one participant noted they work full-time.

Data Collection

Photo-elicitation

This study triangulated three forms of data, starting with participant-generated photographs and accompanied reflective notes, followed by a one-on-one semi-structured interview. Literature suggests that the act of visualization is an excellent point of departure when initiating healthcare infrastructure design (Harty et al., 2015; Jellema et al., 2019). Therefore, participants were asked to visualize spaces that embodied desired characteristics and to capture those elements in photographs (Annemans et al., 2018). For the purpose of this inquiry, the traits asked to be elicited in photographs were characteristics that support well-being and restoration. Previous research indicated that multi-sensorial spatial experiences may be difficult to express, and arts-based methods provide the researcher access to that which may be difficult to articulate (Jellema et al., 2019; Martin et al., 2015). This research approach was congruent with architectural trends increasingly engaging in co-creation with end-users to raise consciousness and facilitate change and innovation in the built environment (Jellema et al., 2019; Radley & Taylor, 2003; Sanders & Stappers, 2008). Visual methods enable tangible insights to defend stakeholder interests during competing and complex priorities that arise during healthcare infrastructure design (Jellema et al., 2019).

Participant-driven photo-elicitation was selected as the most appropriate photo-method for the aims of this study, as it has been utilized extensively with researchers who have attempted to better understand the relationship between the built environment and well-being (McLaughlan,

2019). Photo-elicitation promotes a dialogue to give insight into participants' lived realities, and photographs were used to enrich the research process (McLaughlan, 2019; Murray & Nash, 2017). It also provided the novice researcher with a feasible and accessible photo-method for a time-sensitive study, which will allow to stay true to the intricacies of interpretive photo-elicitation. This method was selected over photovoice as it does not require extensive participant training, focus groups, and dissemination of photographs in a public exhibition (Catalani & Minkler, 2010; Murray & Nash, 2017). Photovoice is distinguished from photo-elicitation in that it promotes a critical dialogue to give insight into participants lived realities and serves as a form of participatory research aimed at transformation, community building, and policy change (Capous-Desyllas & Bromfield, 2018). Due to the immense longitudinal nature of photovoice requiring extensive immersion with participants through repeated focus groups, it extends the scope and time parameter of a master's thesis but would be well-positioned for future doctoral research. Photo-elicitation is relevant to qualitative and interpretive research because the selection of photographs provide insight into the meaning conveyed by the participants, and captured photographic depictions may be viewed as metaphors for human reality (Murray & Nash, 2017). This epistemological congruence made it amenable to use with an interpretive description approach.

Procedures

Prior to capturing photographic data, all participants were provided a form outlining photographic instructions (See Appendix E) to ensure photographs were captured in an ethical manner. Participants were instructed to refrain from taking photographs within their workplace, and from taking identifying photographs of individuals not in the research study. All participants articulated they understood the photographic instructions. Participants understood to

photographically capture images of 3-5 spaces (via smartphone), that elicited feelings of well-being and restoration, alongside a brief narrative note reflecting on the particular elements in the image that are restorative and how they envision those elements incorporated into their workplace. Participants electronically submitted their images and narrative notes to the researcher via a password-protected email. The reflective narrative note and photographs then catalyzed a confidential video-recorded one-on-one semi-structured virtual interview via Zoom with the researcher, which served to let participants elaborate on their chosen photos and reflective notes (Refer to Appendix B for Interview Questions). Prior to starting the interview, consent was audio recorded for both participation in the study, and for the use of photographs for dissemination purposes. All participants were provided the interview questions in advance of the interview to help generate insight into the phenomena of interest. During the video interview, all participants could view their photographs and narrative notes (via screen share) to generate further insight.

The photo-elicitation interview was a key component of data collection in tandem with photographs because it allowed me to further uncover meaning and clarify the visual outcome (Pauwels, 2015). The photo-elicitation interview was guided by the '*PHOTO framework*' (See Appendix B) which has been traditionally used for photovoice research (Capous-Desyllas & Bromfield, 2018; Hussey, 2006), but was adapted for use in this inquiry as it provides a framework to elicit meaning from photos, and thereby serves as an entry to understanding. This framework was initially designed and utilized by Hussey (2006) and allowed me to structure the interviews to consistently elicit "specific experiences and stories portrayed in the photographs" (pg.134). Within 24 hours, all video recordings of the interview were uploaded and transcribed by Otter.ai software. All transcripts were verified for accuracy against the video recording and

were removed of personal identifiers to maintain confidentiality. Transcripts were exported out of Otter.ai immediately upon review and stored on a password-protected laptop.

Data Management

All study data including photographs, narrative notes, and interview transcripts were encrypted with a password and stored on a password-protected laptop. This encryption occurred before any transfer of data between myself and the research supervisor and/or committee. A shared and secure OneDrive file stream was created via the University of Ottawa's Office 365 platform so that team members (supervisor/ thesis committee) could share research documents if needed. If/when e-mail was used to transfer documents, only university e-mails were used, and data was password protected. The password-protected laptop remained in the researcher's secure home office.

Data Analysis

There is no defined consensus on the most appropriate method for analyzing photo-elicitation interviews, but thematic and discourse analyses are often used in conjunction with this method (Murray & Nash, 2017). Thorne (2016) suggests that researchers may borrow analytic guidance to “enhance analysis in the interpretive descriptive context” (Thorne, 2016, pg. 170). Thematic analysis is a method used to identify, analyze, and interpret patterns within qualitative data and is distinguished as a theoretically flexible framework that is suitable for a range of epistemological approaches (Braun & Clarke, 2006), making it amendable to this inquiry. Applied from a constructivist lens, thematic analysis seeks to theorize about “sociocultural contexts, and structural conditions, that enable the individual accounts” (Braun & Clarke, 2006). The following undertakings describe the ways in which I engaged with the data in an attempt to answer my research objectives, and the role of my theoretical forestructure.

Preliminary analysis of narrative notes was used to sense themes and to understand the participant-generated photographs in context (Smith et al., 2017). Interview questions were adjusted in order to elicit richer interview data based on the narrative note. Initial analysis then occurred by reviewing the interview transcript for accuracy which also served to sensitize me to the larger narrative expressed by the participant, while mindfully noting the emotional signals suggesting something intriguing or unexpected in the narrative. This prompted me to consider why particular messages demanded my further consideration (Thorne, 2016). This was followed by a thorough analysis where I considered deeper nuances in elocution, making note of the language used and pauses embedded in the narrative. Thorne (2016) states that this careful deliberation allows us to better “hear more deeply what the language contains” (pg. 158). This was followed by generating preliminary codes emerging from the data, using terms such as ‘music,’ ‘landscapes,’ and ‘stressors.’ This phase was instructive for illuminating the most elemental data which was subsequently assessed for deeper meaning.

Further refinement of data analysis occurred as an iterative and recursive process involving comparative analysis both within and between transcripts. This exercise was non-linear and involved periods of immersion and periods of distance and reflection. It involved astute questioning and observation, thinking deeply about how the narrative addressed the phenomena of interest. Analysis was guided by the overall objectives of the study: (1) To better understand and communicate the architectural needs of nurses in hopes of informing the future (re)design of hospital built environments; (2) To describe how built environments can enhance nurse well-being. Based on these objectives and in an attempt to answer the research question, codes were then ‘collated’ together and organized into logical groups (Braun & Clarke, 2006). Thematic

grouping were considered through a salutogenic lens, paying particular attention to spaces that were meaningful, manageable, and comprehensible to participants.

Further analysis occurred by developing themes emerging from collated codes. This allowed me to examine the data for an overarching theme. Visual representations have been noted to be particularly instructive during this phase to group dominant themes and sub-themes (Smith et al., 2017). A concept map was developed to assist with this procedure and was supported by guidance and input from the thesis supervisor. After generating initial themes further refining of themes occurred, which resulted in the amalgamation of some themes or the separation of others. Themes with insufficient support were removed during this phase. This phase involved two levels of review: (1) Reviewing coded data and formulating whether it forms a pattern or not, (2) examining individual themes if they reflect the data set as a whole (Braun & Clarke, 2006). As a recursive process, the photographs were cross-compared in the final stages of data analysis and grouped into themes (Murray & Nash, 2017). Data analysis proceeded in a collaborative manner with a layer of meaningful support and expertise from the thesis supervisor and thesis advisory committee (TAC). After the first interview and during preliminary analysis, the thesis supervisor reviewed emerging themes to ensure trustworthiness of analysis. This was further supported by the expertise of the TAC where collated codes and pictorial data was presented to offer further insight.

Ethics

Institutional ethics approval from the University of Ottawa's Office of Research Ethics and Integrity was received in August 2021 (Refer to Appendix G). The researcher made clear to participants that their participation was voluntary, and they may withdraw at any time without consequence or providing any explanation for doing so. Informed consent was obtained, and

clear, concise details of the study were provided (Refer to Appendix D). Participant anonymity and confidentiality was observed, and participant identifiers were immediately removed from the data and each participant was assigned a numerical code to maintain confidentiality (Murray & Nash, 2017). Data will remain anonymized in all forms of dissemination including presentations, webinars, and publications and all identifying information (name of employee, name of any colleagues, city, any scenarios that would identify participant or their site of employment) will not appear in any dissemination. All participants were provided pseudonyms by the researcher. The consent form was provided to participants via email prior to the initial meeting to ensure that any questions regarding the study were answered during the first meeting. Participants were asked to reflect upon well-being and restoration in the context of their work-life, which has been recognized to elicit feelings of distress. In order to address this, every effort was made to minimize these risks and participants were made aware they could stop the interview at any time. If participants required additional supports, they could also be referred to their workplace Employee Assistance Programs (EAP), however, no participants during or after the data collection reported any psychological distress to the researcher.

The application of photo-elicitation methods involves a unique sensitivity to ethics due to the visual nature of the data (Copes et al., 2018). It has been suggested that participants of photo-elicitation studies be provided with the ability to consent for permission to allow the researcher to include photographs in publications and other knowledge dissemination activities. This ensures that research participants retain control and censor which photographs are accessible for dissemination (Copes et al., 2018; Murray & Nash, 2017). As such, additional consent was obtained for the use of photographs for dissemination purposes. Participants had the option of declining, consenting for select photographs, or for all photographs to be used in dissemination

(See Appendix C). Participants were provided with a copy of their consent form and transcripts containing the audio consent to participate in the study were kept on my password-protected laptop. Once the University of Ottawa offices re-open, data and any physical project documents will be stored in a locked cabinet at the thesis supervisor's locked office at the University of Ottawa. As outlined by the University of Ottawa Office of Research Ethics and Integrity (2018), the data will be kept in line with best practices in data conservation for a minimum period of five years post data collection.

Credibility of Research

Trustworthiness was established by adhering to the criteria articulated by Thorne (2016) consisting of epistemological integrity, representative credibility, analytic logic, and interpretive authority (Thorne, 2016).

Epistemological Integrity

Epistemological integrity refers to a “defensible line of reasoning” which conveys epistemological coherence from the research question to data sources and research findings (Thorne, 2016, pg. 233). This was demonstrated through decisional strategies that respect the epistemological position of constructivism in the design of this study. Furthermore, any personal biases that could have influenced the interpretation of my findings was acknowledged and the evolution of my thoughts relating to this research was documented in a researcher journal that was accessible to my thesis supervisor, who is well versed in constructivist research.

Representative Credibility

Representative credibility refers to the application of a sampling strategy that is reflective of the phenomena under study (Thorne, 2016). Representative credibility is also enhanced through prolonged engagement with data and triangulation of data sources (Thorne, 2016). This

was achieved through triangulation of pictorial and narrative data which contributed to the credibility of the study. Prolonged engagement with participants occurred from October 2021 to March 2022. Due to unpredictable and extrinsic forces during this time period - Omicron wave of the Covid-19 pandemic (Public Health Agency of Canada, 2021), extensive flooding and landslide events in British Columbia (Global News, 2021), and Ottawa convoy occupation (Politico, 2022) - all participants requested additional time to take photographs, with an average of 6 weeks required. In the spirit of flexibility, all participants were afforded additional time. Interviews were conducted within three weeks of receiving photographs at a mutually convenient time.

Analytic Logic

Analytic logic refers to explicit reasoning and decision-making from the forestructure of the study (Thorne, 2016). This was achieved throughout the study by way of an audit trail to convey an “explicit reasoning pathway” and was supported by the researcher’s thesis supervisor (Thorne, 2016, pg. 235). Such information will also be willingly provided in all dissemination activities if required. This study also utilized thick, verbatim descriptions which served to ground the interpretive claims made in the findings (Thompson Burdine et al., 2021).

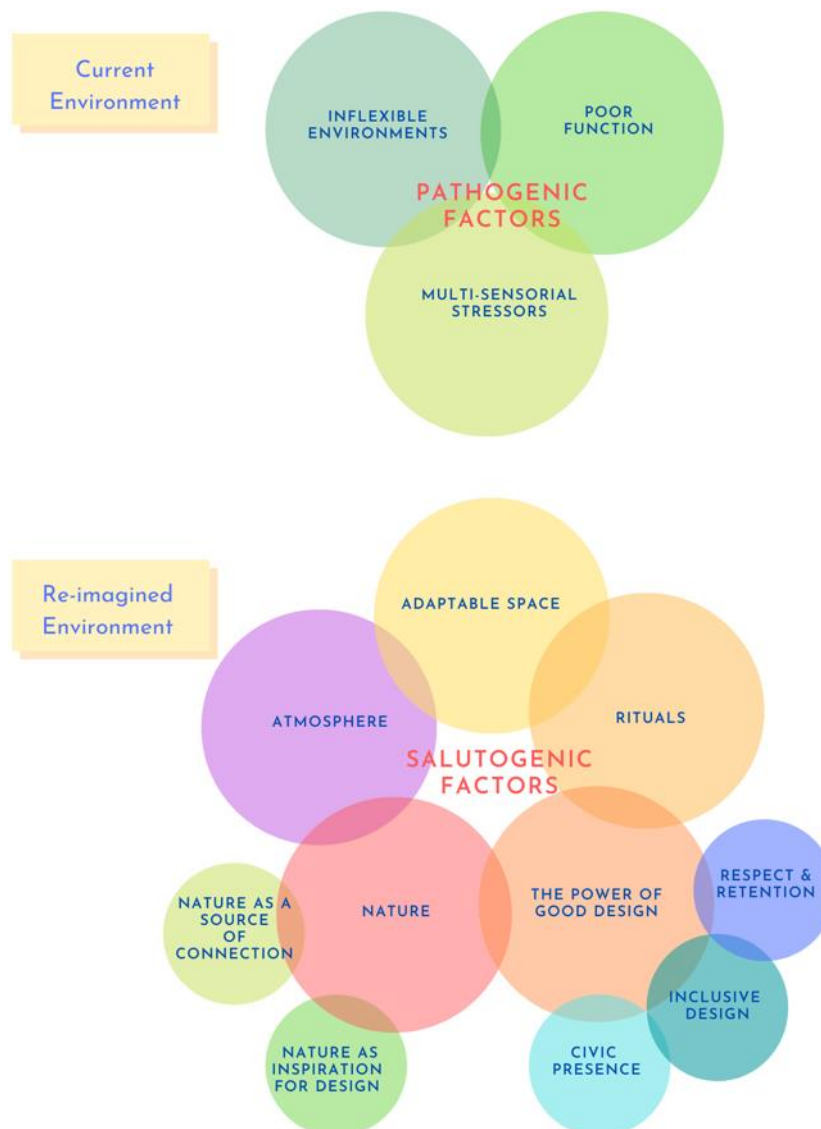
Interpretive Authority

Interpretive authority respects that all knowledge is subjective and contextual, and as such, in order to provide assurance of the trustworthiness of findings the researcher has made explicit their own biases and assumptions (Thorne, 2016). The researcher also maintained a reflexive journal that was maintained throughout the study. This ensured that the researcher remained conscious of how personal opinions, beliefs, and biases shaped the outcome of the research. Preliminary interpretations of the data were reviewed in-depth with the thesis

supervisor and presented to the thesis committee. Further refinement and interpretation of the data was supported and guided by the thesis supervisor.

Chapter 4: Findings

This chapter will present the interpretive and descriptive findings obtained by the triangulation of pictorial and narrative data. For clarity, this chapter will bifurcate into two thematic sections, first illustrating a descriptive portrait of how participants' described their current work environments, followed by an interpretive and descriptive vision participants held for more restorative, salutogenic environments. The following schematic is a visual representation of this bifurcation, and the themes and subthemes which will be enumerated with detail in the following chapter.



Before presenting the findings from this study, I will briefly discuss the results of using photo-elicitation in the context this inquiry. While the intended purpose was for participants to generate new photographs in relation to the study purpose, Table 1 below illustrates that some participants shared old photos that they had previously taken.

Table 1: Use of new and existing photographs

Photo Source	P1	P2	P3	P4
<i>Took new photos</i>			X*	
<i>Selected old photos</i>		X		
<i>Combination of old & new</i>	X			X

One participant reflected that she found it difficult and uninspiring to take pictures during winter, while other participants shared that they found selecting some previous photographs enabled more creativity and a broader selection of elements they found deeply restorative and meaningful. One participant had explicitly generated new photographs for this study* but asked if she could share an additional photograph that she had taken previously in a gallery which left her with a strong emotional imprint. Arguably, this speaks to the underlying significance of older photographs, as they contain characteristics that participants deemed significant enough to pictorially capture. The limitations of this method will be discussed with more depth in the following chapter (*Chapter 5: Discussion*). Since the photographs were a means to elicit richer narrative data via interviews, the generation of new photographs taken explicitly for this study was not paramount, and both old and new photographs generated equal depth and insight from participants. All participants understood the purpose of the study and contributed in a way that

honored both the objectives of the study, as well as their personal preferences and experiences. To recount, the purpose of this study is to explore how nurses envision and benefit from restorative built environments. The overall objectives addressed by the findings are: (1) To better understand and communicate the architectural needs of nurses in hopes of informing the future (re)design of hospital built environments (2) To describe how built environments can enhance nurse well-being.

Part 1: Current (Pathogenic) Environments - “If I could redesign it, I would redesign it”

All participants were provided the opportunity to verbally illustrate their physical workplace environment, in addition to detail what they deemed restorative in these spaces. What became readily apparent through participant depictions was that these spaces were largely pathogenic, often amplifying stress through a combination of sensory assaults and functional limitations. Despite most participants working within institutions that were either constructed or renovated within the past decade (in one case, in the past two decades), all participants deemed their hospital had very little or no restorative elements that were accessible to staff and felt that the underlying design ethos was inflexible and often, uninspiring. This section is largely descriptive in order to amplify the voices and experiences of nurses and provides the contextual detail of current working environments, before moving into an innovative counter-vision for how to (re)design these spaces to be enriching and health promoting for clinicians in *Part 2: Re-imagined (Salutogenic) Environments*. Engagement with these participants offered unique insight into their embodied stress and perceptions related to the built environment and contributes to a better understanding of the architectural need of nurses.

Poor function: “This blueprint does not serve us”

A common sentiment expressed by all participants in this study was that the physical environment where they worked did little to support both their work and well-being. Participants shared that their ability to conduct their work, or step away for a break was restricted by the constraints of the built environment. Some participants explicitly highlighted that hospitals seem to be designed with an explicit spirit of functionality and utility, and yet paradoxically, these spaces often do little to support function, and ease.

Arlo was the first participant interviewed for this study. Her nursing experience spanned 35 years, working in the same inner-city hospital on the Neonatal Intensive Care Unit (NICU). *Arlo* took immediate interest to this study, explaining to me in her first correspondence that she designs green spaces as a hobby, and had previously presented ideas to create a rooftop garden for her unit. Complementary to her interest in design and architecture, her expansive career enabled a unique historical perspective on the structural changes of the hospital that occurred during her tenure as a registered nurse. She described to me that her unit was renovated 22 years ago, and when asked to illustrate her work environment she stated “It’s very cramped. We just had our - sort of annual review if we are meeting standards - we don’t meet standards. We’re too small, we’re too cramped.” She went on to express that this lack of spatial function had deeper consequences on both patients, families, and nurses. She vividly illustrated the constraints of working in a space that was designed without consideration for the neonatal population or the work processes of the nurses. In particular, she notes the lack of ergonomic space and its consequence on both nurses and patients:

It's very small, and nothing is within easy reach. Everything is very awkward; you know and it's not - I guess ergonomic is the word. There's nothing ergonomic about it. And to

access anything, you have to always leave, and to get anybody [you have to use] the intercom system - but the intercom system has one volume, which is blaring loud - which down in the intermediate section of the nursery, [when] you've just got eight kids to sleep, one intercom call can set off a cascade that's entirely unpleasant [*laughing*].

She describes the act of orchestrating care using rich metaphorical terminology such as “running the gauntlet,” but illustrates that the lack of space is a constant source of stress for the nurses. In our conversation she often referenced that they are always “bumping” into one another or the equipment. She explained to me, “...but by the time you get parents in there, and you've got the zero gravity chairs out and you've got the ventilator and the chairs and everything else you've thought about - it's like running the gauntlet. So, you kind of weave around everybody.” This influence of physical space on nursing care was also illustrated by *Sage*, who has spent her six-year nursing career working with pediatric patients in an urban pediatric emergency room (ER). She explained that her work environment did not feel functional for nursing staff because it lacked space and amplified their stress. She illustrated the emergency room triage booth felt like a “fishbowl” and “you're in a very small exam room with windows [...] and so, you always see the lineup, and you can see the waiting room as well. Just extraordinarily stressful, it feels like people are staring at you while you're trying to get through the line as quickly as you can.”

Arlo also went on to explain that taking breaks as a nurse is challenging due to extrinsic elements inherent in acute care but noted that a lack of functionality of the break room was also a contributing factor. She discussed how the staff breakroom which was “inherited” from another unit is only capable of accommodating five staff, “which is a challenge because there's usually 18 of us on each shift.” In addition to the breakroom capacity, the location is also challenging for nurses, especially veteran nurses such as herself who must respond to all high-risk deliveries:

...it's on the same floor, but it's on another wing at the end of the hallway. So, it is a bit of a run. And part of our job - when you are higher training in the NICU, is you go to all high-risk deliveries and all emergencies. So, you have to be connected by a pager or a phone. So sometimes mid-bite, you are racing down the hallway across to get there; kind of leaping over small children, and parents, and laboring mums to get to labor and delivery. But it is on the same floor.

A similar sentiment was expressed by *Olivia*, who has spent her nine-year career working with oncology patients, with her current experience on an inpatient oncology unit. She expressed that when the facility opened nearly 14 years ago, despite being constructed as a speciality cancer hospital, designers accidentally overlooked designing an inpatient oncology unit. As a consequence of this oversight, a hallway was converted post-occupancy into an oncology unit and throughout our conversation she often referred to her workplace as “an afterthought unit,” noting that it “didn't get created until after the hospital was already built and inhabited.” Since this space is not truly being used as originally intended and had to be converted to accommodate the needs of a stand-alone unit, *Olivia* described that their breakroom is in fact, a multi-disciplinary room where space is contested between many different individuals and uses:

...the problem is that our break room is actually - also has to function as a team room. So, it has to be a space where we do rounds, or where doctors can also do charting and dictation if it's too busy or chaotic at the desk. So unfortunately, serving as a multifunctional space in that way, I think does detract a bit from the ability to make it more of a restorative and relaxing place because it has to be very functional as well.

She acknowledged that designers did design a large breakroom to accommodate staff on other wards, but that this is rarely utilized by herself or her colleagues because:

For us as a unit, that's so far removed [...] that there are a lot of days where it's either a) it's just like a significant amount of effort to grab all your stuff and walk five minutes down the hallway. Or b) it's just too far removed in case you are needed for something or in case you know like, *'Oh I'm waiting on our physician to show up for my patient, I need to be close by in case they need to grab me'* all those sorts of things. For us, as a little unit tucked away at the end of a wing, that blueprint doesn't serve us.

Olivia and *Arlo* both expressed the tensions in needing to be readily available for their patients, but similarly noted that that staff have adapted their rhythms and routines to accommodate around the built environment, rather than the built environment constructed and designed in a way to support their work processes and needs.

Multi-sensorial stressors: “It’s overwhelming at times”

Without prompt, all participants provided an organic articulation about the multi-sensorial stressors that they experience within hospitals and how this amplifies their stress and fatigue. Participants frequently reported their environments as “loud,” “dingy,” “smelly,” “crowded,” and replete with harsh, florescent lighting which one participant noted is, “overwhelming at times.” Some participants expressed the frustration of working in spaces that provided no discernable control to staff over noise and light levels, with some participants explicitly questioning why hospital spaces were not designed to reduce sound and filter in more natural light. *Olivia* parsed her physical environment at work into a series of stressors expressing it’s “alarm fatigue, fluorescent fatigue, walking on hard ground fatigue.” She went on to elaborate that while she understands the necessity of alarms to alert nurses, she felt that there was little understanding on the cumulative effect of these spaces on nurses. She emphasized her

distaste for the fluorescent lighting and shared this as a significant stressor for her and her colleagues:

The non-natural light, of course is you know - there's all sorts of research about how that's not very good for you, and also how much it really does mess up your circadian rhythm [...] I realized that that's like both a financial and environmental choice to some extent, but in this day and age, with the technology we have, why can't we do LED technology that's more attuned to a daylight wavelength?

In addition to the challenge of working in a space illuminated with fluorescent lighting, she further elaborated on the haptic challenges and of the one-dimensionality of hospital space. She recognizes that hard surfaces are easy to disinfect, but states this also further contributes to the sensory challenge of working within this environment:

I think that there is a lack of varying textures, both visually and like tactilely. And I know that, that has to be because you have to be able to clean everything in a hospital, but everything is a hard, flat surface. And I think the lack of variety is a stressor and things that are just like hard, hard edges. Hard to stand on.

Olivia goes on to articulate that these spaces are often designed to be “purely functional in an institutional way,” but states that what designers and decision-makers don’t consider is that these spaces are resultingly intended to elicit a degree of fight or flight response in nurses, which contributes significantly to nurse fatigue. *Olivia* explains what she feels working in these spaces:

Auditorily - just kind of always this cacophony of invasive sounds, which for me... call bells and IV pumps, mostly things beeping - and you need things that are alarmed because you need things that are going to spur action. But at the same time, of course, if you've always got a space that is intended to almost trigger that small measure of that

fight or flight because it's like, 'You need to act now!' If you're always being triggered into fight or flight, that's very exhausting on your nervous system...

Again, she tempered this with the awareness that alarms elicit a rapid response for patients, but emphasized that from a clinician perspective, the constant triggering of a 'fight or flight' response is simply exhausting. She explains:

To like some extent, you need to have heightened awareness as a nurse in acute care, because you need to be able to react and respond when people are deteriorating and need quick intervention. You know, it's just that the nature of the space is to constantly trigger that. And it is very neurologically exhausting, especially over a 12-hour shift.

Sage corroborates *Olivia's* sentiment and expresses in the emergency department there is an incessant and habitual stream of "call bells going off every three seconds." In our discussion she noted a design flaw after the ER was renovated 10 years ago that amplifies alarm fatigue. She explains that the colour of the emergency bell and the staff assist bell were designed to be opposite of what can be found in the rest of the hospital. While a seemingly harmless oversight, patients are resultingly unaware that they are triggering a more intense, urgent alarm. She explained, "So you can imagine how much of the time people are pressing the emergency bell because it's green and blue. And it's on the wall. And so, you're just constantly hearing alarm bells. And you get so desensitized to it that you just stop responding." *Sage* reveals to me that she is often under the impression that the design of the ER is "almost like it's intentionally uncomfortable, so people don't want to stay." She also illustrated that because the nursing station and the staff breakroom are located centrally in the department, staff constantly hear alarms and "screaming" and reports the noise levels in her department as "very disruptive."

While some noise and sensory stressors are inherent in any environment, participants often questioned why environmental and design controls could not be more actively harnessed by designers to dampen sound, soften surroundings, and alter fluorescent lighting. All participants agreed that modifications to the environment to reduce these sensory stressors would positively impact the staff experience of repeatedly navigating these spaces.

Inflexible Environments: “Glass, steel, concrete”

Participants remarked that the time and engagement this study required allowed them to critically reflect on their clinical environment in ways they had not considered previously. Many participants spoke of their built environment as inflexible - often constructed in materials that proffered feelings of being cold, hard, and sterile. *Arlo* described this as, “I feel like I am working in a concrete, plastic box.” *Willow*, who had spent her four year career as a nurse in various inpatient and outpatient oncology settings, felt similarity and used the descriptors “steel, concrete, glass” to describe her current environment. Participants *Arlo* and *Sage* drew direct parallels of the aesthetics and architecture of hospitals to the uniformity and atmosphere of prisons. They emphasized this feeling on the basis of being disconnected with the outside community and with nature. *Arlo* expanded on this sentiment by stating, “Hospitals don't, they don't have windows. They're like prison, it's such a sad - they're just rooms.” This sentiment was corroborated by *Sage*, who noted her perception of hospitals was that they were deeply “uninspiring” and were predominantly “bland and lacking creativity.” *Sage* explained that her work environment was designed to intentionally limit the ability to see outside - a design decision which was implemented to preserve the privacy of pediatric patients on the ground floor. Incidentally, this environment limited natural light and connection to the outside world for staff and lent *Sage* to feel as if her and her colleagues were “little mole people” who rarely saw

sunlight. She illustrated the congruence between this lack of connection to the outside world and that of carceral environments noting:

...you know, you hear about people working in prisons [...] and one of the things that they talk about is how, you know like the prisoners, the inmates do time, but the people who work there do time as well. Because they never go outside, they never see the sun, they're in the same carceral environment. And like, as much as they certainly are in a position of power and privilege in that space - It doesn't negate the environmental impact that they feel.



Photo 1 - Sage: "Window"

Reflective Note: This picture captures a moment of calm and restoration indoors that still benefits from the beauty of the natural world. Having windows and plants inside is incredibly

important. In my clinical area, there are no windows except for in patient rooms, which are covered with a tinted film to prevent light from coming in. I often don't know what the weather is like outside throughout the course of my day. During the winter months, I arrive to work in the dark and leave in the dark without ever seeing sunlight. This can have a damaging effect on mental health. Particularly since the lighting in the department is all fluorescent.

Conversations regarding hospital spaces occurred in tandem with participants discussing how hospitals were material exemplifications of inflexible, linear thinking in healthcare. These nurses questioned why there appeared to be a hesitation to dare to think differently about the physical environment of the hospital. *Arlo* noted this visceral fear when it came to improving the built environment citing, “The hospital [administration] talks about things, but they never actually get their foot in the proverbial water and try it. I'm not sure what the fear is...” *Arlo* noted even after reconstructions both to her unit and to the hospital atrium, nurses were cognizant of the apparent inertia to conventional design. *Arlo* was particularly vocal about this sentiment after noting the changes that have occurred in her workplace over the course of her 35-year career. She frequently remarked of missed spatial potential, at one point describing the hopes the nurses had for the new atrium that was constructed, “We were all excited when they built the atrium that it would be a green space. But it really - it's a glass space. That's all it is. Just a glass space with tables and chairs.” She later remarked in our conversation, “...the atrium has great potential, great potential because it's a massive open glass area that, you know, you could just do the most incredible things in there and it would be fantastic.”

Arlo shared that an exemplification of this inflexible thinking was when she and her colleagues were consulted on the re-design of the NICU when it was renovated 22 years ago. She noted the enthusiasm and energy that the staff nurses had in maximizing their space and how

they creatively attended to rectify the spatial stressors that they had identified in their workspace. She expresses the disappointment and betrayal her colleagues felt when the design they had submitted was accepted, but not implemented:

We did the design on our unit, we all did a huge input on it and had everything, and they said, *'Yep okay, we're gonna do this and this.'* And then we all peeked in when it was being renovated and we went, *'Are we on the wrong floor?'* Like it looked as far away from the design that we all agreed on, as was possible. Nothing. From the setup - like when we designed it, we had the beds in a carousel [...] we really thought hard about how to maximize our space [...] they said, *'Yeah, this is great, we're gonna go ahead with it.'* And then we got these little rectangle pods with the beds stuffed up against the wall. And you know, very little space, everybody bumping into it. And if the fire marshal ever came in, we'd all be shut down.

She notes that one of the particularly frustrating aspects is that nurses now must habitually navigate a space that did not address their spatial or sensory concerns. She explained that the nurses had spent considerable energy in creatively thinking of design solutions for their workplace, as exemplified by how nurses considered inventively minimizing the sound in the nursery through environmental cues:

It was really disappointing when we designed the unit that we - and its very loud - we asked for a dimmer on the lights, so that when the noise level rose - and it's easy right? Like [...] you get louder and louder and louder, we just want it where the lights would just do a little dim and go back again, sort of like the house lights are going down, it's time to come back in and see the performance. We asked for that feature. And they said it

wasn't in the budget. And as nurses, we said, *'We'll pay for it out of our own pocket. We will pay for it. It's that important to us.'* And they said 'No.' So we were not impressed.

At the end of our conversation, *Arlo* concluded that she believes this lack of imagination and predominant linear thinking is a direct result of the “McDonald's mentality” that has obfuscated decision-making in healthcare by administrators seduced by immediate solutions and reduced cost. According to *Arlo*, this mentality systematically precludes more innovative solutions, and the lack of spatial imagination is a direct consequence of the systematic rejection of creative, long-term solutions. As a nurse she was frustrated how this inflexible thinking has gained dominance and countervailed this from her own experience with gardening, “Whereas because I grow things, I plant an acorn and I know that it's going to be 400 years before someone is really going to be getting something out of that.”

Part 2: Re-imagined (Salutogenic) Environments - “...And I remember thinking to myself, you can build hospitals like this?”

This section will discuss the interpretive and descriptive findings with an explicitly salutogenic orientation. To recount, the application of salutogenic theory is to better understand what architectural elements foster feelings of well-being, which can then be integrated into the design of the hospital to create a better sense of coherence with the built environment (Golembiewski, 2010; Lyon, 2017). The following segment aims to address how built environments can enhance nurse well-being and will contribute additional depth to understanding and communicating the architectural needs of nurses. My conversations with participants often began with a discussion about their current physical environment as discussed above in *Part 1: Current (Pathogenic) Environments*. This illuminated how nurses embody the stressors imparted and amplified by their physical workplace, and how they recognize these

spaces as a manifestation of someone else's imagination. This serves as a contextual point of departure for the following segment which will illustrate the salutogenic factors that nurses viewed as imperative to recalibrate the environment into one that enhances a sense of coherence and promotes health - both for themselves, their patients, and their communities. Their bold (re)imagining of these environments, as guided by their clinical and personal insight, is thematically detailed below.

Rituals: "A good cup of tea makes you feel braver, wiser, and more optimistic"

Arlo and *Willow* both spoke with nuance about how the inhabitation of space can mediate the experience of engaging in routines and rituals. These everyday acts were deeply meaningful to provide a conduit for connection both with themselves, and with others. As *Willow* noted, rituals for her were emblematic of an intentional commitment to self and she summarized the thoughts she had in these moments as, "... here I am. I'm going to be enjoying this moment. I have a good book; I'm going to relax." *Willow* explained that she finds reading essential for her well-being by providing an escape from her work as an oncology nurse. She explains this as, "I enjoy reading. And it just, it takes you to another place [...] It's just a very good way to escape, especially when you work in such a heavy field. You sometimes need that [mental] space to be thinking about other things." *Willow* richly illustrated a description of her reading ritual:

I also started to tell myself that I would only purchase hardcover books as well. And I remove the sleeves from the hard covers. So, when they're on my shelf, you're only seeing the title and the author of the book, there isn't anything that's popping out [...] But for me, I just enjoy a nice hardcover book. I love when I get a new book, I remove the sleeve, I crack it open right into the middle, put it against my face and take a deep sniff. And then I read it.

The necessary escapism that reading provides *Willow* appears to be shared by her colleagues. She notes that the space in the public atrium of the cancer center has comfortable seating and a fireplace. She explained that depending on her day and her mood, she will often spend her break time in this space and describes it as an inviting community atmosphere where paradoxically, she could be alone and escape into her book. What she illustrates is the communal way in which this relational space allows a community of individuals to be alone, together:

People bring their books, their audio books, and they like to go and sit by the fireplace, and you'll be sitting next to patients, sitting next to physicians, radiation therapists, all sorts of people in that area. And everyone is eating their lunch, reading their book, listening to their audio book, enjoying the nice fire, and enjoying the lighting.

Willow noted that what she found heartening as an oncology nurse was that cancer centers were often constructed with libraries for patients and their caregivers. She found this to be deeply comforting and she explained to me she is always drawn to spaces that contain books.



Photo 2 - Willow: "Untitled"

Reflective Note: This space is very inviting and thoughtful. I'm always drawn to spaces with books...

Arlo also spoke repeatedly about rituals which connected her both to herself, her memories, as well with others. While *Arlo* also spoke to her love of reading, she emphasized the ritual surrounding tea. She stated to me, “There's something about the ritual of making tea...” She explained that during her busy shifts on the NICU she is willing to forgo meal breaks but found that a cup of tea is essential to ground her. She explains how this ritual countervails the frenetic energy and operative fight-or-flight mode of nursing into one where she is forced, even momentarily, to relax:

...But when things are crazy that [whole idea of] having to come in, having to stop, the whole ritual of, *'Okay, what tea am I going to have? What pot am I going to put it in? Am I going to put it in a cup? Am I going to put it through a strainer?'* There's a whole fantastic ritual that goes with it. And you have to put aside, if you're in in the moments of angst, you can't - you're dealing with hot water, you know - *'Honey, no honey, milk, no milk, lemon, no lemon'* - you have to put aside all that's going on and concentrate on this ritual of making the tea. And at the end of this beautiful ritual, you actually get to sit down and have, hopefully, a lovely cup of tea.

She explains that not only is this tea ritual essential to force her to take a momentary pause, but that tea is a wonderful entity for connection. She goes on to explain that tea rituals have significance for others as well as herself, with some cultures having a deeply established traditions surrounding tea. She explained, “The Japanese of course, and the Chinese have perfected the ritual of having tea.” Perhaps what was most touching and deeply meaningful about the tea ritual was that *Arlo* found this activity as a way to connect with her colleagues. She went

on to explain, “I actually have a couple people who come in - ultrasound and cardiology - who like the tea ritual as well. So, when they come, we always stop and say, *'Okay, we're going to make a cup of tea even before you start what you do.'*” She went on to say that she came to know precisely how these colleagues enjoyed their tea “...one likes his tea with jam, and one likes his tea with honey.”

Arlo emphasized that while her workplace avails her to a kettle, she could see opportunity to enhance the environment to enable staff to take opportunity for this momentary pause and connection. She explained, “When you hold a mug or a teacup, or something in your hand, that's a lot different than holding a cardboard or a Styrofoam [cup] [...] like it's this... It's just something a little more, *'Okay, I have to take time. I can't rush this through.'*” In our conversation she had repeatedly emphasized how she felt that future hospitals should be designed to be more conducive to allowing these meaningful rituals for staff stating, “It would be very nice if the hospital had real places to make real tea, or real coffee, in real cups.”

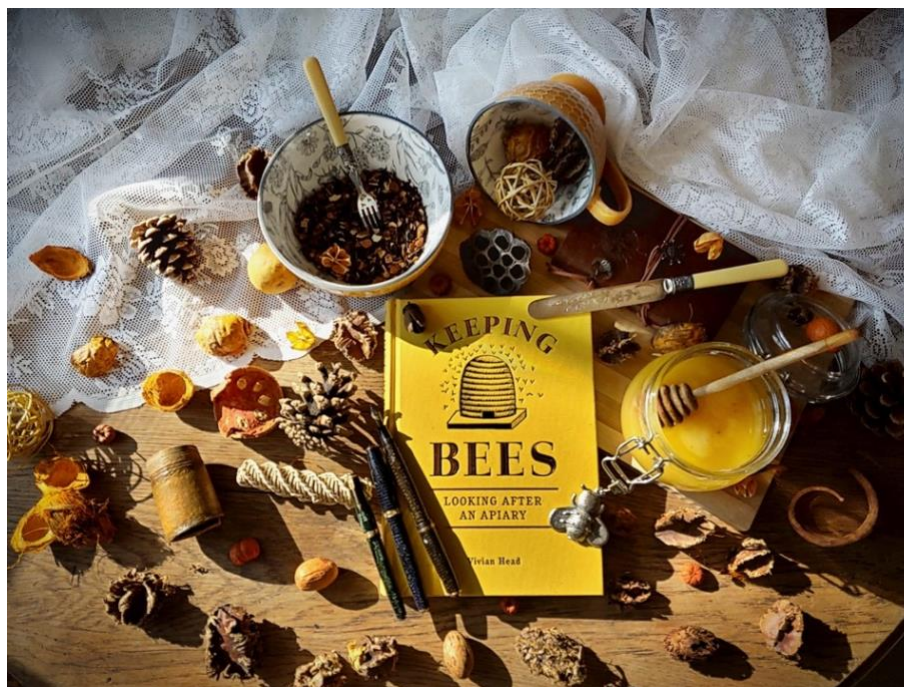


Photo 3 - Arlo: "Tea, Bees & a Good Book"

Reflective Note: George Orwell says a good cup of tea makes you feel braver, wiser, and more optimistic. I'm not sure if there are any substantive scientific studies, but my mother always claimed that the mere ritual of making tea brings calmness in the midst of uncertainty. There is something to be said for opening containers of loose tea, sniffing and trying to decide what fits your current mood. Mint, sweet lemon, spicy ginger and cardamon, or even walnut infused black tea. Sweeten with fresh honey and pair with a good read...

Adaptable Spaces - "Why can't there be rooms of soft color, rooms of bright colors..."

Participants offered adaptable spaces as a creative counterweight to hospital environments that they deemed inflexible. *Olivia* offered unique insight into this and emphasized that in a busy, acute care environment, nurses should be provided with adaptable spaces. *Olivia* went on to explain that for her, a restorative space is one that could be engaged with in a multitude of ways, depending on the day, and her mood. She states, "...and what you might need on one day shift might be different than what you need on the next day shift. Also, some days you just need to walk it off, and sometimes you're like, 'I'm beat. I just need to be still.'" To advance the need for these spaces, she introduced a photograph which she felt best represented an adaptable and "multi-planal, multi-faceted" experience:



Photo 4 - Olivia: "Village Creek"

When discussing this photograph, *Olivia* emphasized that what drew her to capturing this photograph in addition to the seamless integration of nature, was the adaptable experience of being in this space:

...I was saying kind of like having a multi-faceted, multi-planal experience of it, and the fact that you can do any of those things to you know, experience the space in a restorative way. You could sit on that bench with a coffee, you could sit on the steps with a book, you could walk through it, you could [...] be down by the water and just like toying with the water with the stick like a little kid, if that was what was restorative to you.

Olivia explained that while working in the hospital, she has scoped out a spot in a sparsely used public sitting area that she occasionally uses to adapt to her needs. She explained that when she needs to be alone and decompress, she sometimes goes to the sitting area and moves a chair so that it's secluded and tucked between some large plants to offer some privacy. She finds this manipulation of space essential on some days when she needs to be alone in order to "reset my brain a bit."

Willow also shared a very similar sentiment based on her experience in the workplace. She described that over the course of her shift, a lot of energy is expended speaking with various people and engaging with colleagues. She states that she actively seeks out spaces that support her mood. At times, she finds going to the atrium where there is a sense of scale and activity important, while at other times, she feels the need to retreat. She explained these emotional whims to me:

I think that it also depends on your mood. I think sometimes you are in the mood for something vast and bigger than yourself - like depending on what it is that you're going

through. Sometimes I enjoy a space like that if I'm feeling down on myself a little bit and wanting to know and appreciate that there are things bigger than I am in that moment.

But I also appreciate a nice, quiet, cozy small space. And I think that's more for my like introspective moments.

She also explained that she is repelled by having to expend energy on conversation during her breaks, so she avoids the breakroom and that “it only fits three people...” so instead, she sometimes creates her own impromptu private space in a telemedicine room on days when she needs to disconnect. She describes, “Sometimes I find myself eating lunch in like a telemedicine room. It's not the best place, but it's quiet, and it's private. And in that hour, I can cater to whatever I'm feeling in that day.” She went on to explain, “So if we had more spaces like that - that would just be so amazing [...] sometimes I just need a space for myself.” *Willow* stated, “I think that a space does need to be adaptable.”

While *Olivia* and *Willow* explained how they embody and seek out space for themselves based on their emotions, *Arlo* and *Sage* offered more direct solutions. *Sage* stated she too avoids the breakroom depending on her mood, and who else is in the breakroom (“some people have appalling breakroom etiquette”). She also illustrated that the staff breakroom is located in the center of the ER department, so it's incessantly noisy. She explained that inspiration for how to offer a more flexible and adaptable space could come from a spa she once visited where chairs were available with noise cancelling headphones and relaxing music, she recalls this space:

...there's a room where there's like a lineup of chairs and they have noise cancelling headphones, and they have a type of soundscape and music [...] And so even if there couldn't be two spaces, having a wall of these headphones could give you your own private break room. Even if it's in a chair [it] would be something. But yeah, we do have

a quiet room, but it's for patients. But the idea of having a staff lounge and then a quiet room. Yeah, that's a very attractive thought.



Photo 5 - Sage: "Hammock"

Reflective Note: There is no opportunity to recharge without the ability to disconnect.

Arlo drew much of her inspiration from nature and explained that she designed her garden intentionally to cater to different moods. She repeatedly questioned why a similar approach could not be considered in the hospital. She mused how nice it would be, “we could have areas in a hospital where you can go down a hallway and each ward and say, like '*this is the quiet room*' or '*this is a reflective room*,' you know, '*is there a fireplace?*'” Earlier in our conversation she had questioned, “Why can't there be rooms of soft color, rooms of bright colors, you know, things that people like?” *Arlo* explained she designs her gardens to embody these

adaptable traits, "...our acreage is set up where there's probably 10 to 15 spots where you can actually stop and sit and have a cup of tea. Depending on your mood, depending on the view you want, but you will take a corner and there'll be a log, or a chair, or a gazebo or something where you can sit and have your cup of tea and just be quiet and just reflect."

The necessity of adaptable spaces from all participants spoke to creating future hospital environments that are more manageable by staff, by empowering them with spatial choices for what they need in the moment, and thereby, creating a space that is crafted around their emotional needs.



Photo 6 - Arlo: "Garden"

Reflective Note: ...Sit comfortably on soft yarrow, smell the heady vanilla scented milkweed, watch the bees burrowing into azure wild lilies, hear a chorus of songbirds searching out beetles and crickets. A breeze sways the big bluestem grass that catches the last of the pink apple petals with their promise of fruit to come. Truly all problems can be solved in a garden.

Nature: “A top note of fresh spruce”

Nature was a prominent theme interwoven throughout the narrative of all participants. Nature was positioned as a direct inspiration for design in order to make the hospital environment more manageable and comprehensible for staff. Additionally, nature was spoken with a degree of reverence and evoked connection to self, others, and even something “greater than oneself,” which corresponds with how nature can provide considerable meaning. The following subthemes will expand upon this with granularity.

Nature as a conduit for connection: “The only human sound is my paddle dipping in the water.”

Participants spoke at length about how nature provided a deep sense of connection, whether this connection was to themselves, their memories, or to others. What was particularly striking to me in the narratives was the multidimensional ways in which nature provided a deep sense of meaning. All participants considered nature to be deeply therapeutic and meditative, with some participants discussing how being in nature enabled disconnecting from other people, thereby, allowing them to connect deeply with themselves.

Arlo spoke at length about the multidimensional ability of nature to allow her to connect to herself and her memories. She explained to me how being in nature reminds her of childhood and she described how her parents instilled her with a love of the outdoors. She explained to me, “So we grew up in a little shack on a lake [...] so all my best memories, all my most calming and fun memories, are all 10 of us kids squished down at the lake.” She went on to say that every year she goes on a portage spanning four lakes and how this ability to disconnect with other people, is a way for her to reconnect to herself. She describes being in nature where quietude reigns and recalls the experience as deeply restorative. She recounts:

Everything is gone. It's washed away. Your muscles are relaxed, it's calming, it's - when you're out on the water - like this is beautiful. We started this morning, we went out at three in the morning it was pitch black. And just - it was quiet. The sun comes up - it was so misty you couldn't see anything - and then the sun comes up and the mist is slowly burning away. The loons come out and they're singing. Beavers are out. I think this was one of the trips we had the moose come swimming across at us. But we don't speak. We don't have to...



Photo 7 - Arlo: "Kayak"

Reflective Note: ...The sun has just come up and is burning away much of the mist, the birds are

starting their morning chorus, the loon in classic song. The forest has that damp earthy smell with a top note of fresh spruce. The only human sound is my paddle dipping in the water. It's a brand-new day and anything is possible, but nothing is required.

Arlo describes these trips as deeply restorative and grounding, and that the connection she finds in nature is in opposition to the chaotic and noisy environment she described as her workplace. She describes the release of responsibilities and the ability to connect and be present, “There's just anything I want to do. I can just lay back in the kayak and look at the sky. It's just no expectations. No nothing. It's just like all is good with the world. It's so so wonderful.” When asked how this feeling could be translated into the built environment, *Arlo* reflected that the same variety of sound and light that is afforded in nature could be incorporated into hospital spaces, “...in different degrees from bright, sunny, clamorous, down to quiet, muted areas of, you know, contemplative reflection. You know, the morning kayak on the water with the mist coming up with nothing, no noise.”

Willow also recalled positive emotions that were elicited by nature. She recalled a childhood memory of the first time she saw a jellyfish while she was swimming in the ocean and stated, “I thought it was the most beautiful thing I'd ever seen.” She finds water and the movement of aquatic animals such as jellyfish to be particularly mesmerizing. She told me, “I love jellyfish. I cannot explain. No, I can explain why I love jellyfish. I love the vibrancy of jellyfish. They're vibrant. I love the way they move. I love that they are simple creatures. That's what I love most about jellyfish.” *Willow* draws a deeper conclusion as to why the integration of animals and aquatic life can be so beneficial in the hospital environment:

Even if we had a tank, somewhere in the building, somewhere where everyone sits. They can enjoy looking at the fish, or looking at - yeah it's just, it's peaceful. There's a reason

why people are drawn to visiting these kinds of places [aquariums]. Because you're seeing something you don't really see in your everyday life. Things that you can forget exist sometimes because they're not a part of your daily existence. But having that little piece of them just makes you realize and appreciate that there's so much more going on in the world, besides what's happening in your space. That you know, I'm here and I'm working but there's also these fish existing and occupying the same space as I am.

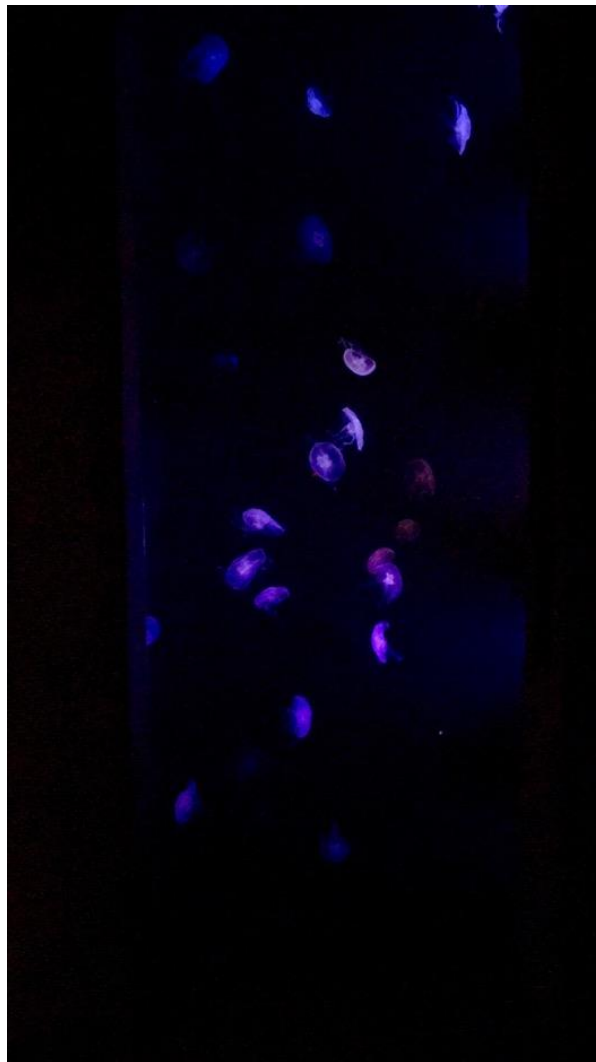


Photo 8 - Willow: "Untitled"

Reflective Note: I love jellyfish, the way they move, their vibrant colours. These jellyfish are housed in a dark hall, which allows them to illuminate the area. They are mesmerising...

For *Willow*, this ability to connect with other beings that exist in nature instilled a perspective that she recounts might serve to be restorative by removing staff from the intense and myopic problems that can occur in acute care nursing. The existence of a tank not only allowed her to recall a memory of swimming in the ocean with jellyfish, but also to something greater than herself.

Recounting a parallel experience to *Willow*, *Olivia* felt that nature had the ability to put problems into perspective. She explained that she spends considerable time outdoors hiking and that she finds this essential to maintain her well-being. What she finds restorative about nature is that it confers a palpable sense of, “that ability to feel small.” She goes on to explain why hiking in the alpine is restorative for her:

To realize that things are bigger than you, the world is bigger than your problems. And there's more going on than what you're myopically focused on. I think being able to take your mind off of that is very restorative. Especially in a nursing sense, when you are super focused in on a set of people with some pretty acute medical problems [...] You need something that's going to force you to take a step back from that, and not be so myopic. And so, I liked the idea of scale here [*Photos 9, 11*], the fact that you've got a tree canopy that extends all the way over you...

For all participants, nature provided a deep sense of connection and meaning, often relating how nature allowed them to connect with themselves, their memories, and with others. Natural elements and entities for these participants allowed them to refocus their outlook beyond their immediate problems and stressors, hinting that the scale and novelty that can be found in

nature can help them emotionally and mentally recalibrate. Nature can enhance the sense of coherence individuals feel to their environment, by providing a deep sense of meaning.



Photo 9 - Olivia: "Mountain View"

Reflective Note: Natural spaces with lots of light and a view to take in, a sense of scale, feel restorative, as taking in something bigger than yourself tends to help put stressors into perspective.

Nature as inspiration for design - "...every function, every design, everything is there in a garden"

All participants drew direct visual and associative inspiration from nature as a way to improve hospital designs. *Arlo* was particularly passionate about drawing inspiration from nature and revealed she spends considerable time planning her garden. She explains this process as, "I

design. I do [a] sort of natural designing called permaculture, which sort of think [of it as] mother nature knock off. But I don't claim to be any big pro at it. It's just a lot about sitting and observing. And then you take the design, and you fast forward it.” She explained in depth her observations of the patterns and design she sees occurring in nature:

So, when you sit in a garden, there is no problem like I say, there is no problem that cannot be solved in a garden. Because every function, every design, everything is there in a garden. The mathematics are there. Cycles are there. Design is there. So, if you want to build something, you look in a garden.

These patterns are something she has noted both in her garden, as well as on her kayak trips. She spoke extensively about her deep affinity for water, and how she found it deeply restorative.

When prompted further she tied this in with design:

But when you look at a waterfall, it's still very controlled. It's still very... it has a determined path it has - it's made a way. And you look at nature, when you start with water, and it's worn through the rock and it's made this, you know, from a drop, to a trickle, stream, to this torrent, you know, it's still a design. It's not random, it's never random. It's always a purposeful design. And there in the wildness, there's still that purposeful design, and that is so calming. And once you see design in nature, once you look at a pinecone, and you see that or once you look at a sunflower - you can never unsee that design again. Like every time you look out, now everything you look at you see the design in that repetition and that sense of completeness.

She offered suggestions for future hospital designers for how she sees this purposeful design incorporated in architecture. Note how her suggestions to incorporate water in the built design also serves as a way to create an adaptable space that reflects the emotions of the end-user:

...when I design anyone a garden it always has water in it. Whether it's a silent, just a bowl of water, or it's maybe just water trickling over a stone, or people who want big noisy waterfalls. I think hospitals should have areas of water that are quiet, whether it's just a pond, maybe you've got some water lilies or something in it...

Arlo also further expands on how water can reflect emotions:

...So on one hand, water that's quiet that you could put your hand in, or just, you know it's just a chance to be still. And then another area where I think if you had a wall, and you had a whole water system and falls in that hole, turbulent sound and motion, because sometimes you look at it, and you're just like, '*yeah, life right now it's crazy, it's turbulent...*'

Olivia also shared a similar observation from her time in nature. She noted the experience of watching patterns in the water reverberate over a calm lake as she was kayaking. She explains that patterns within nature soothe our brain by providing “visual interest without overstimulation.” She found that these patterns in nature were in direct contrast with the overstimulated acute care environment. She had explained to me:

...And it's mesmerizing in its movement. I think that's something that I find very restorative is movement in a way that's very mesmerizing, rather than like chaotic and overstimulating. So, people rushing around the nursing station, and whatnot, is a lot of movement, but it's not restorative. But watching a fire burn, seeing water trickle by in a creek or being out on a lake and experiencing that water movement around you, is very mesmerizing. And I think that can be an easy way to transform a moment into something meditative.



Photo 10 - Olivia: "Water and Kayak"

Olivia also spoke about her hikes into the woods and how she finds these embedded patterns that offer, “enough variation to kind of catch your eye and draw you to different things without being overstimulating.” *Olivia* recounts how she feels when she looks at the vegetation in the alpine on her hikes, “There's a variety of colors without it being like overstimulating, there is a lot of natural light. There is a sense of scale, and being small, but small in a good way.” She felt that the use of scale in design is a way for designers to replicate this feeling of being surrounded by a tree canopy and used an exemplar from her hospital that she felt mimetic of this experience, “...I actually really love that when you walk into our hospital, it is such a huge expansive lobby, and they take advantage of that space to make other more enclosed spaces feel expansive.” Again, she articulated that drawing inspiration from the scale in nature is essential because it provides “a sense that there's something bigger than just you. That there's a bigger purpose, that there's more going on than the one stressful thing you're focused in on.”

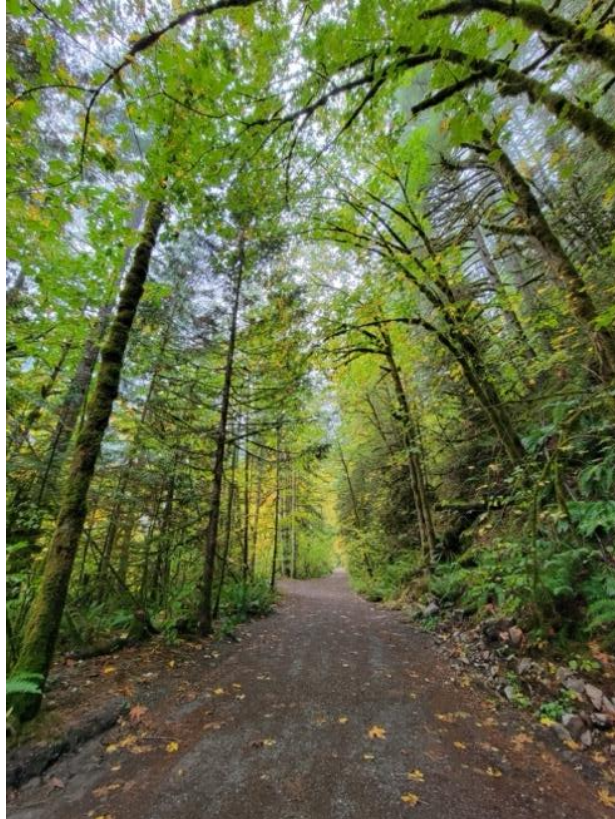


Photo 11 - Olivia: "Forest shot"

Creative Atmospheres – "A tiny bit more like a piano bar..."

Participants spoke not just of natural elements, but also of artistic and aesthetic ones. All participants spoke of the affective power of music or art in combination with spatial qualities such as scale and lighting. In doing so, they revealed how aesthetic and material qualities could influence the atmosphere of a space in ways that was sometimes difficult to articulate. All participants recalled experiences of inhabiting certain spaces that evoked a positive mood, feeling, or memory and expressed similar elements could be harnessed to amplify the positive environment of the hospital.

For *Arlo*, sound and music could create an atmosphere of connection and positive distraction, and she felt that hospital designers should consider creating a space where musicians

could feel welcome to sing or play music. She related music to a memory of playing her grandfathers' violin and felt that music was a particularly important way to transcend language and culture, while also serving as a positive distraction for patients and staff. She explained:

It's a language that transcends everything. I mean you go to Africa, and I worked with the Maasai there, and they have such a different kind of music and great dancing. And then, you know I've been through Europe and every place has something that is uniquely it. [...] And it's just incredible that no matter where you go, someone's got some sort of song, some sort of tune.

Arlo felt that the design of the hospital could harness the positive atmosphere and connection that music can provide and explained how wonderful it would be if, “every hospital has a place where you can invite guests to sing, to play guitar, to play piano, to do anything. And just open it up for people who, you know, maybe they just need something uplifting, or maybe they need a break...”



Photo 12 - Arlo: “Untitled”

Reflective Note: Some people claim that math is the universal language. I still struggle getting the times table right, so I guess I must speak it with a lisp. For me music crosses all boundaries and timelines ... I enjoy playing many instruments, but when I take up the violin, [raising] the bow and set the metronome I feel like I am painting a small picture of myself into the family ballad.

Willow felt similarly about the affective power of art and lighting to transform a space. She recounts walking in a gallery when she first encountered *Autumn Rhythm (Number 30)* by Jackson Pollock and feeling deeply compelled to take a photograph. She explained that something about the confluence of lighting and the artwork itself evoked her emotions in a way she could not explain. She described this moment as:

I remember taking the picture of that painting and thinking to myself, what emotions it was evoking for me, why I felt so strongly about it, why it appealed to me. And even the way that it was hung, the space it was hung, the lighting that was used. I think that it just has the ability to transport you and make you feel something different. And it's very - I find that art is very distracting in a positive sense.



Photo 13 - Willow: "Autumn Rhythm (Number 30)"

Olivia also spoke about the need for public art, and that the hospital she works in has a piano in the atrium where volunteers can play. She goes on to describe how art and music can transform the atmosphere of this space:

I definitely do think there is a role for public art in those [atrium] spaces. And I think that can be something that is adaptive for people as well in that you can interact with, like a physical piece of art from multiple different viewing angles, at the very least, even if it's not something you can tacitly interact with. And honestly, I love it when they have people come and play piano in the atrium, at [redacted] hospital. There's a [...] I think it's a full-size grand piano that's tucked away in the corner. And you know, it's rare sadly, I think that someone's actually signed up to play it, but I love it. Makes it feel a little bit...A tiny bit more like a piano bar and a little bit less like a hospital.

She went on to elaborate on other examples that she felt also exemplified this creative atmosphere and recalled:

I think some part of the campus of [hospital] also does it very well, where you walk into a front entrance, and it's just this huge expanse of space, and they have a large sculpture that's actually hanging from the ceiling in that space. And I think that aspect of not feeling cramped, enclosed in whatever, having scale is important to incorporate.

Participants appreciated and noted the affective power of certain spaces that utilized sound, artistic objects, lighting and how these qualities came together to foster an inspiring, creative, and positive environment.

The Power of Good Design - "...to aspire to something beautiful"

Participants recognized that well-designed spaces leave a positive emotional imprint. Challenging some of the conventional thought that nurses have little awareness of the built

environment, participants in this study explicitly recognized the cumulative effect of good design, both in terms of the ability of the space to connect to a sense of place, but also to convey respect for staff and to reduce nurse burnout. Many of the participants also spoke directly for the need for more inclusive design, which considers the needs and perspectives of staff as well as patients. The following theme will trifurcate into the following expressions: (1) civic presence; (2) respect and retention; and (3) inclusive design. Together, these subthemes reflect the understanding that nurses have for the power of good design.

Civic Presence - “A pillar of the community”

Some participants articulated an explicit vision that hospitals should have a civic identity and expanded their vision of a salutogenic environment, whereby, the space not only enabled staff and patients to thrive, but also communities. They rejected the generic placelessness of hospitals and envisioned spaces that referenced local environments in their design. This theme was unexpected and unfolded organically in the narratives, with both *Olivia* and *Arlo* discussing with depth that their vision for truly restorative and thoughtful design is one in which local references are integrated. Unsurprisingly, *Arlo* drew inspiration from her permaculture hobby and described her idea of thoughtful design as one that carefully considered locality. In her vision for a re-imagined hospital, she described a polyphonic symphony of light, nature, and sound that she would experience as she walked through the front doors of the hospital. Note how she incorporates previous themes of nature and adaptable spaces, but also explicitly imagines an environment that is grounded where she lives, in Manitoba:

I would walk in the front doors. There would be nothing on the windows. No blinds, nothing. The sunlight would be coming in. All the ridiculous coffee things with all their glaring neon signs. Yeah, you can have them but make them wood. No glaring artificial

light. There would be corners, with small alcoves where people could go sit and take a book and read. Or sit with family and talk. There would be of course water. There would be sound - whether you piped in gentle music. There would be plants. And I'm not talking tropical plants. I don't want to have the zoo's tropical house there. There would be Manitoba. You would go and there would be maple trees. There would be spruce trees. There would be prairie plants, they would be like - this is no different than being in my yard. There would be - I'd get greeted by a wagging tail of a service dog...



Photo 15 - Arlo: "Winter Dogs"

Olivia found similar inspiration and described to me how she interpreted thoughtful architecture as something that seamlessly blends into its local surroundings, and described how, "It draws attention to itself in a non-ostentatious way. It's not like, '*Look at me, look at me!*' It's just kind of like, '*Oh, here I am.*' [*laughing*] I think that's what I mean by thoughtful architecture." She felt the best evidence of this design was a park in Whistler where she felt it

was evident that great care was taken to retain the identity of the local surroundings (*Refer to Photo 4 below*). She pointed out to me in her photo, “You've got glacial type water, which is why it has a milky color, you have plants that are all native to British Columbia, you can see where the park ends there [and] where the water finishes.” She points out that the photograph was taken on a cloudy day, but ordinarily this viewpoint would also offer visitors a panorama of the surrounding mountains which further scaffolds the identity of this park. She feels that architects and designers could consider better integrating internal courtyards and external landscaping in hospitals that utilizes a similar “non-ostentatious” integration of the local natural environment that also serves to strengthen a sense of place.



Photo 4 - Olivia: “Village Creek”

Willow offered a slightly different perspective for how the hospital could be better emblematic of the community in which it is situated in, recounted from her experience working

in a large urban hospital. Drawing from the experience of the pandemic, she felt the growing need for hospitals to better integrate in their communities and adopt a civic presence. She described her experience and observations with the following:

...when I think back at [hospital], their grounds are huge. You see, there's a lot of civic activity going on in [hospital], because people would come from surrounding neighborhoods to hike through the grounds, to bike through the grounds, to even eat on the grounds. It was just - there is a very big civic presence there. And I think it is important because I feel like it could change the perception of the space. Instead of it just being '*Oh, you know, this is where people come to get medical treatment,*' it's more of a pillar of the community. I think there's a lot of space for community engagement in health care. Especially in times like this, when we're thinking about being more conscious of our health promotion type things, we can definitely engage with the community at large.

She also felt this feeling of fostering community could be extended for patients and families within the hospital and drew upon the importance of support groups that are often organized for cancer patients. She described to me how she envisioned a civic and community presence inside the hospital by elaborating, "I think that having a space [...] that feels welcoming, that offers beverages, and even more comfortable seating more than what we have now. A guide to help you understand the different information, a place where you can meet with peers or people going through similar things. It really helps you build a sense of community."

This apparent draw towards the hospital as having a sense of place and civic identity, both through the reference of natural surroundings, as well as being designed to welcome and invite community members in, corresponds with a salutogenic environment that is highly

comprehensible by providing staff and visitors an orientation to the physical location and the ability to make sense of the geographical context.

Respect and Retention - "I don't think it values our presence"

All participants recognized and clearly articulated direct linkages between the quality and quantity of space nurses were afforded, and the corresponding respect and value they felt as professionals. Participants felt that the intentional decision to create better physical environments for nurses could translate to reduced burnout and turnover. Some participants also recognized that the built environment could be one component of an overall human resource strategy to retain and support nurses. *Arlo* was uniquely positioned to reflect on the spaces that nurses have been provided over her 35-year career as a nurse, and recounts how designated nursing spaces are often relegated as an afterthought. When asked to explore further, she utilized an example of breakrooms to illustrate this spatial marginalization:

Ah, let me see over my 35 years, we used to have a cafeteria in the basement of the hospital which they shut down. Which wasn't very conducive [to meal breaks] - because when you worked, when you are on any shift but days, they're either in there vacuuming or having something else. Then for a while we got a single patient room that they put down orange carpet, and we lost that room to a patient room. Then we had another little room that you could fit one sofa, a couple cupboards, and a sink. We had that one for about 10 years. And then they took that for a patient room and just kind of up ended us to nowhere. So, we just kind of wandered around like lost sheep.

When describing her current breakroom, she described it as small, containing old "collapsed" sofas and a "squished fridge." She relates this lack of attention to the overall ways in which nursing voices and nursing needs are overlooked. When I asked her how she and her

colleagues felt about having their design suggestions for the NICU disregarded she stated, “Um you know, you kind of feel betrayed. But after a while, you just start to expect it.” She felt that it was particularly important for decision-makers to listen to feedback from nurses and not just “lip service.” She described that she feels it’s important for stakeholders and designers to recognize that nurses and healthcare staff could benefit greatly from good design. She described good design as design that “feeds” you and that this could materialize into higher staff retention:

...if you went to your workplace, and it's not a job anymore, this is again - I think most nurses, and people in medicine they don't go in because it's a job - we go in because it's a calling. Very few people stay in this profession unless they feel some sort of calling. And if you go into a place that you feel is feeding me, feeding the people I work with, and feeding my clients and my patients [...] you probably find people won't retire.

This was a sentiment that was shared by *Olivia*. She also discussed the emerging trend of workplace design and how the pandemic has changed the contemporary discourse surrounding how people feel about their physical workplace, and what they expect in terms of a supportive environment. She described how she felt this trend was emerging:

I think more and more emphasis is being put on workplace environment and, workplace experience because of the amount of people who got removed from their workplaces and realized either '*Oh, I really missed this*' and '*I don't like working from home.*' Or '*Oh, my workplace is shit.*' Pardon my language and '*I don't want to go back there. I want to find a different job where I don't feel like I hate the space I'm in all the time.*'

She relayed that although nurses often work in hospitals and not in a traditional office spaces, they are not exempt from this environmental consideration and felt that the built environment is directly related to satisfaction and reduced burnout. She elaborated:

I think anywhere you go, if you set up a space that shows respect for the people working there, and where people want to be, and have the ability to take the stress out of somebody's life. I think that leads to workplace satisfaction and decreases burnout and stress for anyone.

Willow articulated that space communicates to staff, and that as a nurse, she is cognizant of what messages are being expressed. She drew on her current workplace as an example of how space is designed in such a manner that she doesn't feel it values her presence. She powerfully illustrates: "I don't think it values any of our presence. Going from us as people who work there, but also for our patients. I don't think it does. I think the space is very much built to maximize or pull every little bit of space into functionality." When pressed further, *Willow* reflected on an experience she had early in her career that challenged her perception of what a hospital space could feel like. She recalls the lasting impression that was communicated to her by this space:

I remember, once early in my nursing career, I had gone to [hospital] for an interview. And I remember walking through their atrium, and there were trees growing inside the building. And I thought that was just so amazing and so beautiful. And there was seating everywhere, and it was built, kind of like the middle of the building is completely hollow. And there's all of these trees, and you can sit, and you can relax. And you're looking up and you can see all of the space and all of the light, it was just so completely beautiful. And I remember thinking to myself, '*You can build hospitals like this?*'

While *Willow* described a space that challenged her conventional vision of what hospitals could look like, *Sage* mused the experience of participating in this study allowed her to reflect on the role of the built environment and its potential in supporting nurses. She acknowledged that thinking about her environmental needs was not something she critically examined prior to

participating in this study but recognized that perhaps that is why she feels this study was so important. She shared her concerns on how the pandemic has demoralized nurses, and diminished their imagination of what nursing, and nursing environments could look like:

Like the environment would barely - I don't even know if it would make it on the list. Because I'd be like, *'We need staff.'* [laughing] And there's so many other things that are problems [...] So I think particularly during a pandemic, it's hard to think about, what would an ideal environment be. And, you know, there's research to show that nurses expect and assume that, for example, violence will be a part of their job and so they don't report it as much. And so, I think this idea that we could aim so high as to expect our environment to nurture us and to support us is beyond our capacity to hope for and strive for at this point. Because we're so let down by the fact that you know, like in Ontario, for example, we're not paid appropriately. We're incredibly short staffed, people are leaving the profession in droves. And so, to be able to aspire to something beautiful, when we're just trying to survive is - is beyond I think our collective capacity to really verbalize and to aspire to.

While she illustrated how the profession has been largely devalued and that many nurses have been left persistently disrespected and disappointed, she concluded with "...But I think it's why I think this is such an important prompt. And because it wouldn't come to the forefront of your mind, when you're just trying to get through it - to aspire to something beautiful." She went on to describe later in our conversation that she thinks it would be wonderful for design teams and stakeholders to pay attention to what nurses need in their built environment, as a way to remediate some of the disrespect nurses encounter and described, "it'd be nice to think about it for the healthcare workers and for the nurses in particular, who are rarely thought of."

What struck me in *Sage's* narrative was her vivid illustration of the staff gym, which was a well-intentioned space, but is ironically emblematic of how nurses feel their well-being is overlooked by their employers. Conversely, it presents a real opportunity for design teams to craft a space that could symbolically communicate care and commitment to the well-being of healthcare providers. Sage remarked on her impression of the dingy staff gym:

There is a basement gym, it's like poorly ventilated, tiny, fluorescent, it looks like some guys' basement gym. But I used it, all the time. But obviously [it] was closed for Covid and remains closed, which is a real bummer. I think that having spaces for exercise, and even a spot to do yoga - like I'll do yoga in the stairwells in the basement, just because it's somewhere but there's no light, it's dark, it smells, it's kind of dirty and like, I don't bring my good yoga mat and I put a towel down, you know, because it's like, dingy and gross.

Sage went on to describe that despite the fact that her work environment was renovated 10 years ago, it still does not feel conducive to supporting her health, and that creating a space that allows staff to attend to their health and well-being would be an avenue to reduce burnout. During our conversation, *Sage* described that what sustains her is the meaningful work she does with pediatric patients, but stated if the space, "...could be designed so that it enhances it [work], then I think we would be less tired, we'd be less burnt out, we'd be more excited to come to work." She went on to describe the impact that crafting health-promoting spaces could have for nurses:

... I am doing yoga and meditation and all kinds of things to really try to get my mental health the best place that it can be. And these are active priorities for me, but I don't see - I see them as what I need to do to counteract my work experience. And it would be really beautiful to have a space within my workspace where kind of that could come together.

And I guess because right now, you know, my work doesn't feel like part of a solution when it comes to my health, it just feels like the problem. And so, it would be nice to be able to have a space. I'm thinking like windows - even if it's the same crappy gym, but we need those spaces where you can at least be facilitated to prioritize your health.

There was considerable recognition from participants that they were attuned to the spatial messages that were communicated to them. In all accounts, participants held an expansive vision for the built environment and how channelling more attention to staff spaces could materialize into reduced burnout and stress. In articulating such insight, participants described the power of health promoting environments.



Photo 15 - Sage: "Canoe"

Reflective Note: The canoe represents physical activity, ideally in nature or with a view of nature. Having a gym or outside walkways is very restorative. During Covid our dingy basement

gym was closed. Despite it having been a windowless 'dungeon' as it was often referred to, it offered a space where physical and mental health could be actively prioritized...

Inclusive Design - "I think it's a space for everyone"

My conversations with participants revealed that they held a deeply inclusive vision for hospital environments and for more empathy in designing for a variety of people, needs, and abilities. Provided that the intention of this study was to better understand the spatial needs of nurses, participants were generous with examples of how they felt their needs as nurses were excluded in the built design. *Willow* succinctly summarized the sentiment that was shared by all participants, that hospitals need to be inclusive of staff perspectives stating, "...I think it's important to change our outlook and think about when we are designing spaces, not just to make them look great for patients, but also for the people working there."

In addition to participants augmenting the need for spaces to be inclusive of staff perspectives, participants also defaulted to express their concern for how hospital spaces impacted patients, and how these spaces could be better designed with patients in mind. This was unsurprising, as all participants were frontline clinicians and were privy to observing how patients navigated and experienced these environments. In my discussion with *Olivia*, she articulated how the "institutionalized" aesthetic of her workplace impacted staff, but she also related how this environment affected patients. When she described her workplace, she asserts:

...it's purely functional in an institutional way. But it's also very ironic, not just from a nursing standpoint, but from a patient standpoint, if we're thinking like, we're supposed to be in healthcare when reality - I work in sick care, and I know it. We're not creating a space that's very restorative to patients, either.

One of the ways in which she describes this “functional” aesthetic is the hard surfaces which enable easy cleaning but solidifies the institutional and sterile feel of the unit for patients. In another example, she described the frustration the nurses experience with the fluorescent lighting - which is centrally controlled - automatically turns on at 6 am to enable lab technicians to draw bloodwork. While she recognizes how these decisions were made to facilitate care, she also empathizes that these choices are often not inclusive of patient perspectives. This sentiment of including the experiences of patients was built upon by *Willow*, and she powerfully illustrated the following:

I think that it's important for me to say that we need to move on from normative design. What really hurts me the most about my work environment is not even really much about me, but about patients. Especially when I'm thinking about my patients who are experiencing some weakness. They now have to come to their appointment in a wheelchair, but the room in which they are going to be seen by the physician is not spacious enough to accommodate for that wheelchair or their comfort. And the way that makes me feel... it's just, I do get angry in those moments. Like it's not a comfortable feeling for me. And I know it's not a comfortable feeling for the patient.

She conveys that since nurses are often sympathetic to their patients' needs, crafting these spaces to be more comfortable and inclusive for patients would also alleviate some of the distress nurses feel in these patient encounters.

Arlo expressed this discomfort repeatedly as well, although for her it was related to how nurses feel distressed when the NICU was designed without a designated palliative space. She felt it was “shameful” that parents of a palliative baby were offered no privacy. She explained to me that when she designs a garden, she always considers the perspectives, experiences, and

abilities of the individual she is designing for. She feels this could be exemplified in the hospital and that this inclusive and empathetic view is an essential cornerstone of good design. She explains this process in action:

And we know, we designed a garden for people who were handicapped - which is a horrible word - but people who had physical limitations. So, we design things that were raised up and then we designed things that were very tactile for people who were blind. And then we had a whole section that was overwhelming in different times of day for how it smelt for people who were blind. And it was a lot of fun to design and see what happened. But you know, we miss it. Like, you know it's - you don't know what you got, like, you just don't realize. It's out there. And it's not hard to bring it in.

According to these participants, inclusive design is synonymous with empathetic design. It requires an understanding of the experiences, abilities, and occasionally, the limitations of the individual's inhabiting the space, and centers those experiences in the design. According to participants, this insight into the thoughts and feelings of individuals should enable design decisions that closely align with the physical and emotional needs of patients, visitors, and staff.

Summary of Findings

To recount, participants spoke about their current environments as largely pathogenic with considerable spatial and sensory stressors. Participants spoke of pathogenic factors that could broadly be classified as: (1) inflexible environments; (2) multi-sensorial stressors; (3) poor functionality. Examining and contextualizing current work environments offers a unique insight into the holistic ways in which nurses embody environmental stressors and provides guidance for designers to consider remediating stressors through environmental controls. This serves to provide some insight into the architectural needs of nurses within hospital spaces.

To build upon how to recalibrate hospital environments so that stressors are not only minimized, but that health promoting factors are maximized, several salutogenic factors were proposed by participants. These elements often spoke to how the design could support manageability, comprehensibility, and meaningfulness in the built environment. Salutogenic factors such as nature, rituals, atmosphere, and adaptable space all collectively strengthened the sense of coherence that nurses had to their environment. Subclassifications for how these salutogenic factors are categorized and interpreted are summarized below in Figure 2. Together, the examination of salutogenic factors enabled me to address the study objectives to better understand and communicate the architectural needs of nurses and to describe how built environments can potentially enhance nurse well-being.

Figure 2: Subclassification of health promoting (sub)themes within salutogenic concepts.



Chapter 5: Discussion

The purpose of this study was to better understand how nurses experience and envision restorative built environments in acute care hospitals. The impetus for this inquiry could be summarized with the following trifecta: first, my experience as a registered nurse in acute care where I repeatedly navigate chaotic, enervating workspaces; second, an environmental sensitivity and exposure to beautifully designed spaces that have provided an entree into the powerful emotional influence of well-designed spaces; third, a perplexity for the binary of nursing research foregrounding social and organizational work environments, with a near eclipse examining physical workspaces. This inquiry occurred with the backdrop of the Covid-19 pandemic, where I experienced a constantly evolving narrative on the importance of space; its ability to be altered, adapted, retrofitted, and refitted. In simultaneity, I experienced a heightened awareness of spatial proximity and the ways in which space mediates our relational experiences and movements. My observations and conversations with clinicians during the pandemic only served to further reinforce the importance of this work, and of creating enriched spaces within hospitals for those who navigate them day in, day out.

Recount, the findings of this inquiry that are presented in *Chapter 4: Findings* were guided by the following objectives:

- 1) To better understand and communicate the architectural needs of nurses in hopes of informing the future (re)design of hospital built environments.
- (2) To describe how built environments can enhance nurse well-being.

The results of this study bifurcated broadly into two thematic sections, and the narrative that emerged from the analysis (*See Chapter 4: Findings*) illustrates current hospital environments as predominantly pathogenic and amplifying the stress of participants. These

results offer new contextual insight into the embodied experiences of nurses and allowed participants to articulate how to rectify these spatial stressors. The second component of the findings attempted to thematically parse the salutogenic factors that participants considered essential to recalibrate the environment into one that promotes restoration and well-being. The process of thematic analysis captured five salient themes relating to the phenomena in foci: *'Nature,' 'Creative Atmospheres,' 'The Power of Good Design,' 'Adaptable Spaces,'* and *'(Self)Care Rituals.'* The following chapter will map how the findings are situated within the greater constellation of extant literature. Salutogenic elements were discernable in participant renderings of a re-imagined environment, and this discussion will integrate findings with a more explicitly theoretical lens. I will then articulate the implications of this research on nursing research, practice, and education, Lastly, I will discuss the limitations of the study and conclude with remarks on the use of interpretive description in this qualitative study.

Theoretical Perspectives: Salutogenic Theory

Previously (*See Chapter 3: Theoretical and Methodological Considerations*), I presented my theoretical allegiance with Antonovsky's salutogenic theory. This theoretical framing establishes the importance of supportive built environments that promote an individuals' resources to cope with stressors, and has been empirically recognized to increase well-being and resilience (Mazzi, 2021). While the term 'salutogenic' has been scrutinized as a marketing term co-opted by designers who have little understanding of its theoretical basis, with proper theoretical translation and understanding, salutogenic design has demonstrated exemplary results in improving the built environment (Dilani, 2009; Golembiewski, 2010). Findings from this study penetrate beyond the traditional assumptions of utility, function, and productivity for guiding healthcare built environments, and advances the discourse on how to incorporate

characteristics that also enable restoration and connection to place. According to Mazzi (2021), “translating salutogenic theory to the built environment involves understanding what physical cues promote well-being— perhaps even joy—in a particular physical space” (pg. 341). It is important to disclose that prior researchers have identified that salutogenic theory and its application to the built environment is interpretive (Golembiewski, 2010; Mazzi, 2021). In the following chapter, I will analyze and interpret the meaning of my results with a salutogenic orientation. Note that throughout this discussion, I will continue to augment the voices of the participants and remain close to the verbatim.

This inquiry is, to my awareness, the only study that has been conducted to date using a salutogenic framing to better understand the needs of nurses in the built environment. What drew me to framing this inquiry with a salutogenic orientation was a desire for an expansive theory that could address the health promoting influence of the built environment, not simply one that focused on identifying and eliminating pathogenic stressors. While framing this study - and certainly during analysis - revisiting the core tenants of salutogenic theory allowed me to (re)orient myself to the ways in which nurses were speaking not only of diminishing spatial stressors, but also of augmenting restorative characteristics. This study is salient - as policy decision makers, nursing stakeholders, healthcare organizations, and the public have become increasingly cognizant, alarmed, and invested in remediating the human health resource crisis in nursing (Bourgeault, 2021). This concern has been mirrored in the healthcare design literature that is increasingly recognizing its role in supporting healthcare providers (Gregory, 2021). It is my hope that the findings of this inquiry add to the polyvocal call that clinicians require (and deserve!) innovative solutions to remediate burnout.

The following discussion will be framed in parallel fashion to *Chapter 4: Findings*. Under the subheading of “*Dis-eased Spaces*,” I will situate the current built environments that were described as predominantly pathogenic within the extant literature. Again, this section is important in order to contextualize current environments grounded in the participants’ own experiences, but also to allow nurses to discern elements that could be redesigned to reduce stressors. I will then move on to the subheading “*Building Health*” to examine salutogenic components against the current literature.

Dis-eased Spaces

Recall that all architecture exerts influence on a subconscious level (Golembiewski, 2017; Pallasmaa, 2019), and many individuals are largely unaware of their interdependence with their surroundings. This oblivious dependency occurs because as one architect remarked, the built environment operates as our extended body and incidentally, its vital importance in our lives is quite literally, overlooked (Robinson, 2021). Spaces also contain characteristics that subconsciously and consciously elicit behavioural cues, and negative cues are associated with higher levels of stress, diminished problem-solving ability, and physical health (Mazzi, 2021). Provided that a preponderance of stress is a major contributor to moving someone towards a state of ill health, creating a sense of well-being through the built design involves identifying and creating environmental strategies for reducing stress (Mazzi, 2021). Architects and designers cannot control the stress that clinicians carry with them into a workspace, but they can certainly design environments that can minimize stress once the space is inhabited (Mazzi, 2021).

Broadly speaking, findings supported that participants in this inquiry found their physical work environments replete with spatial stressors. This aligns with the extant literature, but nonetheless remains viscerally troubling, as even spaces that have been constructed or

remodelled within the past decade were described as “dingy,” “noisy,” “crowded,” and “smelly.” One participant, Olivia, directly attributed her neurological exhaustion to environmental elements, stating that the spaces in which nurses work trigger a near-constant “fight or flight” response. This elevated stress response was attributed to the cumulative effects of hard surfaces, fluorescent lighting, and alarms, all of which she and other participants identified as particularly enervating. This notion is expanded upon by architect Harry Francis Mallgrave (2013), in a term he expresses as ‘radical embodiment.’ The premise of radical embodiment is that the nervous system, the body, and the built environment are highly interdependent and dynamic systems (Mallgrave, 2013). Consequently, the stress of the built environment is literally imprinted in the minds and bodies of these participants. Cognitive and neuroscience research is rapidly increasing our understanding of specialized regions in our cortex that respond directly to environmental cues, further challenging previously held epistemic dualities between, “outside and inside, subject and object, body and mind (Robinson, 2015, pg. 361).

This understanding of the deep intricacies between our environment and our mind provides a strong foundation of understanding for why participants emphasized the importance of the senses in their environment. The individual sensory characteristics Olivia explicated such as noise, hard surfaces, and fluorescent lighting are all widely corroborated by the body of literature that has sought to examine the influence of the built design on users. A comprehensive review of the literature by Ulrich and colleagues (2008), found that excessive noise in hospitals was in part environmentally attributed to numerous hard surfaces (e.g., floors, ceilings, walls) that amplify acoustics and enable noise to echo and propagate over large areas. These high noise levels have been well-documented to elevate stress levels, impair judgement, reduce concentration, and negatively influence conditions such as hypertension, heart disease,

depression and anxiety; elevated noise levels have also consistently demonstrated emotional exhaustion and burnout in staff (Kotzer et al., 2011; McCullagh et al., 2022). It has been estimated that in the United States, even a reduction of five decibels in environmental noise would reduce the prevalence of coronary heart disease by 1.8%, and the prevalence of hypertension by 1.4%, thereby providing an economic benefit of 3.9 billion dollars annually (McCullagh et al., 2022). Existing research has pointed to the hopeful transformations of hospital spaces by installing environmental controls that reduce sound. Such examples include high-performance, sound absorbing ceiling tiles (Ulrich et al., 2008), and flooring (Harris, 2015).

In parallel to high levels of noise, all participants articulated their aversion to fluorescent lighting without provocation in our conversation. This intentional foregrounding by all participants subliminally highlights the importance of this spatial factor to these nurses. The presence and quality of lighting afforded in healthcare facilities has received considerable empirical attention with a number of studies highlighting the positive influence of lighting quality within healthcare facilities, and the overwhelming preference for natural daylight (Rechel et al., 2009). One such mixed-methods study conducted by Gharaveis and colleagues (2020), specifically sought to solicit the perception of daylight from acute care nurses within their workspaces. Corroborating previous studies, findings supported that the presence of daylight corresponded with improvements in both mood, satisfaction, stress, and alertness all while reducing medical errors (Gharaveis et al., 2020). Literature has found that having access to views of the outside has also corresponded with increased satisfaction and diminished stress (Gharaveis et al., 2020; Salonen et al., 2013; Tavakkoli et al., 2015). It is worthwhile to note how Sage was particularly polemic about the design decision to add tinted film to prevent daylight from entering her workspace. A decision that was likely made without deeper consideration for the

staff that navigate these spaces repeatedly over the course of their organizational lives. She linked this absence of adequate lighting directly to her mental health. Recall her narrative note: "...I often don't know what the weather is like outside throughout the course of my day. During the winter months, I arrive to work in the dark and leave in the dark without ever seeing sunlight. This can have a damaging effect on mental health. Particularly since the lighting in the department is all fluorescent." Understanding the interdependency between our brain and environment provides understanding why such sensory affordances can have considerable influence, and improving the quality and quantity of lighting is a well-documented avenue to attenuate some of the stressors that nurses experience within their work environments (Ulrich et al., 2008).

Another finding revealed in this study was the poor environmental congruence for supporting work processes and work breaks. Participants often regarded their workspaces as spatially constricted and as one participant stated, "there is no personal space." This aligns with the observations of medical sociologists Halford and Leonard (2003) who observed that within hospitals, nurses are afforded the least access to space as well as less designated staff space. They critically analyze this as a manifestation of professional hierarchies (physicians are comparatively afforded more space) and because of the gendered nature of space. This gendered nature of space informs how nurses (a predominantly feminized profession) are provided little spatial and environmental control (Ahrentzen, 1996). A point of discussion here is the reported absence of adequately located and appropriately sized breakrooms among participants in this study. Often egregiously overlooked in design research (Nejati et al., 2016; Pink et al., 2020), there is an emerging body of evidence on restorative breakrooms for staff to address workplace burnout (Gregory, 2021). A recently published multi-method study by Zhu & Shepley (2022),

corroborated that overcrowding is the most serious issue in nursing designated spaces, and many participants reported insufficient furniture and equipment for their break rooms. Provided these deficiencies, they found many participants purchasing their own equipment for their break areas (Zhu & Shepley, 2022).

Overall, findings from this inquiry support the extant research that indicates that staff spaces are marginalized with minimal space afforded for staff break rooms and locker rooms (Mihandoust et al., 2021; Nejati et al., 2016; Pink et al., 2020). Interestingly, even the term ‘marginalization’ is regarded as a spatial one – it’s premised on the idea of being at the edge, or out of the center. At its essence, this ensures individuals remain at the margin to “reduce their visibility, diffuse their threat, and their ability to take action” (Findley, 2005, pg. 12). The difficulty is that in an architectural sense, spatial power and marginalization is so ubiquitous and invisible in our lives, that it largely goes unnoticed and unchallenged (Findley, 2005). I was particularly drawn to Arlo’s insight in this regard, note how her vignette demonstrates how nursing spaces have been consistently spatially marginalized over her career:

Ah, let me see over my 35 years, we used to have a cafeteria in the basement of the hospital which they shut down. Which wasn't very conducive [to meal breaks] - because when you worked, when you are on any shift but days, they're either in there vacuuming or having something else. Then for a while we got a single patient room that they put down orange carpet, and we lost that room to a patient room. Then we had another little room that you could fit one sofa, a couple cupboards, and a sink. We had that one for about 10 years. And then they took that for a patient room and just kind of up ended us to nowhere. So, we just kind of wandered around like lost sheep.

A systematic review by Rechel and colleagues (2009) outlined that hospital design and infrastructure is dominated by, “a quest for functionality at the expense of the quality of the environment,” thereby largely overlooking the importance of creating a positive working ambience (pg. 1026). Narratives revealed that participants regarded the corporatization of healthcare and its central tenants of efficiency, uniformity, and productivity constructed into the hospital built environment. As a consequence of this, all participants perceived the dominant paradigm of design in their hospital to be one that centers the institution, not the staff or patients inhabiting the space. Interestingly, this subliminally mirrors the healthcare design literature in which many of the studies link to notions of improving the design in order to make nurses more fit for productivity and efficiency (Campos-Andrade et al., 2013; Keddy, 2009). Consider how telling it is when Olivia described her workplace as: “...purely functional in an institutional way.”

Medical sociologist Lindsay Prior (1988) commented on the design of the hospital environment by building upon the Foucauldian notion that discourse is not restricted to the analysis of spoken word or written language. Prior contends that buildings are “as solid a form of discursive enunciation as are texts or speech” (pg. 92). What was surprising in the findings of this study was the depth of participant awareness as to what their workspaces communicated to them, and how they adapted their clinical practice within these spaces. Consider in the following quote of how Sage illustrated the design of the ER triage room: “there's the triage booth where you're sort of like in a fishbowl, because you're in a very small exam room with windows, and you can see the lineup. And so, you always see the lineup, and you can see the waiting room as well. Just extraordinarily stressful, it feels like people are staring at you while you're trying to get through the line as quickly as you can.” This vignette draws a powerful parallel to how the

design of the physical space influences this participant to reconceive their central nursing practice as efficiency. A body of research emerging from medical sociology has outlined hospital expressions are more than environmental backdrops of medico-social relations, but as discourses complicit in the construction of professional identities (Kotzer et al., 2011; Martin et al., 2015; Nettleton et al., 2018; Prior, 1988). Arguably, the design template of the triage booth emphasizes an underlying aspiration towards a 'logic of efficiency' (Martin et al., 2015). Building upon this idea of efficiency and productivity, nursing scholar Wendy Austin argues that the underlying corporatization of healthcare has worked to "reorganize nurses' consciousness" by reductively reframing nursing care as customer service (Rankin & Campbell, 2006, pg. 267). This reorganization misguidedly and problematically reinforces the notion that healthcare is a commodity and that nurses just need to work harder and more efficiently in order to meet demands (Austin, 2011; Rankin & Campbell, 2006).

Arlo was the most experienced nurse in this study and was vehemently opposed to this notion of corporatization. She convincingly cited examples of how to alter the landscape of the hospital built environment, but cited a reluctance or fear from healthcare administrators to disrupt the status quo. She was particularly uninhibited in her critique and felt administrators were disinclined to think creatively and innovatively in all aspects of healthcare, including the built environment. Recall her statement, "The hospital talks about things, but they never actually get their foot in the proverbial water and try it." Again, she elaborated that the lack of daring vision to create, and design change within the built environment was directly attributed to fear:

"...I hate fear. I think it is one of the worst motivators and hospitals really operate under a spirit of fear. It's like an actual entity that makes us make poor decisions and poor budget decisions - and we think very short sightedly, we don't we don't look at a long-

term goal. You know, we plant something, and we have a McDonald's mentality, we want the immediate result.”

Interestingly, she explicitly linked this with the term ‘McDonalds’ which has also been critically interrogated by the works of Ritzer (2018) who uses the term ‘McDonaldized’ to metaphorical explain the means for a corporate push towards extreme efficiency, predictability, and control (Ritzer, 2018; Ritzer & Miles, 2019). Ritzer describes this dominant ethos also infiltrating healthcare systems and built designs which value and emphasize efficiency and control (Ritzer, 2018). Findings illustrated the multitude of complex spatial stressors that lent to the perception that the institution and its underlying values of efficiency, flow, and productivity were privileged over the needs of staff and patients. They felt their current workplaces were inflexible, uninspiring, and unsympathetic to the needs of users, thereby largely perpetuating a sense of *dis-ease* within these spaces.

Building Health: Needs and Values

The subsequent findings will be discussed using an explicitly salutogenic orientation to better situate how results fit within salutogenic theory (See *Figure 2, pg. 109*). There is an abundance of literature that focuses on identifying the pathogenic aspects of built environments, but few studies which examine salutogenic and health-promoting characteristics (Forooraghi et al., 2021). The following results highlight what design elements are instrumental in creating an enriched, restorative environment. In doing so, participants constructed a profoundly human(e) counter-geography that moved the staff, patients, and community from the margins to the forefront in these designs. The findings will be delineated into the three central concepts identified in salutogenic theory: 1) Meaningfulness; 2) Manageability; 3) Comprehensibility.

Meaningfulness: Designing for Connection & (Self)Care

Recall that a central theme of salutogenic architecture is to create spaces that foster a sense of meaning from the stimuli and characteristics of the built environment. This involves the provision of aesthetic and visual cues (Dilani, 2009), and can often be exemplified in visual and associative references to nature, through spaces that support social connections, as well as through personalization and artistic endeavours (Forooraghi et al., 2021). Participants in this study spoke extensively of the meaning attributed to certain spaces, often noting the ways in which space afforded them a sense of connection. A unique attribute emerging in this inquiry is that connection was not limited to only social connections, but some participants decidedly pointed out that certain spaces and architectural elements elicited deeper connection to themselves, and to “something greater than oneself.” The presence of spaces to carry out small rituals of care, the inclusion of nature, and a de-institutionalized creative atmosphere illustrates that participants envision an alchemy of qualities to create places that support connection. Taken together, these architectural elements and choices subliminally articulate meaningful environments of care.

Arlo and Willow both spoke about the affective power of simple (self)care rituals, the former participant relating to the grounding ritual of tea and the latter to the ritual of reading. Rituals are defined as “sociocultural mediums constructed of tradition, exigency, and self-expression” (Gómez & Van Herck, 2012). This emerged as a unique finding that has not been located or discussed in previous evidenced-based design literature, but my underlying suspicion is that perhaps this insight has been difficult to solicit with more reductive and quantitative methods that dominate evidence-based design. Architectural historian Peter Blundell Jones (2016), notes that both grand and habitual rituals are framed and defined by the buildings we

inhabit, and that these rituals provide insight into the ways in which individuals understand the world around them. Human activities are permeated with meaning and these seemingly small and grand activities are influenced by architecture (Jones, 2016). Many of these simple rituals and mundane practicalities are taken for granted, but as noted by Robinson (2021), “paying particular attention to the humble, to that which is commonly thought small, favors practical ground-up interventions to abstract top-down solutions” (pg. 12). Arlo illustrated that in the frenzied healthcare environment, the simple act of making tea serves as an emotional counterbalance to restore equanimity. Recall her statement:

But when things are crazy that - having to come in, having to stop, the whole ritual of - *'Okay, what tea am I going to have? What pot am I going to put it in? Am I going to put it in a cup? Am I going to put it through a strainer?'* There's a whole fantastic ritual that goes with it. And you have to put aside, if you're in in the moments of angst, you can't - you're dealing with hot water, you know, *'honey, no honey, milk, no milk, lemon, no lemon'* - you have to put aside all that's going on and concentrate on this ritual of making the tea. And at the end of this beautiful ritual, you actually get to sit down and have, hopefully, a lovely cup of tea.

In her vignette, she highlights the importance of crafting spaces that enables nurses to disrupt fast paced work in order to engage in small acts of (self)care, which serve as a grounding and restorative act. In her re-imagined workspace, Arlo expresses a pragmatic solution to the seemingly abstract notion of ritual: “It would be very nice if the hospital had real places to make real tea, or real coffee, in real cups.”

Note that I explicitly bracket the term (self)care to connote that these rituals serve to care for the self, but for Arlo, these rituals also served to express care for others, and she

explained, "...when they [cardiology and ultrasound] come we always stop and say, *'Okay, we're going to make a cup of tea even before you start what you do.'*" Care is often not verbally articulated, but rather "folded within embodied moments" (Martin et al., 2019, pg. 2). Creating a space that affords the ability to make a cup of tea, taking the time to prepare it with care, and share it with colleagues – is a poetic act. In ever increasingly fast-paced healthcare with an emphasis on efficiency and reductive metrics, it has been expressed that "this kind of poetry triggers a cascade of material, emotional, social, cultural, and political consequences that when compounded...are by no means trivial" (Robinson, 2021, pg. 11). Similarly, Willow related reading as deeply ritualistic - again pay particular attention to how she describes her process of reading, "I just enjoy a nice hardcover book. I love when I get a new book, I remove the sleeve, I crack it open right in the middle, put it against my face, take a deep sniff. And then I read it." For Willow, the presence of hospital libraries was deeply comforting, and even the ability to have a space that she could share with others, such as the atrium that had comfortable seating and a fireplace, was emphasized as deeply important and meaningful. Architectural theorist Juhani Pallasmaa notes, these designed relational spaces create a humane and empathetic impression of a space (Martin et al., 2019).

While small rituals allowed participants to connect with others and ground themselves, being surrounded by nature also provided a deep sense of connection and meaning. The inclusion of natural elements in design (referred to as biophilic design), has been researched extensively, and the integration of natural elements such as plants and water into the built environment has been noted to mediate against a stress response and promote well-being (Huisman et al., 2012; Nejati et al., 2016; Ulrich, 1984). Biophilic design aims to respond to individuals' environmental needs while encouraging restoration and connection to place (Abdelaal & Soebarto, 2019).

Research grounded in environmental psychology has illustrated that individuals often seek comfort in nature during periods of stress, despite not being cognizant of the biological basis for doing so. Although the exact mechanism remains unknown, it is believed that the human brain and sensory system are evolutionarily adapted to be immersed in nature and thereby, elicit our parasympathetic nervous system resulting in feelings of restoration (Rosley et al., 2014; Yin et al., 2020). While natural elements are increasingly recognized to support health, their utilization unfortunately remains a peripheral consideration in building construction, and therefore, not viewed as something fundamental within design (Weerasuriya et al., 2019).

Despite this peripheral relegation in the built design, participants deemed the meaning and connection nature provided as the crucible through which to create a more restorative and humane care environment. Participants noted nature elicits “the ability to feel small,” often instilling a sense of connection to “something greater than oneself.” Both Willow and Olivia noted the connection they feel to nature as “meditative” but also a powerful way to diminish acute stress. For Willow, even the presence of an aquarium allowed her to reflect beyond her immediate stressors. Recall the statement: “There's a reason why people are drawn to visiting these kinds of places [aquariums]. Because you're seeing something you don't really see in your everyday life. Things that you can forget exist sometimes because they're not a part of your daily existence. But having that little piece of them just makes you realize and appreciate that there's so much more going on in the world, besides what's happening in your space. That you know, I'm here and I'm working but there's also these fish existing and occupying the same space as I am.” Natural elements more broadly speaking, have been well-supported to allow staff an escape from stressful clinical environments, and it has been reported that even three to five minutes of

exposure to natural elements corresponds to physiological restoration (Abdelaal & Soebarto, 2019; Salonen et al., 2013).

Literature has recognized that the atmosphere of hospitals can be unsettling and anxiety provoking (Annemans et al., 2018; Martin et al., 2019). Findings suggest that within their work settings, spaces with a deinstitutionalized feel were minimal, and only present in areas such as the public atrium. One way in which participants identified this could be remediated is through the creation of creative atmospheres that married certain architectural characteristics (such as lighting and scale) with visual arts and music. The utilization of the term ‘atmosphere’ was intentional because it denotes the *affective* ways that spatial configurations and characteristics in combination with the arts impacted participants, and the resulting emotions they felt within these spaces. Architectural atmosphere is a term that has been characterized by abstraction and ambiguity, but architect Peter Zumthor relates that atmosphere is how one perceives and experiences spaces, and is often understood as an immediate emotional response due to our ability to innately perceive characteristics such as material, sound, light, and temperature within a building (Gernot et al., 2014). It has been understood that about 90% of our experience of architecture is pre-reflective and experienced as an organic, embodied event (Goffi, 2019). Take for example how Willow recalled the affective experience of being in a gallery when she encountered a painting by Jackson Pollock. She explained that something about the confluence of lighting and the artwork itself evoked her emotions in a way that was difficult to articulate: “I remember taking the picture of that painting and thinking to myself, what emotions it was evoking for me, why I felt so strongly about it, why it appealed to me. And even the way that it was hung, the space it was hung, the lighting that was used. I think that it just has the ability to transport you and make you feel something different.” While the inclusion of the arts may be

criticized as superfluous in healthcare, they have been recognized to create an atmosphere of “human-to-human understanding. They nurture and expand the notion that we are all connected through experience, regardless of what side of the hospital bed we find ourselves” (Beatley et al., 2018, pg. 182).

A systematic review by Salonen (2013) found there is an abundance of support that artwork can contribute to improved feelings of well-being and perception of care within an institution (Salonen et al., 2013). These findings are important to illuminate because being sensitive to the ways certain affective atmospheres influence people can allow us to better understand, “why certain assemblages of people, objects, and environment coalesce to result in places that enable care and health promotion (Martin et al., 2019, pg. 2). What these participants found meaningful about the interplay between spatial qualities and art was the evocation of joy and connection they experienced; which has been recognized as the ways in which a building can express care (Martin et al., 2019).

Despite poor working conditions, nurses in this study expressed they found their work deeply meaningful, however, they felt that the overall dispirited design and lack of functional space did detract from their ability to feel connected to their organizations. Findings illuminated that participants believed the importance of improving workspaces would translate to respect and retention of healthcare providers. Arlo beautifully articulated this as: “...if you go into a place that you feel is feeding me, feeding the people I work with, and feeding my clients and my patients [...] you probably find people won't retire.” In a parallel fashion, Sage also expressed, “I do feel a sense of connectedness and inspiration in my workplace, but not related to the environment. [...] But, if it [workspace] could be designed so that it enhances it [work], then I think we would be less tired, we'd be less burnt out, we'd be more excited to come to work.” This

sentiment is corroborated by findings from Nejati and colleagues (2016), whose participants remarked that facility design contributes to overall job satisfaction and thoughtfully designed and appropriate spaces for nurses materially articulate feelings of value and respect for the profession. According to participants in this study, built design should be employed as a strategy to minimize stress and a human resource strategy to retain staff. The quality of the built environment is perceived as expressing organizational values, commitment, and support to staff and consequently, improved design may create an affective connection between employees and the organization (Rechel et al., 2009; Sadatsafavi et al., 2015; Sadatsafavi & Walewski, 2013). Research on these connections remains emergent and requires further investigation, but is promising (Sadatsafavi et al., 2015; Sadatsafavi & Walewski, 2013).

Manageability: Designing for Optimal Function, Adaptability, & Inclusivity

Recall that manageability refers to an individual's experience that they have all the required resources necessary to cope with a given challenge or demand. In an architectural sense, improving manageability in the healthcare milieu translates to improving the functionality of a particular space or building (Golembiewski, 2017). As previously voiced under the subheading '*Dis-eased Spaces,*' participants unequivocally shared that their workspaces were not functional for their needs and work processes, despite the underlying tenor of utility. Some participants deemed a lack of space in both work and break spaces, while some explicitly highlighted a lack of privacy in order to decompress. Again, recall how Arlo described her workspace: "It's very small, and nothing is within easy reach. Everything is very awkward; you know and it's not - I guess ergonomic is the word. There's nothing ergonomic about it. And to access anything, you have to always leave, and to get anybody [you have to use] the intercom system..."

Ergonomics is defined as, “the science of fitting or matching workplace conditions and job demands to the capabilities of the working population. The intent of ergonomic design is to create a good fit between the worker and the environment” (Stichler & Feiler, 2011, pg. 49). Importantly, the literature has identified that ergonomic considerations and environmental fit are critical in minimizing employee injuries, reducing illness, and increasing work productivity, and satisfaction (Richardson et al., 2018; Weber, 2006). Environmental fit and ergonomic design have significant nursing implications, with nurses experiencing higher rates of musculoskeletal injuries than other healthcare occupational groups. It is estimated that in the United States, 34% of sick days are attributed to these injuries (Richardson et al., 2018). As Arlo proposed, enhancing the functionality of these spaces requires involving nurses in the process of design, hearing their experiences, and understanding their spatial requirements in order to improve environmental fit. This sentiment is supported by Stichler & Feiler (2011), who note that designing more functional and ergonomic spaces should occur in conjunction with nurses, particularly by employing the use of mock-ups of workspaces that allow stakeholders to assess the strengths and weaknesses of a space prior to construction. A notable point here is that these mock-ups should involve functional space simulations with *actual* equipment and simulations of routine tasks and critical events such as codes (Jouppila & Tiainen, 2020; Stichler & Feiler, 2011). Observational studies of work processes in conjunction to these mock-ups could provide a realistic vision for how these spaces can truly be functional and manageable for staff, while also avoiding future costs related to staff injuries and post-occupancy remodelling.

Findings enabled insight into how staff improvise and adapt space to meet their needs, particularly when there is low environmental congruence and function. These accounts led all participants to highlight that if designers could design adaptable and flexible spaces, this could

help enhance the function of the built environment. This is an interesting and unexpected observation, and the predominant literature on the adaptability and flexibility of hospital spaces reflects the need for the building to flex and accommodate relative to operational changes and patient demands (Brambilla et al., 2021; Harvey & Debajyoti, 2008; Pilosof, 2021). There is considerably less insight reflected in the literature to demonstrate the need for creating adaptable spaces based on emotional needs. Building upon this notion, Olivia articulated that her view of well-designed architecture is one that offers a variety of stimuli depending on mood. This insight was articulated by all participants in this study. Olivia beautifully summarized this as "...and what you might need on one day shift might be different than what you need on the next day shift. Some days you just need to walk it off, and sometimes you're like, *'I'm beat. I just need to be still.'*"

Olivia illustrated that on some days she would create her own private space in a public lounge by tucking a chair between large plants to offer some privacy. This finding is critical, as there is very little knowledge known about the experiential and improvisational ways in which healthcare staff adapt space for their needs in hospitals (Keddy, 2009; Pink et al., 2020). An ethnography by Pink and colleagues (2020) that sought to solicit the experiential and embodied experiences of healthcare staff found that in the absence of functional staff spaces (especially break rooms), participants sought out and adapted spaces based on their moods and emotional needs. A recent article by Bogaert (2021), advocates that spaces should be personalized for the emotions of its users. It drew upon the example of a waiting room that afforded privacy as well as movement and interaction depending on the emotional needs of occupants. Most hospitals are designed to accommodate the average patient, family, and staff, but fail to account for the considerable variability that can occur amongst these individuals (Robson et al., 2020). Further

research would be valuable to better understand these improvisational ways of being, and to better advocate for moving towards an architecture of flexibility. As Arlo succinctly put it when envisioning a re-imagined space, “Why can't there be rooms of soft colour, rooms of bright colours, you know, things that people like?” She further had envisioned, “...we could have areas in a hospital where you can go down a hallway and each ward and say, like *'this is the quiet room'* or *'this is a reflective room,'* you know, *'is there a fireplace?'*”

Participants also envisioned the creation of more manageable spaces by taking direct inspiration from nature, which has been described in the architectural literature as biomimicry, or quite simply, design that is directly inspired by nature in terms of functional concepts (Jamei & Vrcelj, 2021). There is considerable design alchemy required in order to bring spaces to life, and biomimicry has been described as “abstraction of good design from nature” (Samy et al., 2020; Vincent et al., 2006, pg. 90). Participants were particularly drawn to ways in which nature just seemed to be processed by their brains without being overstimulating. As Olivia noted, “I think there's enough variation to kind of catch your eye and draw you to different things without being overstimulating. Somehow nature is like that, you know...” This sentiment of drawing inspiration from nature was also extensively noted by Arlo, who spoke of her garden. Recall the statement, “So when you sit in a garden, there is no problem like I say, there is no problem that cannot be solved in a garden. Because every function, every design, everything is there in a garden. The mathematics are there. Cycles are there. Design is there. So, if you want to build something, you look in a garden.” In numerous statements, Arlo illustrated that nature is a master of adaptability and design. In concordance with this thought, it has been noted by proponents of biomimicry in architecture that, “nature always provides a large database of various adaptation strategies and mechanisms which is used as a problem solving guide where one can find different

solutions for specific problem by imitating nature” (Samy et al., 2020). The accounts of these participants strongly demonstrate a preference not just for the inclusion of nature, but for associative and abstractive references for nature, which further reinforces the importance of nature within healthcare settings.

Another unique finding that emerged was that nearly all participants voiced an increasing need to center the experiences of individuals who may have physical limitations and other disabilities. As nurses, these participants were privy to the limitations their patients experienced in these spaces, and consequently, they advocated for more a inclusive design that moved beyond what Willow termed, “normative design.” The built design can facilitate or restrict participation in society (Layton & Steel, 2015), and this recognition has enabled a paradigmatic shift within the design community to fulfill the needs of all end-users, regardless of ability (Layton & Steel, 2015; Lloyd-Esenkaya et al., 2020). For design to be considered inclusive, it should have the ability to function for all users either through specialized access or equipment. While arguably, no design can realistically meet the requirements of every individual, it remains an important aim and regarded as emblematic of good design (Lloyd-Esenkaya et al., 2020).

Willow noted her experiences with this lack of oversight and shared, “I think that it's important for me to say that we need to move on from normative design. What really hurts me the most about my work environment is not even really much about me, but about patients. Especially when I'm thinking about my patients who are experiencing some weakness. They now have to come to their appointment in a wheelchair, but the room in which they are going to be seen by the physician is not spacious enough to accommodate for that wheelchair or their comfort...” Empathizing with patient, family, and staff experiences is the first step in imaginative thinking. Empathy is a proven design thinking strategy that aids in directing the

process toward creativity, effectiveness, and efficiency (Robson et al., 2020). Carmel-Gilfilen & Portillo (2016), eloquently articulated that inclusive and empathetic design is life-affirming. It requires designers to expand their empathy and moral imagination (Austin, 2011), and center the experiences of patients as this further contributes to a holistic culture of care (Carmel-Gilfilen & Portillo, 2016). Detailed attention to the human experience is central to nursing, and arguably, it should also be central to design. Therefore, there is calls to (re)focus on identifying the needs of individuals who are rarely considered or marginalized in architecture (Gregory, 2020). This supports good design and optimal functionality of spaces, particularly in the context of healthcare (Carmel-Gilfilen & Portillo, 2016), where participants in this study felt the underlying ethos should be to create comfortable and functional spaces for everyone – regardless of ability.

Comprehensibility: A Sense of Identity & Understanding

Recall that salutogenic researchers conceptualize ‘comprehensibility’ as a person’s “ability to make sense of one’s life narrative, one’s context and current circumstances” (Golembiewski, 2017, pg. 268). As discussed previously, the over-arching narrative of current hospital environments was predominantly pathogenic, and firmly entrenched in institutional aesthetics and biomedical paradigms. Participants were cognizant that the built environment reinforced a narrative of discomfort, as well as isolation from the community. Sage pointedly remarked, “It’s almost like it’s intentionally uncomfortable, so people don’t want to stay.” This narrative of discomfort and inhospitality has been documented previously by salutogenic researchers who noted that even within the maternity ward (where patients are regarded as healthy and engaging in a normal life process) midwives are challenged to support birth in a space where, “the narrative is one of risk” and the design reinforces biomedicine and surveillance (Foureur & Harte, 2017, pg. 118). This narrative sequence of environmental cues

reinforces that the hospital is a place of illness (Foureur & Harte, 2017; Golembiewski, 2017). By re-imagining the script, participants in this study disrupted this narrative and conjured an image of hospitals with a welcoming presence and deep connections to the local community.

Recall how *Willow* drew on her previous experience working in a larger urban hospital that enjoyed a strong civic identity. Recall again her statement:

You see, there's a lot of civic activity going on in [hospital], because people would come from surrounding neighborhoods to hike through the grounds, to bike through the grounds, to even eat on the grounds. It was just - there is a very big civic presence there. And I think it is important because I feel like it could change the perception of the space. Instead of it just being '*Oh, you know, this is where people come to get medical treatment,*' it's more of a pillar of the community. I think there's a lot of space for community engagement in health care. Especially in times like this, when we're thinking about being more conscious of our health promotion type things, we can definitely engage with the community at large.”

This fosters a narrative that advances how hospitals are significant institutions within their communities, where all members of the community should feel welcomed, not simply those who are ill. There has been some emerging thoughtful commentary on the civic role of the hospital, with one study beautifully articulating, “We must also work to build empathic and imaginative connections with the community we serve, using the knowledge we have while holding space for what we do not yet know” (Robson et al., 2020, pg. 23).

Not only was there a call for designers to consider creating narrative of a welcoming place that supported a civic identity, but some participants also emphasized the importance of intentionally creating designs that consider locality in order to provide some degree of context

and global orientation to occupants. In her vision of a re-imagined space, Arlo walked us through what she would experience as she stepped in the front doors of the hospitals. Recall how she depicted this space: “I would walk in the front doors [...] There would be plants. And I'm not talking tropical plants. I don't want to have the zoo's tropical house there. There would be Manitoba. You would go and there would be maple trees. There would be spruce trees. There would be prairie plants...”

This aligns with the extant literature on placemaking, which is regarded as the provision of optimal psychological fit between individuals and their surroundings. It aims to consider a more holistic consideration of user perceptions (Mourshed & Zhao, 2012) and is an approach to designing public spaces by incorporating local characteristics and individuality (Levin, 2016). Placemaking has also been noted to have ethical implications, as health justice demands “the creation and sustenance of places that nurture care; allow for bodily integrity, mobility, and autonomy; and promote equity” (Eckenwiler, 2016, pg. 1944). It must be crafted and designed in such a manner that it conveys authenticity and puts users and occupants at ease. More importantly, the pervasive and profound effects of spaces on clinician and patient health outcomes have been called by some as analogous to a medical intervention and should therefore be subject to the same ethical scrutiny (Anderson et al., 2022). This ethical scrutiny also involves an obligation to think more carefully of how spaces are designed and how they can be designed to be more inclusive. Research on the bioethics of healthcare spaces however, remains sparse (Anderson et al., 2022).

Healthcare designer Debra Levin (2016) notes, “When healthcare design is done thoughtfully, the concepts of placemaking are innately incorporated into the design process, creating spaces that are unique and draw people in, facilitating communication and providing a

distinct, positive environment. The users of these spaces may not be able to articulate why they feel good when they're there; they just know that they do" (para 2). Salutogenic built environments help empathetically support and respond to cognitive, emotional, and physical needs. As Mazzi (2021) noted, "they are spaces that make people better."

Implications for Research, Practice, and Education

Implications for Research

In order to diminish gaps in understanding the complexity of the hospital built environment and its subsequent influence on occupants, researchers have begun to assert that we need to shift our perspectives to more holistic and emotive experiences of space (Bogaert, 2021; Carmel-Gilfilen & Portillo, 2016; Pink et al., 2020; Zhang et al., 2019). Most reviewed studies to date remain functionalist in tenor and over-emphasize efficiency, productivity, and flow and rarely considered broader "contextual, relational, social, or salutogenic design values" (Jamali et al., 2020, pg. 498). This study provides a path forward for future research using visual and creative methods that privileges emotions and experience as credible and intelligent evaluations of our built environment. This inquiry is, to my awareness, the only study that has used photo-elicitation to better understand nursing experiences to enhance and improve physical workspaces. As noted previously, an arts-based method enabled to make the tacit, unspoken environmental knowledge of acute care nurses into a visible articulation of experiences and needs which would have been simply inaccessible through conventional studies. I concur with design researchers Pink and colleagues (2020) who suggest that future hospital designers and researchers should carefully consider, whose future is being designed for in hospitals, and what is the epistemological foundation that constitutes the knowledge being used to inform these design decisions. There is a need to equilibrate quantitative findings that have made enormous

contributions to evidenced-based design but are unable to fully capture the holistic experience of the built environment. Qualitative studies are uniquely positioned to allow staff and patients to elaborate on their experiences and ideas in their own words, thus making them invaluable to better realize future designs that are humanized and centered around user needs.

Nursing research is ensconced in the belief that knowledge is not static, but inherently dynamic and evolving (Thorne, 2016). With this belief in mind, there is considerable opportunity for nursing researchers to engage in this novel and relatively unexplored area of inquiry as a way to better understand connections between spatial influences and nursing practices. While often overlooked, environmental influences have considerable influence on patient and staff experiences, and critical examination of the built environments offers an avenue to improve nursing experiences and patient outcomes. As critically noted by architectural researcher Karen Keddy (2016), nursing voices remain largely marginalized in environmental design research, and nursing researchers have a unique emic understanding of the complexity of nursing work that would make them well-positioned for this work. Building upon this, it became apparent through soliciting data for this study that future studies should also employ more observational and environmental mapping as a component of their research, as this allows for more concrete insight into the improvisation and experiential ways that space is used, and how clinicians embody space. Lastly, it is critical for more interdisciplinary research between nurses and design professionals so that knowledge develops collaboratively, and not within disciplinary silos.

Implications for Education

The participants in this study demonstrated considerable depth and insight into their built environments, and conjured ideas for how to improve future designs. Through discussions with study participants, as well as conversations with fellow graduate students, nurses shared they

would welcome the opportunity to have a more pronounced role during facility planning and design. As noted by Clarke (2014), this sentiment is also welcomed by design professionals, but optimal collaboration is hampered by differences in disciplinary jargon, and nurses' risk being circumvented without adequate training. In order for nurses to be effective and provide meaningful input to design teams, they must be adequately prepared with the knowledge and skills about the design process. From this emerges a call for more pedagogical approaches that value experiential, interprofessional learning as students from design and healthcare backgrounds can benefit from learning about healthcare design and innovation alongside each other.

With increasing recognition that innovation and creative problem-solving cannot remain on the periphery of nursing education, niche graduate program options in healthcare innovation and design have emerged as a result of collaboration between architectural and nursing programs. Although, it must be noted that at present they remain limited and primarily located in the United States. These collaborative programs allow nurses to learn about the design process and be adept at articulating a clinical perspective, while learning and working alongside architectural students. Such graduate programs include the interdisciplinary 'Healthcare Innovation and Design Certificate' within the School of Nursing (*University of Calgary*), the 'Health Systems and Facilities Design Certification' (*Kent State University*), and 'Leadership and Innovation in Health + Design Certificate' (*Clemson University*). For undergraduate nursing students, some faculties have implemented modules on the built environment within public health courses (Hays et al., 2006), with some faculty fostering experiential learning by encouraging students to take a predetermined bicycle route in order to critique land use and community development (McNiel & Koplitz, 2022). Such experiential learning is important for

expanding the oculus of nursing education and raising nursing consciousness to including environmental health into clinical practice (Hays et al., 2006; McNiel & Koplitz, 2022).

These programs are innovative but most importantly, these educational pathways expose nurses to design thinking, which is defined as “a collaborative method of inquiry that fosters innovative, team-generated solutions to complex scenarios” (Lorusso et al., 2021, pg. 17). It is based on team-based creativity and has been called a counterweight to more deductive and linear ways of knowing (Valentine et al., 2017). Noting the importance of this divergent thinking, design thinking has been extrapolated and advocated to be applied to enable a more creative and daring framework for embracing change and generating solutions within the healthcare (Valentine et al., 2017). Increasing these educational pathways through specialized program pathways exposes nurses to new ways of knowing and effectuating change.

Implications for Practice

The participant narratives and photographs reveal that nurses are deeply attuned to their surroundings, and this study has further reinforced that while clinical and spatial geography is frequently overlooked in nursing, it has considerable influence on both patient care and clinician well-being. Similarly to what was voiced by participants in this study, researchers have noted that clinicians are often aware of design and architectural characteristics that impedes optimal care (Annemans et al., 2018; Stichler & Okland, 2015). Therefore, frontline nurses should always be consulted and encouraged to identify new design features they would like to see incorporated into future built designs (Stichler & Okland, 2015). However, in order to improve care areas, nurses need to be welcomed as collaborators and experts.

It has been noted that there is an increasing demand for nurses of various designations to be involved in healthcare design (Stichler & Okland, 2015). Contributions to care environments

and evidence-based design can be provided by clinical nurses who are instrumental in identifying spatial barriers and provide insight into how to improve care delivery. Furthermore, there is increasing roles for nurse leaders and consultants who ensure that frontline nurses are heard, and their voices integrated into new designs. Nursing practice leaders are also critical for fostering a culture of creativity and innovation that is also essential in reimagining a supportive environment (Roddy & Polfuss, 2020). Lastly, there is a demand for nursing researchers who are able to foster a spirit of inquiry into how the care environment can influence care, and to add to the emerging body of knowledge on the built environment (Stichler & Okland, 2015).

Limitations

Study Limitation

This study examined the architectural and design needs of registered nurses in acute care, to facilitate the creation of more restorative environments. In order to better understand the phenomena, a qualitative design was used to solicit insight into environmental perceptions, emotions, and experiences. Provided the heterogeneity of personal preference, this study does not claim to reflect the experiences and needs of all nurses. Furthermore, hospital architecture is varied in expression, and it is possible that individuals who have a more favourable perception of their physical environments were not captured in this sample. The findings of this study offer a point of departure for further research, and provided that the sample size was very small (n=4), there were a range of acute care practice areas that were not reflected in the sample. Furthermore, all participants identified as working in large, urban centers and findings are not reflective of rural, community hospital settings. Lastly, provided the time constraints with this inquiry, participants did not have a follow-up interview and therefore did not have the opportunity to further reflect, clarify, or provide feedback of study findings. Despite the aforementioned

limitations, this study offers value by triangulating multiple data sources that provides the basis for rich empirical findings and adds theoretical novelty by framing and examining the findings through a salutogenic lens. Further research should consider a heterogenous sample inclusive of a range of nurses (licenced practical nurses, registered nurses, advanced practice nurses) and solicit a range of different settings.

Methodological Limitation

Another limitation that became apparent as the study proceeded was the limitations with photo-elicitation. Photo-elicitation provided invaluable depth and dimension to this study, however, as a method it assumes that participants will generate new photographs for respective inquiries. Some participants of this study selected photographs that had been previously captured as they felt this allowed them to best represent their attempts at answering the study prompt. Since the photographs were a means to elicit richer narrative data via interviews, the generation of new photographs taken explicitly for this study was not paramount, and all photographs, both old and new, generated equal insight from participants. Participants voiced that the selection of previously captured photographs enabled them more creativity in answering the study prompt and decreased their anxiety about capturing photos.

Another limitation with photo-elicitation was that most participants voiced that generating, selecting, and discussing photographs was considerably harder than they initially anticipated. This was attributed to the emotive and subconscious nature of restorative elements with many participants articulating they intuitively were drawn to particular images and visuals but had to spend considerably more time deconstructing why they felt drawn to these images, and subsequently, how they saw these elements integrated into the environment. Provided this complexity, additional flexibility and sensitivity on behalf of the researcher was needed, to

ensure that no undue hardship or stress was imparted on participants. Furthermore, additional time was provided to all participants to generate photographs and narrative notes, with an average of six weeks between the initial meeting with the researcher and the photo-elicitation interview.

More pragmatic limitations with photo-elicitation include additional time, attentiveness, and organization on behalf of the researcher, as each photo requires careful organization and identification for each participant. Additional attention is also required when transcribing narratives to ensure photographs correspond with the appropriate text. This additional time was also noted in a previous photo-elicitation inquiry which also corroborated that photo-elicitation demands, “more time before, during, and after the interviews” (Roddy & Polfuss, 2020). While this method is indisputably more involved for both participants and researcher, I would argue that this methodological complexity added a significant layer of meaningful depth and novelty to the findings and provides a visual defense for what participants need from their physical environment. Participants themselves also remarked that although the study prompt was unexpectedly difficult, they felt the experience was overwhelmingly positive and therapeutic, because contemplating the photographs required reflecting upon and reexperiencing positive emotions and memories.

Concluding Remarks on Interpretive Description

Having its epistemological roots in nursing, interpretive description (ID) has been characterized as a non-categorical qualitative method relevant for understanding contextually embedded clinical phenomena (Thorne et al., 2004). ID was created specifically to address the shortcomings within the formally established methodological traditions in order to better address concerns regarding the experience of health and illness from holistic, interpretative, and

relational perspectives (Thompson Burdine et al., 2021). As previously described in Chapter 3 (See *Theoretical and Methodological Considerations*) ID was selected as an appropriate method to guide this study as it offers creative flexibility to design research informed by clinical realities (Thorne, 2016). While interpretive description offers logical structure and methodological flexibility, the emergence of non-categorical qualitative methods invigorates debate in the qualitative literature regarding its credibility and ability to maintain rigor (Caelli et al., 2003; Hunt, 2009; Kahlke, 2014). Kahlke (2014) levels a critique of non-categorical research methods arguing that researchers must be cognizant to avoid methodological impediments such as a theoretical void, lack of robust methodological literature, and method slurring. In the following section, I will briefly address each of these critiques and reflect on my experiences using ID to frame this inquiry.

Theoretical Void

Both Kahlke (2014) and Caelli and colleagues (2003), critique generic qualitative methodologies for their inconsistent application or complete absence of explicitly articulated theoretical allegiances. Some note that generic qualitative approaches are reductive, fail to engage deeply with philosophical assumptions and endorse an atheoretical position. A counterargument I would levy to address this concern is that Thorne (2016) allows for researchers to explicate theoretical influences and an analytic framework within the theoretical scaffold. As made explicit in Chapter 3 (*Theoretical and Methodological Considerations*), I illuminated the theoretical assumptions framing this study, in addition to explicitly engaging with my theory throughout Chapter 4 (*Findings*) and Chapter 5 (*Discussion*).

Lack of Robust Methodological Literature

The second charge against non-categorical qualitative approaches is the absence of a robust scholarly foundation of critical literature, constructed by an established and longstanding research community (Kahlke, 2014). In the absence of this established grounding, Kahlke (2014) notes issues of research design congruence may arise “within and between elements of the research framework” thereby reducing the research quality (pg. 13). To counter this, I would argue that there is a documented increase in frequency utilizing ID by a variety of health professionals (Thompson Burdine et al., 2021), which contributes to building a comprehensive and thoughtful scholarly foundation. In my sensitivity to maintaining epistemological congruence between various aspects of my research design, many discussions occurred between myself (a neophyte researcher) and my thesis supervisor (an experienced qualitative researcher), as well as meaningful support and guidance from the thesis committee, all of whom have expertise in qualitative research methodologies.

Method Slurring

A final critique against non-descript qualitative approaches is identified as method slurring (Holloway & Todres, 2003; Kahlke, 2014). Method slurring refers to the haphazard blend of philosophically incompatible methodologies. This diminishes the epistemological congruence between various components of the research design (Holloway & Todres, 2003). Thorne and colleagues (2004) acknowledge that a non-categorical method of research such as ID risks method slurring, however, what distinguishes and minimizes the risk within interpretive description is that it requires a coherent epistemological congruence and logic weaving the research study together. My inquiry drew on meaningfully triangulating interviews with narrative notes, photographs, and interviews in order to answer my research question and

better understand the phenomena of interest. Astute attention and sensitivity were utilized to ensure that flexibility was balanced with consistency and coherence. All elements of the research design were aligned with a constructivist underpinning that was detailed in Chapter 3 (See *Theoretical and Methodological Considerations*) that also carried through to my empirical claims.

Conclusion

The narratives the participants shared in this inquiry are revelatory, multilayered, and rich with meaning. This study has further supported the body of literature that demonstrates that we are shaped by our built environment and its enduring influence is encoded in our cognition (Robinson, 2021). Architecture struggles to be elevated to a higher political priority in the face of more utilitarian demands (de Botton, 2006; Goldhagen, 2017), but I believe when regarded as foundational in shaping our health it could certainly strengthen the argument for its importance. Despite increasing recognition to design for health, there is a need to make continued advancements in this area of research about how we experience and improvise within space. More importantly as noted by critics, there must be a progressive move towards “architecture of and for health as being restorative and regenerative in the broadest term possible. It must be part of a larger ecosystem of health resources, set within a wholesome and healthful environment, resilient and sustainable, open and accessible, flexible and adaptable” (Battisto & Wilhelm, 2019, pg. 378). As exemplified by the findings of this inquiry and the constellation of preceding studies, this ever-expanding body of knowledge will continue to present an indefensible argument as to why our built environment is so important. And to borrow from architectural critic Sarah Williams Goldhagen (2017), it is only when we raise the bar for good design, do we begin to “live it, demand it, and expect it.” (pg. 292).

References

- Abdelaal, M. S., & Soebarto, V. (2019). Biophilia and Salutogenesis as restorative design approaches in healthcare architecture. *Architectural Science Review*, 62(3), 195–205. <https://doi.org/10.1080/00038628.2019.1604313>
- Ahrentzen, S. (1996). *The F Word in Architecture: Feminist analyses in/of/for architecture*. University of Minnesota Press.
- Alvariza, A., Mjörnberg, M., & Goliath, I. (2020). Palliative care nurses' strategies when working in private homes—A photo-elicitation study. *Journal of Clinical Nursing*, 29(1–2), 139–151. <https://doi.org/10.1111/jocn.15072>
- Anåker, A., Heylighen, A., Nordin, S., & Elf, M. (2017). Design Quality in the Context of Healthcare Environments: A Scoping Review. *HERD: Health Environments Research & Design Journal*, 10(4), 136–150. <https://doi.org/10.1177/1937586716679404>
- Anderson, D. C., Teti, S. L., Hercules, W. J., & Deemer, D. A. (2022). The Bioethics of Built Space: Health Care Architecture as a Medical Intervention. *Hastings Center Report*, 52(2), 32–40. <https://doi.org/10.1002/hast.1353>
- Andrews, G. (2006). Geographies of health in nursing. *Health & Place*, 12(1), 110–118. <https://doi.org/10.1016/j.healthplace.2004.10.002>
- Andrews, G. J., & Shaw, D. (2008). Clinical geography: Nursing practice and the (re)making of institutional space. *Journal of Nursing Management*, 16(4), 463–473. <https://doi.org/10.1111/j.1365-2834.2008.00866.x>
- Annemans, M., Stam, L., Coenen, J., & Heylighen, A. (2017). Informing hospital design through research on patient experience. *The Design Journal*, 20(sup1), S2389–S2396. <https://doi.org/10.1080/14606925.2017.1352753>

- Annemans, M., Van Audenhove, C., Vermolen, H., & Heylighen, A. (2018). The Role of Space in Patients' Experience of an Emergency Department: A Qualitative Study. *Journal of Emergency Nursing, 44*(2), 139–145. <https://doi.org/10.1016/j.jen.2017.11.002>
- Antonovsky, A. (1996a). The salutogenic model as a theory to guide health promotion. *Health Promotion International, 11*(1), 11–18. <https://doi.org/10.1093/heapro/11.1.11>
- Antonovsky, A. (1996b). The salutogenic model as a theory to guide health promotion. *Health Promotion International, 11*(1), 11–18. <https://doi.org/10.1093/heapro/11.1.11>
- Applebaum, D., Fowler, S., Fiedler, N., Osinubi, O., & Robson, M. (2010a). The Impact of Environmental Factors on Nursing Stress, Job Satisfaction, and Turnover Intention. *Journal of Nursing Administration, 40*(7–8), 323–328. <https://doi.org/10.1097/NNA.0b013e3181e9393b>
- Applebaum, D., Fowler, S., Fiedler, N., Osinubi, O., & Robson, M. (2010b). The Impact of Environmental Factors on Nursing Stress, Job Satisfaction, and Turnover Intention. *JONA: The Journal of Nursing Administration, 40*(7/8), 323–328. <https://doi.org/10.1097/NNA.0b013e3181e9393b>
- Appleton, J. V., & King, L. (2002). Journeying from the philosophical contemplation of constructivism to the methodological pragmatics of health services research. *Journal of Advanced Nursing, 40*(6), 641–648. <https://doi.org/10.1046/j.1365-2648.2002.02424.x>
- Austin, W. J. (2011). The incommensurability of nursing as a practice and the customer service model: An evolutionary threat to the discipline: Nursing and the customer service model. *Nursing Philosophy, 12*(3), 158–166. <https://doi.org/10.1111/j.1466-769X.2011.00492.x>
- Bates, V. (2018). 'Humanizing' healthcare environments: Architecture, art and design in modern hospitals. *Design for Health, 2*(1), 5–19. <https://doi.org/10.1080/24735132.2018.1436304>

- Beatley, T., Jones, C., & Rainey, R. (Eds.). (2018). *Healthy Environments, Healing Spaces: Practices and Directions in Health, Planning, and Design*. University of Virginia Press.
<https://doi.org/10.2307/j.ctv8d5sgp>
- Bender, M., & Holmes, D. (2019). Reconciling nursing's art and science dualism: Toward a processual logic of nursing. *Nursing Inquiry*, 26(3), 1–9.
<https://doi.org/10.1111/nin.12293>
- Bentz, V., & Shapiro, J. (1998). *Mindful Inquiry in Social Research*. SAGE Publications, Inc.
<https://doi.org/10.4135/9781452243412>
- Bogaert, B. (2021). *Moving Toward Person-Centered Care: Valuing Emotions in Hospital Design and Architecture*. 10.
- Bolton, B., & Berlinger, N. (2011). Values Engineering: The Ethics of Design in Community Health Centers. *The Hastings Center Report*, 41(1), 27–28.
- Bourgeault, I. (2021). Vulnerabilities in the Nursing Workforce in Canada: The Anatomy and Physiology of Nursing Workforce Challenges and Potential Solutions for Better Planning, Policy and Management. *Canadian Journal of Nursing Leadership*, 34(4), 11–18. <https://doi.org/10.12927/cjnl.2021.26694>
- Brambilla, A., Sun, T., Elshazly, W., Ghazy, A., Barach, P., Lindahl, G., & Capolongo, S. (2021). Flexibility during the COVID-19 Pandemic Response: Healthcare Facility Assessment Tools for Resilient Evaluation. *International Journal of Environmental Research and Public Health*, 18(21), 11478. <https://doi.org/10.3390/ijerph182111478>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>

- Caelli, K., Ray, L., & Mill, J. (2003). 'Clear as Mud': Toward Greater Clarity in Generic Qualitative Research. *International Journal of Qualitative Methods*, 2(2), 1–13. <https://doi.org/10.1177/160940690300200201>
- Campos-Andrade, C., Hernández-Fernaudo, E., & Lima, M.-L. (2013). A better physical environment in the workplace means higher well-being? A study with healthcare professionals. *Psychology*, 4(1), 89–110. <https://doi.org/10.1174/217119713805088324>
- Capous-Desyllas, M., & Bromfield, N. F. (2018). Using an Arts-Informed Eclectic Approach to Photovoice Data Analysis. *International Journal of Qualitative Methods*, 17(1), 160940691775218. <https://doi.org/10.1177/1609406917752189>
- Cardoso, M., Presado, H., & Nascimento, T. (2015). *HEALTHY PLACES: THE RELATIONSHIP BETWEEN ARCHITECTURE AND NURSING*. 10.
- Carmel-Gilfilen, C., & Portillo, M. (2016). Designing With Empathy: Humanizing Narratives for Inspired Healthcare Experiences. *HERD: Health Environments Research & Design Journal*, 9(2), 130–146. <https://doi.org/10.1177/1937586715592633>
- Catalani, C., & Minkler, M. (2010). Photovoice: A Review of the Literature in Health and Public Health. *Health Education & Behavior*, 37(3), 424–451. <https://doi.org/10.1177/1090198109342084>
- Chauvin, J., Pauls, J., & Strobl, L. (2016). Building codes: An often overlooked determinant of health. *Journal of Public Health Policy*, 37(2), 136–148. <https://doi.org/10.1057/jphp.2016.5>
- Ciezar-Andersen, S., & King-Shier, K. (2021). Detriments of a Self-Sacrificing Nursing Culture on Recruitment and Retention: A Qualitative Descriptive Study. *Canadian Journal of Nursing Research*, 53(3), 233–241. <https://doi.org/10.1177/0844562120908747>

- Clark, E. (2014). Bedside to Blueprints: The Role of Nurses in Hospital Design. *HERD: Health Environments Research & Design Journal*, 7(4), 100–107.
<https://doi.org/10.1177/193758671400700409>
- Clarke, V., & Braun, V. (2017). Thematic analysis. *The Journal of Positive Psychology*, 12(3), 297–298. <https://doi.org/10.1080/17439760.2016.1262613>
- Collins, C. S., & Stockton, C. M. (2018). The Central Role of Theory in Qualitative Research. *International Journal of Qualitative Methods*, 17(1), 160940691879747.
<https://doi.org/10.1177/1609406918797475>
- Colorafi, K. J., & Evans, B. (2016). Qualitative Descriptive Methods in Health Science Research. *Health Environments Research and Design Journal*, 9(4), 16–25.
<https://doi.org/10.1177/1937586715614171>
- Copes, H., Tchoula, W., Brookman, F., & Ragland, J. (2018). Photo-Elicitation Interviews with Vulnerable Populations: Practical and Ethical Considerations. *Deviant Behavior*, 39(4), 475–494. <https://doi.org/10.1080/01639625.2017.1407109>
- Damico, J. S., & Ball, M. J. (2019). The SAGE Encyclopedia of Human Communication Sciences and Disorders. *The SAGE Encyclopedia of Human Communication Sciences and Disorders*, 479–484. <https://doi.org/10.4135/9781483380810>
- de Botton, A. (2006). *The Architecture of Happiness*. Vintage International.
- Dendaas, N. (2004). The Scholarship Related to Nursing Work Environments: Where Do We Go From Here? *Advances in Nursing Science*, 27(1), 12–20.
<https://doi.org/10.1097/00012272-200401000-00003>
- Dendaas, N. (2011). Environmental Congruence and Work-Related Stress in Acute Care Hospital Medical/Surgical Units: A Descriptive, Correlational Study. *HERD: Health*

Environments Research & Design Journal, 5(1), 23–42.

<https://doi.org/10.1177/193758671100500103>

Dijkstra, K., Pieterse, M. E., & Pruyn, A. (2008). Stress-reducing effects of indoor plants in the built healthcare environment: The mediating role of perceived attractiveness. *Preventive Medicine*, 47(3), 279–283. <https://doi.org/10.1016/j.ypmed.2008.01.013>

Dijkstra, K., Pieterse, M., & Pruyn, A. (2006). Physical environmental stimuli that turn healthcare facilities into healing environments through psychologically mediated effects: Systematic review. *Journal of Advanced Nursing*, 56(2), 166–181. <https://doi.org/10.1111/j.1365-2648.2006.03990.x>

Dilani, A. (2009). *Psychosocially Supportive Design: A Salutogenic Approach to the Design of the Physical Environment*. 12.

Donetto, S., Penfold, C., Anderson, J., Robert, G., & Maben, J. (2017). Nursing work and sensory experiences of hospital design: A before and after qualitative study following a move to all-single room inpatient accommodation. *Health & Place*, 46, 121–129. <https://doi.org/10.1016/j.healthplace.2017.05.001>

Duarte, J., & Pinto-Gouveia, J. (2016). Effectiveness of a mindfulness-based intervention on oncology nurses' burnout and compassion fatigue symptoms: A non-randomized study. *International Journal of Nursing Studies*, 64, 98–107. <https://doi.org/10.1016/j.ijnurstu.2016.10.002>

DuBose, J., MacAllister, L., Hadi, K., & Sakallaris, B. (2018). Exploring the Concept of Healing Spaces. *HERD: Health Environments Research & Design Journal*, 11(1), 43–56. <https://doi.org/10.1177/1937586716680567>

- Duchscher, J. B., & Myrick, F. (2008). The Prevailing Winds of Oppression: Understanding the New Graduate Experience in Acute Care. *Nursing Forum*, 43(4), 191–206.
<https://doi.org/10.1111/j.1744-6198.2008.00113.x>
- Dyess, S. M. L., Prestia, A. S., Marquit, D.-E., & Newman, D. (2018). Self-Care for Nurse Leaders in Acute Care Environment Reduces Perceived Stress: A Mixed-Methods Pilot Study Merits Further Investigation. *Journal of Holistic Nursing*, 36(1), 79–90.
<https://doi.org/10.1177/0898010116685655>
- Eckenwiler, L. A. (2016). Defining Ethical Placemaking for Place-Based Interventions. *American Journal of Public Health*, 106(11), 1944–1946.
<https://doi.org/10.2105/AJPH.2016.303433>
- Elf, M., Anåker, A., Marcheschi, E., Sigurjónsson, Á., & Ulrich, R. S. (2020). The built environment and its impact on health outcomes and experiences of patients, significant others and staff—A protocol for a systematic review. *Nursing Open*, 7(3), 895–899.
<https://doi.org/10.1002/nop2.452>
- Fawcett, J., Watson, J., Neuman, B., Walker, P. H., & Fitzpatrick, J. J. (2001). On Nursing Theories and Evidence. *Journal of Nursing Scholarship*, 33(2), 115–119.
<https://doi.org/10.1111/j.1547-5069.2001.00115.x>
- Findley, L. (2005). Power, Space and Architecture. In *Building Change* (1st ed.). Routledge, Taylor & Francis Group.
- Forooraghi, M., Miedema, E., Ryd, N., & Wallbaum, H. (2021). How Does Office Design Support Employees' Health? A Case Study on the Relationships among Employees' Perceptions of the Office Environment, Their Sense of Coherence and Office Design.

- International Journal of Environmental Research and Public Health*, 18(23), 12779.
<https://doi.org/10.3390/ijerph182312779>
- Foureur, M. J., & Harte, J. D. (2017). Salutogenic Design for Birth. In D. Kopec (Ed.), *Health and Well-being for Interior Architecture* (1st ed., pp. 108–122). Routledge.
<https://doi.org/10.4324/9781315464411-9>
- Fries, C. J. (2020). Healing Health Care: From Sick Care Towards Salutogenic Healing Systems. *Social Theory & Health*, 18(1), 16–32. <https://doi.org/10.1057/s41285-019-00103-2>
- Galanis, P., Vraka, I., Fragkou, D., Bilali, A., & Kaitelidou, D. (2021). Nurses' burnout and associated risk factors during the COVID-19 pandemic: A systematic review and meta-analysis. *Journal of Advanced Nursing*, 77(8), 3286–3302.
<https://doi.org/10.1111/jan.14839>
- Gaminiesfahani, H., Lozanovska, M., & Tucker, R. (2020). A Scoping Review of the Impact on Children of the Built Environment Design Characteristics of Healing Spaces. *Health Environments Research and Design Journal*, 13(4), 98–114.
<https://doi.org/10.1177/1937586720903845>
- Gernot, B., Eliasson, O., & Pallasmaa, J. (2014). *Architectural atmospheres: On the experience and politics of architecture*. Birkhäuser Basel.
- Ghaffarianhoseini, A., AlWaer, H., Omrany, H., Ghaffarianhoseini, A., Alalouch, C., Clements-Croome, D., & Tookey, J. (2018). Sick building syndrome: Are we doing enough? *Architectural Science Review*, 61(3), 99–121.
<https://doi.org/10.1080/00038628.2018.1461060>
- Gharaveis, A., Yekita, H., & Shamloo, G. (2020). The Perceptions of Nurses About the Behavioral Needs for Daylighting and View to the Outside in Inpatient Facilities. *HERD:*

Health Environments Research & Design Journal, 13(1), 191–205.

<https://doi.org/10.1177/1937586719851271>

Goffi, F. (Ed.). (2019). The Experience of Architecture. In *InterVIEWS: Insights and Introspection on Doctoral Research in Architecture* (1st ed.). Routledge.

<https://doi.org/10.4324/9780429423192>

Goldhagen, S. W. (2017). *Welcome to your world: How the built environment shapes our lives*. HarperCollins.

Golembiewski, J. A. (2010). Start making sense: Applying a salutogenic model to architectural design for psychiatric care. *Facilities*, 28(3/4), 100–117.

<https://doi.org/10.1108/02632771011023096>

Golembiewski, J. A. (2017). Salutogenic Architecture in Healthcare Settings. In M. B.

Mittelmark, S. Sagy, M. Eriksson, G. F. Bauer, J. M. Pelikan, B. Lindström, & G. A. Espnes (Eds.), *The Handbook of Salutogenesis* (pp. 267–276). Springer International Publishing. https://doi.org/10.1007/978-3-319-04600-6_26

Gómez, L., & Van Herck, W. (2012). *The Sacred in the City* (1st ed.). Bloomsbury Academic.

Gregory, D. (2021). Code Lavender: Designing Healthcare Spaces to Enhance Caregiver Wellness. *HERD: Health Environments Research & Design Journal*, 14(2), 13–15.

<https://doi.org/10.1177/1937586721993785>

Grignoli, N. (2021). Potential Space in Hospitals: Insight From a Health Psychologist. *HERD:*

Health Environments Research & Design Journal, 14(2), 84–95.

<https://doi.org/10.1177/1937586720983831>

Guba, E. G., & Lincoln, Y. S. (2013). *10-Guba_Lincoln_94.Pdf* (p. 13).

- Halford, S., & Leonard, P. (2003). Space and place in the construction and performance of gendered nursing identities: *Gendered nursing identities. Journal of Advanced Nursing*, 42(2), 201–208. <https://doi.org/10.1046/j.1365-2648.2003.02601.x>
- Harries, K. (1975). The Ethical Function of Architecture. *Humanist Issues in Architecture*, 29(1), 3.
- Harris, D. D. (2015). The Influence of Flooring on Environmental Stressors: A Study of Three Flooring Materials in a Hospital. *HERD: Health Environments Research & Design Journal*, 8(3), 9–29. <https://doi.org/10.1177/1937586715573730>
- Harty, C., Jacobsen, P. H., & Tryggestad, K. (2015). Constructing Healthcare Spaces—The Complex Role of Visualisations in Negotiating Hospital Designs and Practices. *Procedia Economics and Finance*, 21, 578–585. [https://doi.org/10.1016/S2212-5671\(15\)00215-4](https://doi.org/10.1016/S2212-5671(15)00215-4)
- Harvey, T., & Debajyoti, P. (2008). Functional Flexibility: Nine attributes of adaptable hospital spaces. *Health Facilities Management*, 21(2), 29–34.
- Hays, J. C., Davis, J. A., & Miranda, M. L. (2006). Incorporating a Built Environment Module into an Accelerated Second-Degree Community Health Nursing Course. *Public Health Nursing*, 23(5), 442–452. <https://doi.org/10.1111/j.1525-1446.2006.00582.x>
- Heerwagen, J. (2009). Biophilia, Health and Well-being. *Restorative Commons: Creating Health and Well-Being through Urban Landscapes*, 39–57.
- Heerwagen, J., Heubach, J., Montgomery, J., & Weimer, W. (1995). Environmental Design, Work, and Well Being: Managing Occupational Stress Through Changes In The Workplace Environment. *Workplace Health & Safety*, 43(9).

- Henshall, C., Davey, Z., & Jackson, D. (2020). Nursing resilience interventions-A way forward in challenging healthcare territories. *Journal of Clinical Nursing*.
<https://doi.org/10.1111/jocn.15276>
- Holloway, I., & Todres, L. (2003). The Status of Method: Flexibility, Consistency and Coherence. *Qualitative Research*, 3(3), 345–357.
<https://doi.org/10.1177/1468794103033004>
- Hopkins Walsh, J., & Dillard-Wright, J. (2020). The case for “structural missingness:” A critical discourse of missed care. *Nursing Philosophy*, 21(1). <https://doi.org/10.1111/nup.12279>
- Hozak, M. A., Nelson, J., & Gregory, D. (2016). Relationship of Hospital Architecture to Nursing Staff Caring for Self, Caring for Patients, and Job Satisfaction. *Interdisciplinary Journal of Partnership Studies*, 3(1). <https://doi.org/10.24926/ijps.v3i1.121>
- Huisman, E. R. C. M., Morales, E., van Hoof, J., & Kort, H. S. M. (2012a). Healing environment: A review of the impact of physical environmental factors on users. *Building and Environment*, 58, 70–80. <https://doi.org/10.1016/j.buildenv.2012.06.016>
- Huisman, E. R. C. M., Morales, E., van Hoof, J., & Kort, H. S. M. (2012b). Healing environment: A review of the impact of physical environmental factors on users. *Building and Environment*, 58, 70–80. <https://doi.org/10.1016/j.buildenv.2012.06.016>
- Hunt, M. R. (2009). Strengths and Challenges in the Use of Interpretive Description: Reflections Arising From a Study of the Moral Experience of Health Professionals in Humanitarian Work. *Qualitative Health Research*, 19(9), 1284–1292.
<https://doi.org/10.1177/1049732309344612>

- Jamali, N., Leung, R. K., & Verderber, S. (2020). A review of computerized hospital layout modelling techniques and their ethical implications. *Frontiers of Architectural Research*, 9(3), 498–513. <https://doi.org/10.1016/j.foar.2020.01.003>
- Jamei, E., & Vrcelj, Z. (2021). Biomimicry and the Built Environment, Learning from Nature's Solutions. *Applied Sciences*, 11(16), 7514. <https://doi.org/10.3390/app11167514>
- Jelić, A., Tieri, G., De Matteis, F., Babiloni, F., & Vecchiato, G. (2016). The Enactive Approach to Architectural Experience: A Neurophysiological Perspective on Embodiment, Motivation, and Affordances. *Frontiers in Psychology*, 7. <https://doi.org/10.3389/fpsyg.2016.00481>
- Jellema, P., Annemans, M., & Heylighen, A. (2019). Researching and Designing Health Care Environments: A Systematized Review of Creative Research Methods. *Qualitative Health Research*, 29(2), 290–300. <https://doi.org/10.1177/1049732318792227>
- Jones, P. B. (2016). *Architecture and Ritual: How Buildings Shape Society*. Bloomsbury Academic.
- Jouppila, T., & Tiainen, T. (2020). Nurses' Participation in the Design of an Intensive Care Unit: The Use of Virtual Mock-Ups. *HERD: Health Environments Research & Design Journal*, 193758672093540. <https://doi.org/10.1177/1937586720935407>
- Kaelin, K., & Okland, K. (2018). Buildings, Barriers, and Breakthroughs: Bridging Gaps in the Health Care Enterprise. *Nursing Administration Quarterly*, 42(1), 15–25. <https://doi.org/10.1097/NAQ.0000000000000269>
- Kahlke, R. M. (2014). Generic Qualitative Approaches: Pitfalls and Benefits of Methodological Mixology. *International Journal of Qualitative Methods*, 13(1), 37–52. <https://doi.org/10.1177/160940691401300119>

- Keddy, K. (2009). New methods of researching healthcare facility users: The nursing workspace. *Enquiry The ARCC Journal for Architectural Research*, 6(2).
<https://doi.org/10.17831/enq:arcc.v6i2.41>
- Kisacky, J. (2017). *Rise of the Modern Hospital: An Architectural History of Health and Healing, 1870-1940*. University of Pittsburg Press.
- Korpela, K., De Bloom, J., & Kinnunen, U. (2015). From restorative environments to restoration in work. *Intelligent Buildings International*, 7(4), 215–223.
<https://doi.org/10.1080/17508975.2014.959461>
- Kotzer, A. M., Zacharakis, S. K., Raynolds, M., & Buenning, F. (2011). Evaluation of the Built Environment: Staff and Family Satisfaction Pre- and Post-Occupancy of the Children’s Hospital. *HERD: Health Environments Research & Design Journal*, 4(4), 60–78.
<https://doi.org/10.1177/193758671100400405>
- Layton, N., & Steel, E. (2015). “An Environment Built to Include Rather than Exclude Me”: Creating Inclusive Environments for Human Well-Being. *International Journal of Environmental Research and Public Health*, 12(9), 11146–11162.
<https://doi.org/10.3390/ijerph120911146>
- Levin, D. (2016). The Concept Of Placemaking. *Healthcare Design*.
<https://healthcaredesignmagazine.com/trends/perspectives/concept-placemaking/>
- Lloyd-Esenkaya, T., Lloyd-Esenkaya, V., O’Neill, E., & Proulx, M. J. (2020). Multisensory inclusive design with sensory substitution. *Cognitive Research: Principles and Implications*, 5(1), 37. <https://doi.org/10.1186/s41235-020-00240-7>
- Lorusso, L., Lee, J. H., & Worden, E. A. (2021). Design Thinking for Healthcare: Transliterating the Creative Problem-Solving Method Into Architectural Practice. *HERD: Health*

- Environments Research & Design Journal*, 14(2), 16–29.
<https://doi.org/10.1177/1937586721994228>
- Lundin, S. (2021). A Consciously Applied, Design-Driven Dialogue Can Improve Healing Architecture. *HERD: Health Environments Research & Design Journal*, 14(1), 61–70.
<https://doi.org/10.1177/1937586720954931>
- Lyon, C. (2017). Humanist Principles, Sustainable Design and Salutogenics: A New Form of Healthcare Architecture. *Architectural Design*, 87(2), 56–65.
<https://doi.org/10.1002/ad.2153>
- Malagon-maldonado, G. (2014). *In Health Design*. 7(4), 120–134.
- Mallgrave, H. F. (2013). *Architecture and Embodiment: The implications of the New Sciences and Humanities for Design* (1st ed.).
- Malone, R. (2003). Distal Nursing. *Social Science & Medicine*, 56, 2317–2326.
- Martin, D., Nettleton, S., & Buse, C. (2019). Affecting care: Maggie’s Centres and the orchestration of architectural atmospheres. *Social Science & Medicine*, 240, 112563.
<https://doi.org/10.1016/j.socscimed.2019.112563>
- Martin, D., Nettleton, S., Buse, C., Prior, L., & Twigg, J. (2015). Architecture and health care: A place for sociology. *Sociology of Health & Illness*, 37(7), 1007–1022.
<https://doi.org/10.1111/1467-9566.12284>
- Mazzi, A. (2021). Toward a Unified Language (and Application) of Salutogenic Design: An Opinion Paper. *HERD: Health Environments Research & Design Journal*, 14(2), 337–349. <https://doi.org/10.1177/1937586720967347>

- McCullagh, M. C., Xu, J., Dickson, V. V., Tan, A., & Lusk, S. L. (2022). Noise Exposure and Quality of Life Among Nurses. *Workplace Health & Safety*, 70(4), 207–219.
<https://doi.org/10.1177/21650799211044365>
- McLaughlan, R. (2019). Virtual reality as a research method: Is this the future of photo-elicitation? *Visual Studies*, 34(3), 252–265.
<https://doi.org/10.1080/1472586X.2019.1680315>
- McMillan, K. (2016). Politics of change: The discourses that inform organizational change and their capacity to silence. *Nursing Inquiry*, 23(3), 223–231.
<https://doi.org/10.1111/nin.12133>
- McMillan, K., & Perron, A. (2020a). Change fatigue in nurses: A qualitative study. *Journal of Advanced Nursing*, 76(10), 2627–2636. <https://doi.org/10.1111/jan.14454>
- McMillan, K., & Perron, A. (2020b). Ideological tensions amidst rapid and continuous organizational change in healthcare. *Journal of Organizational Change Management*, 33(6), 1029–1039. <https://doi.org/10.1108/JOCM-02-2020-0061>
- McNiel, P., & Koplitz, J. (2022). Learning While Biking for Nursing Students: The Impact of the Built Environment on Health. *Nursing Education Perspectives*, 43(1), 60–62.
<https://doi.org/10.1097/01.NEP.0000000000000759>
- Meo, A. I. (2010). Picturing Students' Habitus: The Advantages and Limitations of Photo-Elicitation Interviewing in a Qualitative Study in the City of Buenos Aires. *International Journal of Qualitative Methods*, 9(2), 149–171.
<https://doi.org/10.1177/160940691000900203>

- Mihandoust, S., Pati, D., Lee, J., & Roney, J. (2021). Exploring the Relationship Between Perceived Visual Access to Nature and Nurse Burnout. *HERD: Health Environments Research & Design Journal*, *14*(3), 258–273. <https://doi.org/10.1177/1937586721996302>
- Minton, C., & Batten, L. (2016). Rethinking the intensive care environment: Considering nature in nursing practice. *Journal of Clinical Nursing*, *25*(1–2), 269–277. <https://doi.org/10.1111/jocn.13069>
- Mittelmark, M. B., & Bull, T. (2013). The salutogenic model of health in health promotion research. *Global Health Promotion*, *20*(2), 30–38. <https://doi.org/10.1177/1757975913486684>
- Mittelmark, M. B., Sagy, S., Eriksson, M., Bauer, G. F., Pelikan, J. M., Lindström, B., & Espnes, G. A. (2016). The handbook of salutogenesis. In *The Handbook of Salutogenesis*. <https://doi.org/10.1007/978-3-319-04600-6>
- Mittelmark, M. B., Sagy, S., Eriksson, M., Bauer, G. F., Pelikan, J. M., Lindström, B., & Espnes, G. A. (Eds.). (2017). *The Handbook of Salutogenesis*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-04600-6>
- Mourshed, M., & Zhao, Y. (2012). Healthcare providers' perception of design factors related to physical environments in hospitals. *Journal of Environmental Psychology*, *32*(4), 362–370. <https://doi.org/10.1016/j.jenvp.2012.06.004>
- Mroczek, J., Mikitarian, G., Vieira, E. K., & Rotarius, T. (2005). Hospital Design and Staff Perceptions: An Exploratory Analysis. *The Health Care Manager*, *24*(3), 233–244. <https://doi.org/10.1097/00126450-200507000-00008>

- Mukumbang, F. C., & van Wyk, B. (2020). Leveraging the Photovoice Methodology for Critical Realist Theorizing. *International Journal of Qualitative Methods*, *19*, 160940692095898. <https://doi.org/10.1177/1609406920958981>
- Murray, L., & Nash, M. (2017). The Challenges of Participant Photography: A Critical Reflection on Methodology and Ethics in Two Cultural Contexts. *Qualitative Health Research*, *27*(6), 923–937. <https://doi.org/10.1177/1049732316668819>
- Nejati, A., Rodiek, S., & Shepley, M. (2016). The implications of high-quality staff break areas for nurses' health, performance, job satisfaction and retention. *Journal of Nursing Management*, *24*(4), 512–523. <https://doi.org/10.1111/jonm.12351>
- Nejati, A., Shepley, M., Rodiek, S., Lee, C., & Varni, J. (2016a). Restorative Design Features for Hospital Staff Break Areas: A Multi-Method Study. *Health Environments Research and Design Journal*, *9*(2), 16–35. <https://doi.org/10.1177/1937586715592632>
- Nejati, A., Shepley, M., Rodiek, S., Lee, C., & Varni, J. (2016b). Restorative Design Features for Hospital Staff Break Areas: A Multi-Method Study. *HERD: Health Environments Research & Design Journal*, *9*(2), 16–35. <https://doi.org/10.1177/1937586715592632>
- Nettleton, S., Buse, C., & Martin, D. (2018). 'Essentially it's just a lot of bedrooms': Architectural design, prescribed personalisation and the construction of care homes for later life. *Sociology of Health & Illness*, *40*(7), 1156–1171. <https://doi.org/10.1111/1467-9566.12747>
- Nguyen, T. N. M., Whitehead, L., Dermody, G., & Saunders, R. (2022). The use of theory in qualitative research: Challenges, development of a framework and exemplar. *Journal of Advanced Nursing*, *78*(1). <https://doi.org/10.1111/jan.15053>

- Pallasmaa, J. (2019). Design for Sensory Reality: From Visuality to Existential Experience. *Architectural Design*, 89(6), 22–27. <https://doi.org/10.1002/ad.2496>
- Pauwels, L. (2015). ‘Participatory’ visual research revisited: A critical-constructive assessment of epistemological, methodological and social activist tenets. *Ethnography*, 16(1), 95–117. <https://doi.org/10.1177/1466138113505023>
- Perdue, W. C., Stone, L. A., & Gostin, L. O. (2003). The Built Environment and Its Relationship to the Public’s Health: The Legal Framework. *American Journal of Public Health*, 93(9), 1390–1394. <https://doi.org/10.2105/AJPH.93.9.1390>
- Peréz-Gómez, A. (2016). *Attunement: Architectural Meaning after the Crisis of Modern Science*. The MIT Press.
- Peter, E., & Liaschenko, J. (2004). Perils of proximity: A spatiotemporal analysis of moral distress and moral ambiguity. *Nursing Inquiry*, 11(4), 218–225. <https://doi.org/10.1111/j.1440-1800.2004.00236.x>
- Pilosof, N. P. (2021). Building for Change: Comparative Case Study of Hospital Architecture. *HERD: Health Environments Research & Design Journal*, 14(1), 47–60. <https://doi.org/10.1177/1937586720927026>
- Pink, S., Duque, M., Sumartojo, S., & Vaughan, L. (2020a). Making Spaces for Staff Breaks: A Design Anthropology Approach. *Health Environments Research and Design Journal*, 13(2), 243–255. <https://doi.org/10.1177/1937586719900954>
- Pink, S., Duque, M., Sumartojo, S., & Vaughan, L. (2020b). Making Spaces for Staff Breaks: A Design Anthropology Approach. *HERD: Health Environments Research & Design Journal*, 13(2), 243–255. <https://doi.org/10.1177/1937586719900954>

- Prasad, S. (2017). Regenerative Agents: Patient-Focused Architectures. *Architectural Design*, 87(2), 122–127. <https://doi.org/10.1002/ad.2161>
- Prior, L. (1988). The Architecture of the Hospital: A Study of Spatial Organization and Medical Knowledge. *The British Journal of Sociology*, 39(1), 86. <https://doi.org/10.2307/590995>
- Radley, A., & Taylor, D. (2003). Images of Recovery: A Photo-Elicitation Study on the Hospital Ward. *Qualitative Health Research*, 13(1), 77–99. <https://doi.org/10.1177/1049732302239412>
- Rankin, J. M., & Campbell, M. L. (2006). *Managing to nurse: Inside Canada's health care reform*. University of Toronto Press.
- Rechel, B., Buchan, J., & McKee, M. (2009). The impact of health facilities on healthcare workers' well-being and performance. *International Journal of Nursing Studies*, 46(7), 1025–1034. <https://doi.org/10.1016/j.ijnurstu.2008.12.008>
- Renalds, A., Smith, T. H., & Hale, P. J. (2010). A Systematic Review of Built Environment and Health. *Family & Community Health*, 33(1), 68–78. <https://doi.org/10.1097/FCH.0b013e3181c4e2e5>
- Richardson, A., McNoe, B., Derrett, S., & Harcombe, H. (2018). Interventions to prevent and reduce the impact of musculoskeletal injuries among nurses: A systematic review. *International Journal of Nursing Studies*, 82, 58–67. <https://doi.org/10.1016/j.ijnurstu.2018.03.018>
- Ritzer, G. (2018). *The McDonaldization of Society* (9th ed.). SAGE Publications, Inc.
- Ritzer, G., & Miles, S. (2019). The changing nature of consumption and the intensification of McDonaldization in the digital age. *Journal of Consumer Culture*, 19(1), 3–20. <https://doi.org/10.1177/1469540518818628>

- Roberts, J. P., Fisher, T. R., Trowbridge, M. J., & Bent, C. (2016). A design thinking framework for healthcare management and innovation. *Healthcare*, 4(1), 11–14.
<https://doi.org/10.1016/j.hjdsi.2015.12.002>
- Robinson, S. (2015). John Dewey and the dialogue between architecture and neuroscience. *Architectural Research Quarterly*, 19(4), 361–367.
<https://doi.org/10.1017/S1359135515000627>
- Robinson, S. (2021). *Architecture is a Verb* (1st ed.). Routledge, Taylor & Francis Group.
- Robson, K., Smith, J., & Dunn, M. S. (2020). Towards an architecture of flexibility. *Journal of Perinatology*, 40(S1), 22–28. <https://doi.org/10.1038/s41372-020-0751-9>
- Roddy, L., & Polfuss, M. (2020). Employing design thinking methods in nursing to improve patient outcomes. *Nursing Forum*, 55(4), 553–558. <https://doi.org/10.1111/nuf.12461>
- Roskams, M., & Haynes, B. (2019). Salutogenic workplace design: A conceptual framework for supporting sense of coherence through environmental resources. *Journal of Corporate Real Estate*, 22(2), 139–153. <https://doi.org/10.1108/JCRE-01-2019-0001>
- Rosley, M. S. F., Rahman, S. R. A., & Lamit, H. (2014). Biophilia Theory Revisited: Experts and Non-experts Perception on Aesthetic Quality of Ecological Landscape. *Procedia - Social and Behavioral Sciences*, 153, 349–362.
<https://doi.org/10.1016/j.sbspro.2014.10.068>
- Roxberg, Å., Tryselius, K., Gren, M., Lindahl, B., Werkander Harstäde, C., Silverglow, A., Nolbeck, K., James, F., Carlsson, I.-M., Olausson, S., Nordin, S., & Wijk, H. (2020). Space and place for health and care. *International Journal of Qualitative Studies on Health and Well-Being*, 15(sup1), 1750263.
<https://doi.org/10.1080/17482631.2020.1750263>

- Ruohomäki, V., Lahtinen, M., & Reijula, K. (2015). Salutogenic and user-centred approach for workplace design. *Intelligent Buildings International*, 7(4), 184–197.
<https://doi.org/10.1080/17508975.2015.1007911>
- Sadatsafavi, H., & Walewski, J. (2013). Corporate Sustainability: The Environmental Design and Human Resource Management Interface in Healthcare Settings. *HERD: Health Environments Research & Design Journal*, 6(2), 98–118.
<https://doi.org/10.1177/193758671300600209>
- Sadatsafavi, H., Walewski, J., & Shepley, M. M. (2015). Factors influencing evaluation of patient areas, work spaces, and staff areas by healthcare professionals. *Indoor and Built Environment*, 24(4), 439–456. <https://doi.org/10.1177/1420326X13514868>
- Salonen, H., Lahtinen, M., Lappalainen, S., Nevala, N., Knibbs, L. D., Morawska, L., & Reijula, K. (2013). Physical characteristics of the indoor environment that affect health and wellbeing in healthcare facilities: A review. *Intelligent Buildings International*, 5(1), 3–25. <https://doi.org/10.1080/17508975.2013.764838>
- Samy, S., Nadim, W., & Abdelkader, M. (2020). Biomimicry in Architecture: The Potential Shift from Theory to Practice. In S. Kamel, H. Sabry, G. F. Hassan, M. Refat, A. Elshater, A. S. A. Elrahman, D. K. Hassan, & R. Rashed (Eds.), *Architecture and Urbanism: A Smart Outlook* (pp. 89–103). Springer International Publishing. https://doi.org/10.1007/978-3-030-52584-2_7
- Sandelowski, M. (1993). Theory unmasked: The uses and guises of theory in qualitative research. *Research in Nursing & Health*, 16(3), 213–218.
<https://doi.org/10.1002/nur.4770160308>

- Sandelowski, M. (1995). Sample size in qualitative research. *Research in Nursing & Health*, 18(2), 179–183. <https://doi.org/10.1002/nur.4770180211>
- Sanders, E. B.-N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5–18. <https://doi.org/10.1080/15710880701875068>
- Schulz, M., Romppel, M., & Grande, G. (2016). Built environment and health: A systematic review of studies in Germany. *Journal of Public Health*, jphm;fdw141v1. <https://doi.org/10.1093/pubmed/fdw141>
- Scotland, J. (2012). Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methodology and methods of the scientific, interpretive, and critical research paradigms. *English Language Teaching*, 5(9), 9–16. <https://doi.org/10.5539/elt.v5n9p9>
- Seidel, A. D., Jeong Tai, K., & Tanaka, I. B. (2012). Architects, Urban Design, Health, and the Built Environment. *Journal of Architectural and Planning Research*, 29(3), 29.
- Shannon, M. M., Nordin, S., Bernhardt, J., & Elf, M. (2020). Application of Theory in Studies of Healthcare Built Environment Research. *Health Environments Research and Design Journal*, 13(3), 154–170. <https://doi.org/10.1177/1937586719901108>
- Simonsen, T. P., & Duff, C. (2020). Healing architecture and psychiatric practice: (Re)ordering work and space in an in-patient ward in Denmark. *Sociology of Health & Illness*, 42(2), 379–392. <https://doi.org/10.1111/1467-9566.13011>
- Smith, J. A., Mccullough, R., Critchlow, C., & Luke, M. (2017). Proposing an Initiative Research Methodology for LGBTQ+ Youth: Photo-Elicitation and Thematic Analysis. *Journal of LGBT Issues in Counseling*, 11(4), 271–284. <https://doi.org/10.1080/15538605.2017.1380557>

- Stelnicki, A. M., Carleton, R. N., & Reichert, C. (2020a). Nurses' Mental Health and Well-Being: COVID-19 Impacts. *The Canadian Journal of Nursing Research = Revue Canadienne de Recherche En Sciences Infirmieres*, 52(3), 237–239.
<https://doi.org/10.1177/0844562120931623>
- Stelnicki, A. M., Carleton, R. N., & Reichert, C. (2020b). Nurses' Mental Health and Well-Being: COVID-19 Impacts. *Canadian Journal of Nursing Research*, 52(3), 237–239.
<https://doi.org/10.1177/0844562120931623>
- Sternberg, E. (2009). *Healing Spaces: The Science of Place and Well-Being*. Harvard University Press.
- Stevens, R., Petermans, A., & Vanrie, J. (2019). Design for Human Flourishing: A Novel Design Approach for a More 'Humane' Architecture. *The Design Journal*, 22(4), 391–412.
<https://doi.org/10.1080/14606925.2019.1612574>
- Stichler, J. F. (2007). Leadership Roles for Nurses in Healthcare Design. *JONA: The Journal of Nursing Administration*, 37(12), 527–530.
<https://doi.org/10.1097/01.NNA.0000302390.29485.7a>
- Stichler, J. F., & Feiler, J. L. (2011). Ergonomics in Healthcare Facility Design, Part 1: Patient Care Areas. *JONA: The Journal of Nursing Administration*, 41(2), 49–51.
<https://doi.org/10.1097/NNA.0b013e31820592e6>
- Stichler, J. F., & Okland, K. (2015). *Nurses as Leaders in Healthcare Design: A Resource for Nurses and Interprofessional Partners*. Herman Miller.
- Sullivan, G. C. (1989). Evaluating Antonovsky's Salutogenic Model for its adaptability to nursing. *Journal of Advanced Nursing*, 14(4), 336–342. <https://doi.org/10.1111/j.1365-2648.1989.tb03421.x>

- Tanja-Dijkstra, K., & Pieterse, M. E. (2011). The psychological effects of the physical healthcare environment on healthcare personnel. *Cochrane Database of Systematic Reviews*.
<https://doi.org/10.1002/14651858.CD006210.pub3>
- Tavakkoli, S., Mohammad Mahdy Asaadi, Pakpour, Amir, & Hajiaghababaei, Marzieh. (2015). *Environmental Psychology Effects on Mental Health Job Satisfaction and Personal Well Being of Nurses*. 8.
- Taylor, E. (2017). The Healthcare Workplace: More than a New 'Old' Hospital: The Healthcare Workplace. *Journal of Interior Design*, 42(1), 9–18. <https://doi.org/10.1111/joid.12093>
- Thompson Burdine, J., Thorne, S., & Sandhu, G. (2021). Interpretive description: A flexible qualitative methodology for medical education research. *Medical Education*, 55(3), 336–343. <https://doi.org/10.1111/medu.14380>
- Thorne, S., Joachim, G., Paterson, B., & Canam, C. (2002). Influence of the Research Frame on Qualitatively Derived Health Science Knowledge. *International Journal of Qualitative Methods*, 1(1), 1–34. <https://doi.org/10.1177/160940690200100101>
- Thorne, S., Kirkham, S. R., & O'Flynn-Magee, K. (2004). The Analytic Challenge in Interpretive Description. *International Journal of Qualitative Methods*, 3(1), 1–11.
<https://doi.org/10.1177/160940690400300101>
- Thorne, S., Stephens, J., & Truant, T. (2016). Building qualitative study design using nursing's disciplinary epistemology. *Journal of Advanced Nursing*, 72(2), 451–460.
<https://doi.org/10.1111/jan.12822>
- Trau, D., Keenan, K. A., Goforth, M., & Large, V. (2015). Nature Contacts: Employee Wellness in Healthcare. *Health Environments Research and Design Journal*, 9(3), 47–62.
<https://doi.org/10.1177/1937586715613585>

- Trau, D., Keenan, K. A., Goforth, M., & Large, V. (2016). Nature Contacts: Employee Wellness in Healthcare. *HERD: Health Environments Research & Design Journal*, 9(3), 47–62. <https://doi.org/10.1177/1937586715613585>
- Tryselius, K., Benzein, E., & Persson, C. (2018). Ideas of home in palliative care research: A concept analysis. *Nursing Forum*, 53(3), 383–391. <https://doi.org/10.1111/nuf.12257>
- Tvedebrink, T. D. O., & Jelić, A. (2021). From Research to Practice: Is Rethinking Architectural Education the Remedy? *HERD: Health Environments Research & Design Journal*, 14(1), 71–86. <https://doi.org/10.1177/1937586720953529>
- Ulrich, R. S. (1984). View through a window may influence recovery from surgery. *Science*, 224(4647), 420–421. <https://doi.org/10.1126/science.6143402>
- Ulrich, R. S., Zimring, C., Zhu, X., DuBose, J., Seo, H.-B., Choi, Y.-S., Quan, X., & Joseph, A. (2008). A Review of the Research Literature on Evidence-Based Healthcare Design. *HERD: Health Environments Research & Design Journal*, 1(3), 61–125. <https://doi.org/10.1177/193758670800100306>
- Valentine, L., Kroll, T., Bruce, F., Lim, C., & Mountain, R. (2017). Design Thinking for Social Innovation in Health Care. *The Design Journal*, 20(6), 755–774. <https://doi.org/10.1080/14606925.2017.1372926>
- Van der Linden, V., Annemans, M., & Heylighen, A. (2016). Architects' Approaches to Healing Environment in Designing a Maggie's Cancer Caring Centre. *The Design Journal*, 19(3), 511–533. <https://doi.org/10.1080/14606925.2016.1149358>
- van Hoof, J., Verhagen, M. M., Wouters, E. J. M., Marston, H. R., Rijnaard, M. D., & Janssen, B. M. (2015). Picture Your Nursing Home: Exploring the Sense of Home of Older

- Residents through Photography. *Journal of Aging Research*, 2015, 1–11.
<https://doi.org/10.1155/2015/312931>
- VanHeuvelen, J. S. (2019). Isolation or interaction: Healthcare provider experience of design change. *Sociology of Health & Illness*, 41(4), 692–708. <https://doi.org/10.1111/1467-9566.12850>
- Vasilski, D. (2016). On minimalism in architecture—Space as experience. *Spatium*, 36, 61–66.
<https://doi.org/10.2298/SPAT1636061V>
- Verderber, S. (2010). *Architecture for health: A brief history of sustainability* (1st Editio). Routledge. <https://doi-org.proxy.bib.uottawa.ca/10.4324/9780203855751>
- Verderber, S., Wolf, J. P., & Skouris, E. (2020). Indigenous Ecohumanist Architecture for Health in Canada’s Far North. *HERD: Health Environments Research & Design Journal*, 13(4), 210–224. <https://doi.org/10.1177/1937586720933176>
- Vincent, J. F. V., Bogatyreva, O. A., Bogatyrev, N. R., Bowyer, A., & Pahl, A.-K. (2006). Biomimetics: Its practice and theory. *Journal of The Royal Society Interface*, 3(9), 471–482. <https://doi.org/10.1098/rsif.2006.0127>
- Vivian, E., Oduor, H., Arceneaux, S. R., Flores, J. A., Vo, A., & Madson Madden, B. (2019). A Cross-Sectional Study of Perceived Stress, Mindfulness, Emotional Self-Regulation, and Self-Care Habits in Registered Nurses at a Tertiary Care Medical Center. *SAGE Open Nursing*, 5, 237796081982747. <https://doi.org/10.1177/2377960819827472>
- Weaver, K., & Olson, J. K. (2006). Understanding paradigms used for nursing research. *Journal of Advanced Nursing*, 53(4), 459–469. <https://doi.org/10.1111/j.1365-2648.2006.03740.x>
- Weber, S. (2006). Ergonomics for healthcare providers. *Journal of the American Academy of Nurse Practitioners*, 18(1), 6–7. <https://doi.org/10.1111/j.1745-7599.2006.00093.x>

- Weberg, D. (2012). Complexity Leadership: A Healthcare Imperative: Complexity Leadership: A Healthcare Imperative. *Nursing Forum*, 47(4), 268–277.
<https://doi.org/10.1111/j.1744-6198.2012.00276.x>
- Weerasuriya, R., Henderson-Wilson, C., & Townsend, M. (2019). Accessing Green Spaces Within a Healthcare Setting: A Mixed Studies Review of Barriers and Facilitators. *Health Environments Research and Design Journal*, 12(3), 119–140.
<https://doi.org/10.1177/1937586718810859>
- Weninger Henderson, M. (2020). The economic case for meeting employees' needs. *Journal of Nursing Management*, 28(1), 17–23. <https://doi.org/10.1111/jonm.12897>
- West, C. P., Dyrbye, L. N., Erwin, P. J., & Shanafelt, T. D. (2016). Interventions to prevent and reduce physician burnout: A systematic review and meta-analysis. *The Lancet*, 388(10057), 2272–2281. [https://doi.org/10.1016/S0140-6736\(16\)31279-X](https://doi.org/10.1016/S0140-6736(16)31279-X)
- West, C. P., Dyrbye, L. N., & Shanafelt, T. D. (2018). Physician burnout: Contributors, consequences and solutions. *Journal of Internal Medicine*, 283(6), 516–529.
<https://doi.org/10.1111/joim.12752>
- Yin, J., Yuan, J., Arfaei, N., Catalano, P. J., Allen, J. G., & Spengler, J. D. (2020). Effects of biophilic indoor environment on stress and anxiety recovery: A between-subjects experiment in virtual reality. *Environment International*, 136(December 2019), 105427.
<https://doi.org/10.1016/j.envint.2019.105427>
- Zborowsky, T., & Bunker-Hellmich, L. (2010). Integrating Healthcare Design Research into Practice: Setting a New Standard of Practice. *HERD: Health Environments Research & Design Journal*, 4(1), 115–130. <https://doi.org/10.1177/193758671000400108>

Zhang, Y., Tzortzopoulos, P., & Kagioglou, M. (2019). Healing built-environment effects on health outcomes: Environment–occupant–health framework. *Building Research & Information*, 47(6), 747–766. <https://doi.org/10.1080/09613218.2017.1411130>

Zhao, J., Li, X., Xiao, H., Cui, N., Sun, L., & Xu, Y. (2019). Mindfulness and burnout among bedside registered nurses: A cross-sectional study. *Nursing & Health Sciences*, 21(1), 126–131. <https://doi.org/10.1111/nhs.12582>

Zhu, X., & Shepley, M. M. (2022). Assessing Preferences and Perceived Restorative Qualities of Break Spaces for Nurses in China. *HERD: Health Environments Research & Design Journal*, 193758672210758. <https://doi.org/10.1177/19375867221075837>

Appendix A - Literature Search Strategy

Table 1. Search terms used in databases (CINAHL, SCOPUS, PROQUEST, 1Findr).

Concept or Term	Search terms used in databases
Architecture	Architecture, built environment, healthcare design, healthcare architecture, restorative design, restorative spaces, architectural design
Nursing	Nurse or nurses or nursing or healthcare professional or nursing care or nursing staff

Table 2. Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> ○ Written in English ○ Quantitative, Qualitative, Mixed Methods or Systematic Reviews ○ Peer-reviewed, full-text 	<ul style="list-style-type: none"> ○ Language other than English ○ Thesis/Dissertations ○ Conference Abstracts ○ Book reviews

Appendix B - Interview Questions

Note: Interview questions will be reviewed on an ongoing basis, based on recommendations from thesis supervisor/committee as well as participant response and engagement throughout data collection. Interview questions will also be guided by participants narrative notes and photographs to elicit additional insights into the phenomena in foci.

Question Guide:

Hello, my name is Chaman and I am conducting an interview on what restorative elements in the built environment nurses find assist in their well-being. This interview will be guided by the photographs you have taken and I am going to ask you why the characteristics captured are important to you and how you feel they invoke feelings of well-being and restoration. Depending on your responses, I expect the interview will take approximately 45-90 minutes.

**Researcher prompt - review conditions of consent and ensure all questions are answered.*

Demographic Questions:

1. How long have you practiced as a registered nurse?
2. What city and province do you practice in?
3. Is the hospital where you practice located in a rural or urban area?
4. What specialty do you practice (ex. Oncology, ICU, Palliative)?
5. Do you work full-time or part-time?
6. Do you work day-shifts/ night-shifts or a combination of both?

-Well-being:

1. What does well-being mean to you?

-Participant Photography Guided Questions (Using 'PHOTO' framework)

2. Describe your **P**icture? What is meaningful?
3. What is **H**appening in your picture?
4. Why did you select to take a picture **O**f this?
5. What does this picture **T**ell us about what you find restorative?
6. What **O**pportunities are there to improve the built environment with what you have captured?

-Restorative Environments:

7. Please describe, what does a restorative space mean to you?
8. Can you describe the physical characteristics in your work environment that cause you the most stress? What causes the most support or restoration?

Additional prompt (as required)

- a. If you could change one thing about your physical work environment, what would it be and why?

-Conclusion:

9. Is there anything else you would like to add or feel I've missed?

Appendix C - Informed Consent

INFORMED CONSENT DOCUMENT



Title of the study: Architecture for Nurses: A Salutogenic Re-Imagining of Hospital Infrastructure

Student Investigator:

Chaman Akoo, RN, BScN (Hons.), MScN student
School of Nursing, Faculty of Health Sciences
University of Ottawa

Under the supervision of:

Dr. Kim McMillan, RN, PhD, CHPCN(C)
Assistant Professor
School of Nursing, Faculty of Health Sciences
University of Ottawa

Université d'Ottawa
Faculté des sciences
de la santé

École des sciences
infirmières

University of Ottawa
Faculty of Health
Sciences

School of Nursing

Invitation to Participate: You are invited to participate in the abovementioned research study conducted by Chaman Akoo, under the supervision of Dr. Kim McMillan.

Purpose of the Study: The purpose of the study is to explore how nurses envision and benefit from restorative spaces.

Participation: Your participation will consist of one initial short meeting with the researcher, followed by the collection of 3-5 photos on your smartphone, and a reflective note relating to your photos, followed by a longer one on one interview with the researcher. First, an initial meeting with the researcher that will take approximately 20 minutes during which the researcher will explain the procedure of taking photographs and writing the accompanying reflective note. You will be asked to take photographs of elements that evoke feelings of well-being that you would like incorporated in your workplace - this could include photos of art, nature, a comfortable chair etc. Feel free to be creative. You will then submit the note and photographs to the researcher (via email). Within two to three weeks following your email submission, you will be asked to complete a one-on-one video or audio recorded interview with the researcher that will be scheduled via Zoom. This interview will ask questions about what you deem restorative in your photographs and how you think this could be translated to design better spaces for nurses. You will also be asked what physical elements of your current work environment causes you stress, and how you think hospital design should change to better support nurse health. The interview will last approximately 45 to 90-minutes.

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Risks: Your participation in this study will elicit reflections on well-being and restoration in the context of your work-life, and this may cause feelings of distress. Every effort will be made to minimize these risks, including stopping the interview if it is too emotionally distressing.

Benefits: Your participation in this study will be for the advancement of understanding the physical environment on nurse well-being. Such knowledge is crucial to inform the designing

Confidentiality and anonymity: The information you share will remain strictly confidential. The contents will be used only for data analysis. Confidentiality will be protected by removing all identifiers from photographs, narrative notes and interview transcripts. In order to minimize the risk of security breaches and to help ensure your confidentiality we recommend that you use standard safety measures such as signing out of your email account after sending your photos and accompanying notes, closing your browser and locking your screen or device when you are no longer using them / when you have completed the study.

Photographs: During the interview with the researcher, you will be asked to confirm whether or not you would like to share the photographs you have taken and your reflective note with the researcher for their use in publications and presentations. You may choose to select what, if any, of these documents for dissemination purposes. Photographs for this study must be taken in an ethical manner. This means that identifiable items such as license plates and addresses should not be photographed. Taking photos of individuals not participating in this study should also be avoided. If such photos are included, the researcher will blur or crop the identifying information from the photographs before publications or presentations. I understand that my name and any identifiers will not be associated with the images to protect my anonymity and confidentiality.

Anonymity: Anonymity will be protected with a unique numerical code that will be assigned to each participant in the study and will be used on any data collected, thereby data will not contain any identifiers.

Ownership of Photographs: The researcher retains the publication rights of the photographs participants take and the reflective note produced, if you wish to share them. Public use (i.e., in presentations or publications) is limited to the researcher. However, as a participant in this study, you retain the personal use of these items, which means that you may print or share these photographs with family members or friends, on personal social media and personal websites. You may not share these items in other studies, presentations, publications. If you wish to share your photographs on social media or on websites via a professional or organization account, please contact the PI.

Conservation of data: The data collected such as photographs, narrative notes, and interview transcripts will be kept in a secure manner on a password-protected laptop that only the researcher can access. Any physical documents will be kept in a locked cabinet in a University of Ottawa office.

Voluntary Participation: You are under no obligation to participate and if you choose to participate, you can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences. Your confidentiality will be protected through the

Appendix D - Recruitment Poster

WOULD YOU LIKE TO PARTICIPATE IN
A RESEARCH STUDY?

ARCHITECTURE FOR NURSES

If you are a registered nurse in Canada, we are interested in learning more about how your surroundings impact your well-being, and the kind of spaces you would like designed in hospitals to support you.



Your participation will consist of:

- 20 min meeting with the researcher
- Taking 3-5 photos of spaces that promote restoration & a short note for each photo
- 45 - 90 min virtual interview

To participate you will need to be able to communicate in English and have access to the internet and a smartphone.

This study is being led by MScN student Chaman Akoo under the supervision of Dr. Kim McMillan from the School of Nursing at the University of Ottawa. If you would like more information or are interested in participating, please email: [redacted]@uottawa.ca
Recruitment will be on a first come, first served basis

Ethics approval has been obtained by the uOttawa REB. For questions about ethical conduct of the study, contact the Protocol Officer for Ethics in Research, University of Ottawa, ethics@uottawa.ca

The project is being conducted independently from the organizations and agencies from which participants may be recruited.



Appendix E - Photographic Instructions

Thank you for your participation in this study, *Architecture for Nurses: A Salutogenic Re-Imagining of Hospital Infrastructure*.

Participation in this study will include taking 3-5 photos in response to the study prompt “What spaces or surroundings evoke feelings of restoration or well-being?” Following the period of photography, you will email your photos to [redacted].

Upon receipt of your photos, I will review each one. The photos will be used during the 45-90 min, audio or video-recorded interview. During the interview, you will have access to copies of the photos you took and will be asked to discuss each photograph in relation to the interview questions.

The interviews will be audio or video-recorded for transcription purposes, and I will keep one set of the photographs and reflective notes. During the interview with the researcher following the collection of your photographs and reflective notes, you will be asked to provide informed verbal consent (that will be recorded) for the use of your photographs and reflective notes in knowledge dissemination activities (presentations, webinars, scholarly publications). Your photographs and reflective notes will not be used in publications or presentations without your permission.

Your participation in this study is completely voluntary and you may withdraw at any point in the process.

Information for taking photographs:

- Your photos must not include anything illegal
- Consider focus, angle, lighting, color/contrast while taking photos.
- Please refrain from taking photographs of individuals
- Please refrain from taking photographs in and at your workplace
- Please refrain from taking photos of identifiable items such as license plates, realty signs, and addresses
- Be as creative as you like!

Contact Information

If you have any questions throughout the process of participating in this study, please contact Chaman Akoo, RN, BScN (Hons.), MScN student at [redacted] or Dr. Kim McMillan, RN, PhD, CHPCN(C) at [redacted].

If you have any questions regarding the ethical conduct of this study, you may contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 154, Ottawa, ON K1N 6N5
 Tel.: (613) 562-5387
 Email: ethics@uottawa.ca

Appendix F - 12-month Research Timeline

Thesis Goal	Date
Beginning of Thesis	
Select Supervisor	October 2020 Dr. Kim McMillan
Deciding on a topic	October 2020
Literature Review	April - July 2021
Deciding Method for Research	October 2020
Planning for Thesis	
Thesis Topic Registration	March 2021
Rough Draft of Proposal	April 2021
Final Draft of Proposal	April/May 2021
Forming Thesis Committee	May-June 2021
Submit Proposal to REB	Aug 1 st , 2021
REB Revisions & Re-submit	Sept 2021
Begin writing chapters to thesis (lit review/epistemological stance/methods)	June 2021
Research Study	
Participant Recruitment	Oct 2021
Chapters 1-3 written	September 2021
Data Collection	October 2021
Transcription of Data	October - November 2021
Data Analysis	December 2021
Chapter 4 - writing findings	Jan 2022
Chapter 5 - writing discussion	Feb 2022
Submit chapters to supervisor and committee	March 2022
Completing Thesis	
Submit manuscript for journal	April 2022
Submit completed thesis	May 2022
Defend thesis	May 2022

Appendix G - Ethics Certificate

Université d'Ottawa

Bureau d'éthique et d'intégrité de la recherche

University of Ottawa

Office of Research Ethics and Integrity

31/08/2021

CERTIFICAT D'APPROBATION ÉTHIQUE | CERTIFICATE OF ETHICS APPROVAL

Numéro du dossier / Ethics File Number	H-08-21-7163
Titre du projet / Project Title	Architecture for Nurses: A Salutogenic Re-Imagining of Hospital Infrastructure
Type de projet / Project Type	Thèse de maîtrise / Master's thesis
Statut du projet / Project Status	Approuvé / Approved
Date d'approbation (jj/mm/aaaa) / Approval Date (dd/mm/yyyy)	31/08/2021
Date d'expiration (jj/mm/aaaa) / Expiry Date (dd/mm/yyyy)	30/08/2022

Équipe de recherche / Research Team

Chercheur / Researcher	Affiliation	Rôle
Chaman AKOO	École des sciences infirmières / School of Nursing	Chercheur Principal / Principal Investigator
Kim MCMILLAN	University of Ottawa	Superviseur / Supervisor

Conditions spéciales ou commentaires / Special conditions or comments

550, rue Cumberland, pièce 154 550 Cumberland Street, Room 154
Ottawa (Ontario) K1N 6N5 Canada Ottawa, Ontario K1N 6N5 Canada

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