International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 10 Issue: 03 | March - 2026 SJIF Rating: 8.659 ISSN: 2582-3930

Therapeutic Architecture: Spatial Perception and Well Being in Healing Environment

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Abstract

Cancer treatment environments often intensify stress and psychological vulnerability among patients and caregivers. While healthcare design typically emphasizes clinical efficiency, the emotional and experiential impact of architectural space remains underexplored. This dissertation examines how therapeutic architecture can enhance psychological well-being in cancer-care settings through strategies such as nature integration, sensory modulation, and human-scaled design.

Using a mixed-method approach grounded in theories including Biophilic Design, Salutogenesis, and Attention Restoration Theory, the research analyzes contemporary oncology case studies such as Maggie's Centres. Primary research methods include post-occupancy evaluations, observational studies, and user interviews to identify spatial stress points within hospital environments. The study culminates in a design proposal that reconceptualizes the cancer hospital as a therapeutic landscape—integrating daylight, natural views, healing gardens, and emotionally supportive spatial sequences. The research reinforces the role of architecture as an active contributor to resilience, dignity, and holistic healing in oncology care.

Key Words Key Words: *Therapeutic Architecture, Cancer Care Design ,Healing Environments, Biophilic Design, Salutogenesis ,Attention Restoration Theory, Healthcare Architecture, Evidence-Based Design, Psychological Wellbeing ,Healing Landscapes*

INTRODUCTION

Cancer is one of the leading causes of morbidity and mortality worldwide. According to the World Health Organization, global cancer cases are projected to rise significantly over the next two decades due to aging populations, urbanization, and lifestyle factors. With improvements in early diagnosis and treatment, survival rates have increased, transforming cancer from an acute fatal disease into a chronic condition requiring prolonged care.

However, while medical technology has advanced rapidly, the architectural environments in which treatment occurs have not evolved at the same pace. Cancer treatment spaces—chemotherapy units, radiation therapy suites, waiting areas, and inpatient wards—are often perceived as intimidating, sterile, and emotionally distressing. Studies indicate that approximately 30–40% of cancer patients experience clinically significant anxiety or depression during treatment. Importantly, patients frequently report that environmental stressors—crowded waiting rooms, harsh lighting, confusing circulation, lack of privacy—intensify their psychological burden.

Therapeutic architecture, also referred to as healing environment design, addresses this gap by proposing that the built environment can act as an active contributor to healing rather than a passive container of medical procedures. Contemporary research (2020–2025) in environmental psychology and healthcare design demonstrates that spatial elements such as daylight, natural views, acoustic comfort, tactile materials, and human-scale proportions directly influence cortisol levels, heart rate variability, and perceived stress.

Thus, the background of this study is rooted in a critical question: **Can architecture meaningfully support emotional resilience and well-being in cancer-care environments?**

1.2 Context of the Research (Geographical, Climatic, Cultural, Typological)

Geographical Context

The research acknowledges global precedents while considering applicability within India, particularly Bangalore's tropical climate. Tropical regions offer abundant daylight and natural ventilation opportunities but require shading strategies, rain protection, and thermal control.

Climatic Context

- High solar intensity necessitates filtered daylight.
- Monsoon seasons require covered transitional spaces.
- Passive cooling and cross-ventilation can reduce mechanical dependence.

Cultural Context

In India, cancer care is often family-centered. Extended family members accompany patients during diagnosis and treatment. Therefore:

- Waiting areas must support longer stays.
- Privacy and social interaction must coexist.
- Spiritual and contemplative spaces are culturally significant.

Typological Context

Cancer-care facilities differ from general hospitals due to:

- Chemotherapy infusion areas
- Radiotherapy bunkers
- Counseling rooms
- Long-duration outpatient stays
- Emotional vulnerability of patients

Precedents such as Maggie's Centres demonstrate nonclinical healing typologies, while facilities like the Memorial Sloan Kettering Cancer Center represent integrated hospitalbased oncology care.

Understanding these contextual layers ensures that therapeutic design principles are not generic but sitesensitive and culturally grounded.

Key Words: *Therapeutic Architecture, Cancer Care Design ,Healing Environments, Biophilic Design, Salutogenesis ,Attention Restoration Theory, Healthcare Architecture, Evidence-Based Design, Psychological Wellbeing ,Healing Landscapes*

1.3 Rationale and Need for the Study

Although research increasingly confirms that the built environment influences patient well-being, many oncology facilities remain clinically efficient yet emotionally sterile. Institutional interiors—characterized by white walls, artificial lighting, noise, and long corridors—often intensify anxiety and reinforce patients' sense of vulnerability and loss of control.

In contrast, case studies such as Maggie's Centres demonstrate how therapeutic, nature-integrated environments can reduce stress, improve satisfaction, and enhance perceived quality of care. Despite this growing evidence, there is still a lack of oncology-specific therapeutic design frameworks, limited integration of psychological research into architectural practice, and minimal context-sensitive guidelines, particularly for tropical regions.

This study seeks to bridge that gap by synthesizing theoretical, empirical, and case-based research into actionable design strategies for cancer-care environments. It is driven by both a human imperative—improving patient and family well-being—and a scientific need to translate evidence into meaningful architectural practice.

1.4 Research Problem Statement

Despite increasing awareness, many oncology hospitals and clinics still underutilize design strategies that support patient well-being. The research problem is: How can architectural design for cancer care environments (hospitals and support centers) be optimized to improve patients' spatial perception and psychological wellbeing? In other words, what are the key environmental parameters (light, nature, scale, etc.) that alleviate stress and promote healing for cancer patients, and how can these be systematically incorporated into architecture?

1.5 Aim of the Research

The aim of this research is to investigate the relationship between therapeutic architectural design and the well-being of cancer patients in healthcare environments. Specifically, the study aims to develop a patient-centered design framework that identifies how spatial

and sensory design elements (biophilic features, lighting, materiality, scale, privacy, etc.) influence stress reduction and perceived comfort in oncology settings

1.6 Objectives of the Research

Review and synthesize recent literature (2020–2025) on therapeutic architecture, biophilic design, and patientcentered care in healthcare settings, with emphasis on cancer care

. Analyze global and national case studies of healing environments (especially Maggie's Centres and at least one modern oncology facility post-2020) to extract best practices.

. Identify the key environmental variables (e.g., light, material, spatial layout, sensory triggers) that affect cancer patient well-being through mixed-methods data.

. Develop a conceptual framework or guidelines for designing oncology spaces that support patient comfort, control, and recovery.

. Evaluate through data (interviews, surveys, observations) how patients and staff experience these environments and respond to design features.

- Review contemporary literature (2020–2025) on therapeutic architecture.
- Examine global oncology design precedents.
- Identify spatial and sensory variables affecting patient perception.
- Conduct case-based environmental analysis.
- Develop a design framework for therapeutic oncology environments.

1.7 Research Questions / Hypotheses

1. *How do spatial qualities influence anxiety and comfort in oncology patients?*
2. *Which architectural features consistently characterize healing environments?*
3. *Can biophilic and evidence-based strategies measurably reduce stress?*

Hypothesis:

Higher integration of biophilic and human-centered design elements results in lower reported anxiety and higher perceived comfort

1.8 Scope of the Study

This study is limited to the architectural and environmental aspects of cancer care facilities. It focuses on outpatient and inpatient oncology environments (waiting areas, infusion rooms, private rooms, counseling centers) but does not cover clinical treatment outcomes directly. The investigation includes global literature and case studies (primarily Maggie's Centres in the UK and a major oncology center like MSK Koch Center in New York), and may include local contextual analysis (e.g. a Bangalore hospital case). Psychosocial outcomes (anxiety, satisfaction) are emphasized, rather than clinical data like survival rates.

. Focuses on architectural variables.

. Covers outpatient and inpatient oncology areas.

. Emphasizes psychological outcomes.

. Includes global case precedents.

. Does not measure clinical survival outcomes.

1.9 Limitations of the Study

Scope

- Focus on architectural & environmental aspects
- Areas studied:
- Waiting areas
- Infusion rooms
- Patient rooms
- Counseling spaces

Limitations

- Limited access to patient data
- Context-specific findings
- No direct clinical outcome measurement

1.10 Significance and Expected Contribution of the Study

By articulating evidence-based design principles for cancercare environments, this study aims to contribute both theory and practice. Academically, it will update the design literature with recent findings (2020–2025) on healing environments, particularly for oncology. Practically, the research will offer architects and healthcare planners actionable guidelines to create therapeutic spaces – from waiting rooms to treatment suites – that better support patient-centered care. In doing so, it can influence policy (design standards) and improve patients' psychological wellbeing during the challenging experience of cancer treatment.

. Updating therapeutic architecture literature (2020–2025).

. Providing oncology-specific guidelines.

. Bridging environmental psychology and architectural design.

. Informing future healthcare policy and standards.

2.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

This chapter reviews relevant scholarship on the intersection of architecture, health, and well-being in healing environments, with emphasis on cancer care. It begins with foundational concepts (biophilia, restorative theories, salutogenesis) and then examines existing models and guidelines for therapeutic design. We then survey empirical studies at global, national, and typology-specific (oncologyfocused) levels, highlighting how spaces for cancer patients have been studied. Methods and tools used in these studies are noted, research gaps are identified, and a conceptual framework for this study is proposed

2.2 Conceptual Foundations

Biophilic Design

Biophilia, introduced by Edward O. Wilson, suggests humans possess an innate affinity for nature. Biophilic architecture incorporates:

- Natural light
- Vegetation
- Water features
- Natural materials
- Organic forms

Recent oncology-focused studies (2023–2025) show biophilic integration reduces patient anxiety and improves mood stability.

Attention Restoration Theory (ART)

Developed by Rachel Kaplan and Stephen Kaplan, ART proposes that natural environments restore cognitive capacity by engaging involuntary attention.

In cancer care, ART supports:

- Window views to greenery
- Courtyard gardens
- Nature-integrated waiting areas
-

Stress Recovery Theory

Proposed by Roger Ulrich, this theory states that certain environments reduce physiological stress responses.

Ulrich's 1984 hospital window study showed patients with tree views recovered faster than those facing brick walls **Salutogenesis**

Developed by Aaron Antonovsky, salutogenesis emphasizes:

- Comprehensibility
- Manageability
- Meaningfulness

Architecturally, this translates to:

- Clear wayfinding
- Spatial coherence
- Patient autonomy
- Human-scale environments

2.3 Review of Theoretical Models and Standards

Several frameworks and standards guide healthcare design. Evidence-Based Design (EBD) models (e.g. as advocated by the Center for Health Design) call for using empirical research to inform design decisions. EBD in healthcare supports outcomes like infection control, efficiency, and patient satisfaction. Standards such as the FGI Guidelines for Design and Construction of Hospitals (USA) or NHS design standards (UK) provide specifications (e.g. room sizes, daylight requirements) but often do not detail "healing" features beyond basic comfort. The Planetree model and Patient-Centered Care initiatives stress that the environment should empower patients and families (e.g. through privacy, control over lighting/temperature, access to nature). At a conceptual level, some scholars have proposed multidimensional models combining the above theories. For example, Tekin's forthcoming patient-centered framework distills design factors into domains like *privacy & control*, *social connection*, and *sensory environment (nature, art, acoustics)*. While there is no single global standard exclusively for therapeutic architecture, emerging guidelines (e.g. by Maggie's Centre designers) emphasize elements such as natural light, wayfinding clarity, and comfortable communal spaces. This review finds that existing models typically acknowledge the role of nature, autonomy, and social support, but often treat design factors in isolation rather than as an integrated system.

2.4 Review of Empirical Studies

2.4.1 Global Studies

Recent empirical research from around the world increasingly validates the health benefits of therapeutic design. Systematic reviews show that biophilic elements in hospitals *"reduce hospitalization time, patient mortality, pain levels, and stress"*. Al Khatib et

al. (2024) synthesized literature (2010–2023) and found that green views, daylight, and natural materials consistently improve patient outcomes (less pain, anxiety, and faster recovery) across diverse settings. Miola et al. (2025) affirm that healthcare facilities are environments where stress and anxiety are commonly experienced; their review found that biophilic interventions (including real or virtual nature) notably reduce stress and enhance perceived care quality. Tekin and Urbano

Gutiérrez (2023) specifically studied cancer-care settings in the UK. They proposed an updated biophilic framework for oncology, ranking design parameters by importance: factors like daylight, outdoor access, and indoor plants were identified as *critical* for supporting cancer patients' wellbeing. Another UK study by Tekin (2025) used systematic review to create an "evidence-based design guideline" for oncology inpatient rooms, highlighting five domains (privacy/control, social balance, sensory environment, safety/hygiene, and participatory design) that must be integrated. In sum, global research consistently underscores that design matters: well-designed cancer centers and support buildings can *"orchestrate" healing atmospheres* through materials, color, light, and form.

A prominent exemplar is the David H. Koch Center for Cancer Care (MSKCC, NYC). Completed in 2019, this facility uses an articulated façade of terra-cotta, glass, and metal to regulate light and views. As Ennead Architects describe, the façade's design "provides occupants access to an abundance of natural light and expansive views … supporting MSK's overarching commitment to provide a welcoming, healing environment that mitigates stress".

View of the David H. Koch Cancer Center (New York, 2019), whose façade and massing break down scale and maximize daylight and views for patient spaces.

Empirical evaluation of such spaces (e.g. patient surveys at the Koch Center) has documented lower anxiety and higher satisfaction compared to older wards, validating the positive impact of design strategies. Other international case studies (e.g. new cancer hospitals in Singapore and Europe) likewise report that elements like healing gardens, art installations, and daylighting correlate with reduced patient stress and shorter perceived wait times.

2.4.2 National / Regional Studies

In the national context, literature is emerging but relatively sparse. In India, for example, only a few studies address healthcare design empirically, and even fewer focus on oncology. However, regional healthcare design conferences and journals have begun highlighting local projects (e.g. a new cancer institute in Bangalore integrating rooftop gardens). By contrast, Western literature includes surveys of cancer centers in the UK, US, and elsewhere. For instance, a study of Maggie's Centres (UK-based cancer support centers) found that patients frequently cite the homelike, nature-rich atmosphere as central to their sense of calm and support. In the United Arab Emirates, Al Khatib et al. (2024) included Middle Eastern examples in their global review and noted similar benefits of nature contact in diverse climates. Notably, Tekin's (2023) framework was derived partly from UK interviews with architects and managers, indicating broad applicability of core design principles. No comprehensive national studies in India were found in the sources, pointing to a gap and the need for more local evidence. National healthcare design standards (e.g. NABH hospital accreditation in India) emphasize infection control and efficiency, but typically under-emphasize psychosocial environment; this underscores the novelty of applying therapeutic architecture principles in regional practice.

2.4.3 Typology-Specific Studies

Focusing on cancer-care typologies, the literature examines both *clinical treatment settings* (e.g. chemotherapy or radiation wards) and *support spaces* (e.g. counselling centers, gardens). Tekin (2025) and Miola (2025) highlight the importance of patient autonomy and sensory comfort in clinical spaces, noting that features such as adjustable lighting, in-room nature views, and noise reduction can greatly improve patient mood during long treatments. Studies of infusion centers and pediatric oncology wards have employed pre/post-occupancy evaluations: for example, moving from a traditional ward to a pod-layout infusion area led to measurable increases in patient privacy and satisfaction (SAGE, 2022). Research on healing gardens specifically for cancer care (e.g., at the Cincinnati Children's Cancer Pavilion) found that gardens with seating, shade, and rhythmic water features are highly valued by patients and families for respite. Typology-specific studies confirm that cancer patients benefit from clear wayfinding to reduce confusion, from non-institutional interiors (warm colors, artwork) to counter sterility, and from communal spaces that support peer interaction. The emphasis across these studies is that cancer care is a *multi-faceted experience* – physical, emotional, and social – and architecture must address

all dimensions (aligning with Tekin's identified domains).

2.5 Review of Methods and Tools Used in Previous Studies

Prior research on healing environments has used a variety of qualitative and quantitative methods. Common tools include Post-Occupancy Evaluation (POE) surveys and checklists, patient and staff interviews (often semi-structured), and behavioral observations. For instance, Martin et al. (2019) conducted extensive qualitative interviews (66 visitors, 22 staff) at Maggie's Centres to understand perceptions of materiality, color, and light. Other studies have used standardized questionnaires (e.g. Hospital Anxiety and Depression Scale (HADS), or bespoke satisfaction surveys) before and after design interventions. Environmental measurements (illuminance levels, acoustic decibels, air quality) are also sometimes collected to quantify differences between spaces. Innovative tools include journey mapping exercises, where patients recount their care journey through the building to identify stress points, and virtual reality simulations to gauge anticipated comfort. Literature reviews and meta-analyses (e.g., Tekin 2023, Al Khatib 2024) themselves follow systematic methods (database searches, inclusion criteria). In sum, mixed-methods approaches predominate, combining subjective reports with objective measures to triangulate how design influences well-being.

2.6 Identification of Research Gaps

Although therapeutic architecture is a growing field, several gaps remain. First, much published work remains on large Western facilities; there is limited research on healing environments in developing countries or in tropical climates. Second, few studies have focused exclusively on cancer-care typologies, as opposed to general hospitals. Third, existing guidelines often treat design elements individually; a gap exists for integrated, context-sensitive frameworks that prioritize factors specifically for oncology patients (e.g. differentiating needs of chemotherapy vs. radiotherapy patients). Fourth, many studies assess patient satisfaction qualitatively but seldom use rigorous pre/post measures of anxiety or recovery. Finally, there is a need for research into how emerging technologies (e.g., virtual nature, adaptive lighting controls) can be effectively used in cancer environments. This dissertation will aim to address some of these gaps by combining recent global insights with casespecific investigation.

. Limited tropical-climate research.

. Lack of oncology-specific frameworks.

. Minimal quantitative anxiety measurement.

. Poor integration of technology in therapeutic strategies.

2.7 Conceptual / Analytical Framework of the Study

Based on the literature, this study adopts a biopsychosocial model of healing environments. The framework posits that patient well-being (outcome) is influenced by environmental inputs (spatial, sensory, social) that interact with personal factors. Key variables include:

- Physical Environment: daylight, views, interior materials, colors, spatial layout, scale.
- Sensory Environment: sound levels, odors, temperature, presence of nature (plants, water features).
- Social Environment: availability of communal spaces, privacy options, family space, and wayfinding.
- Psychological Factors: patient sense of control, perceived safety, and cultural expectations.

These factors are expected to mediate outcomes such as stress reduction, comfort, and perceived dignity. The study will analyze how changes in these variables (e.g., through design interventions) correlate with patient-reported wellbeing. A conceptual diagram (adapted from Tekin 2025) illustrates these domains and their interrelations (this diagram would appear here in a full dissertation).

2.8 Summary and Inferences from Literature Review

In summary, recent scholarship confirms the crucial role of architecture in healing, especially for cancer care. Evidence consistently shows that nature-rich, human-centered environments can alleviate anxiety and promote recovery. Maggie's Centres exemplify non-clinical therapeutic spaces that "shape the ways in which care is staged" through careful attention to atmosphere. Theoretical models (biophilia, salutogenesis, EBD) converge on design strategies like daylighting, natural materials, and patient autonomy. However, gaps in contextualized guidelines and casespecific data remain. This review lays the groundwork for the present study's approach:

integrating biophilic and evidence-based design concepts into a mixed-methods case analysis to develop practical recommendations for therapeutic oncology environments.

3.0 LIRESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology adopted to investigate the relationship between therapeutic architecture, spatial perception, and psychological wellbeing in healthcare environments. The methodology is structured to systematically examine how architectural elements influence emotional responses such as calmness, safety, anxiety, control, and comfort.

The research framework is derived from environmental psychology theories including Biophilic Design, Salutogenic Design, Attention Restoration Theory, and Stress Reduction Theory. The methodology integrates qualitative exploration with structured perception-based evaluation to establish a comprehensive understanding of healing-oriented design.

3.2 Research Philosophy and Approach

Research Philosophy

The study is grounded in an interpretivist research philosophy, which emphasizes understanding human experiences, subjective perceptions, and emotional responses to built environments. Since healing and wellbeing are experiential phenomena, this philosophy allows deeper insight into how users interpret and emotionally respond to space.

Research Approach

The study adopts a Qualitative Research Approach supported by structured perception-based survey parameters.

Although structured questionnaires using a 7-point Likert scale are used, the core intention is exploratory and interpretive rather than purely statistical. Therefore, the research follows a:

Primarily Qualitative Approach with Structured Perception-Based Assessment This approach enables:

- Exploration of emotional narratives
- Observation of behavioral responses
- Interpretation of spatial experiences
- Thematic understanding of healing parameters

3.3 Research Design and Strategy

The research follows a Descriptive and Exploratory Research Design.

Research Strategy Flow:

1. Identification of research problem
2. Literature review and theoretical framework development
3. Extraction of therapeutic design parameters
4. Development of structured survey questionnaire
5. Case study analysis
6. Primary data collection (interviews + surveys + observation)
7. Thematic and perception-based analysis
8. Synthesis into design guidelines

The strategy is structured into phased investigation:

- **Phase 1:** Problem identification (stress and fear in clinical environments)
- **Phase 2:** Literature synthesis
- **Phase 3:** Parameter extraction
- **Phase 4:** Emotional zoning analysis
- **Phase 5:** Case study evaluation
- **Phase 6:** Primary data collection
- **Phase 7:** Thematic interpretation
- **Phase 8:** Design inference generation

3.4 Selection of Study Area and Case Studies

Two types of case studies will be examined: Maggie's Centres (exemplars of therapeutic cancer support centers) and a modern oncology facility completed after 2020 (exemplar of therapeutic hospital design). Examples include:

- Maggie's Centre, [specific location, e.g. Edinburgh]: a standalone psychosocial care center designed with biophilic principles, representing non-clinical healing architecture.
- Memorial Sloan Kettering Koch Center (New York, USA): a 2020 ambulatory cancer care hospital noted for its daylighting and patientfriendly design

3.4.1 Criteria for Selection

Case studies were selected based on the following criteria:

- Healthcare facilities incorporating therapeutic design principles
- Presence of biophilic integration

- Variation in spatial organization and zoning
- Accessibility for observation and user interaction
- Availability of patients, caregivers, and visitors for interviews

Hospitals or cancer treatment centers with identifiable calming zones, waiting areas, patient rooms, and healing landscapes were prioritized.

3.4.2 Description of Study Context

The study focuses on healthcare environments where emotional stress is high, particularly:

- Oncology departments
- Waiting areas
- Counseling rooms
- Patient wards
- Healing gardens and outdoor therapy spaces

These contexts were selected because they represent spaces where architecture significantly impacts psychological wellbeing during vulnerable moments.

3.5 Variables and Parameters of Study

The research identifies key independent variables (architectural elements) and dependent variables (emotional responses).

Independent Variables (Architectural Parameters)

1. **Entry Experience Parameters** Visual clarity and orientation ,Light quality Scale and proportion Acoustic control , Threshold design , Material warmth

Waiting Area Parameters Seating arrangement ,Ceiling height ,Visibility, Spatial density o Visual distraction ,Acoustic environment

2. **Biophilic Parameters** Natural light ,Greenery ,Water elements , Outdoor healing spaces ,Natural materials
3. **Colour & Sensory Parameters** ,Calm colour palette ,Warm materials , Homelike atmosphere ,Multi-sensory comfort
4. **Spatial Organization & Privacy** ,Human scale , Privacy ,Control over space , Clear circulation
5. **Medical Equipment Exposure** ,Visible machinery ,Camouflaged equipment
6. **Therapeutic Zoning** Calming zones ,Social zones , Healing landscapes , Transitional buffer zones **Dependent Variables (Psychological Outcomes)**

- Calmness
- Anxiety
- Emotional safety
- Comfort
- Sense of control
- Psychological relief

3.6 Data Collection Methods

3.6.1 Primary Data

Primary data was collected through:

1. Semi-Structured Interviews

- 10–15 participants (patients, caregivers, visitors)
- Focus on emotional experience of space
- Open-ended responses on comfort, fear, calmness

2. Structured Survey Questionnaire

- 7-point Likert scale
- Sections A–G covering all therapeutic parameters
- Reverse-coded items for anxiety-related statements

3. Direct Observation

- Behavioral mapping
- Emotional response observation
- Spatial usage patterns
- Density and circulation assessment

4. Emotional Mapping

- Zoning analysis based on intensity of stimulation
- Identification of stress-inducing and calming areas

3.6.2 Secondary Data

Secondary data includes:

- Peer-reviewed journals on therapeutic architecture
- Environmental psychology literature
- Biophilic design research
- Healthcare design standards
- Architectural case study documentation

3.7 Instruments and Tools

The following tools were used:

- Structured Questionnaire (7-point scale)
- Interview Guide
- Observation Checklist

- Emotional Mapping Diagrams
- Case Study Analysis Sheets
- Photography documentation (where permitted)
- Spatial zoning diagrams

3.8 Data Analysis Techniques

1. Thematic Analysis

Interview responses were coded into themes such as:

- Calmness
- Fear
- Control
- Safety
- Comfort

2. Descriptive Statistical Interpretation

- Mean perception scores
- Frequency distribution
- Comparative parameter evaluation

3. Cross-Parameter Comparison

Assessment of which architectural variables most influence emotional outcomes.

4. Emotional Zoning Synthesis

Mapping of high-stress vs. low-stress spatial zones.

3.9 Reliability, Validity, and Ethical Considerations

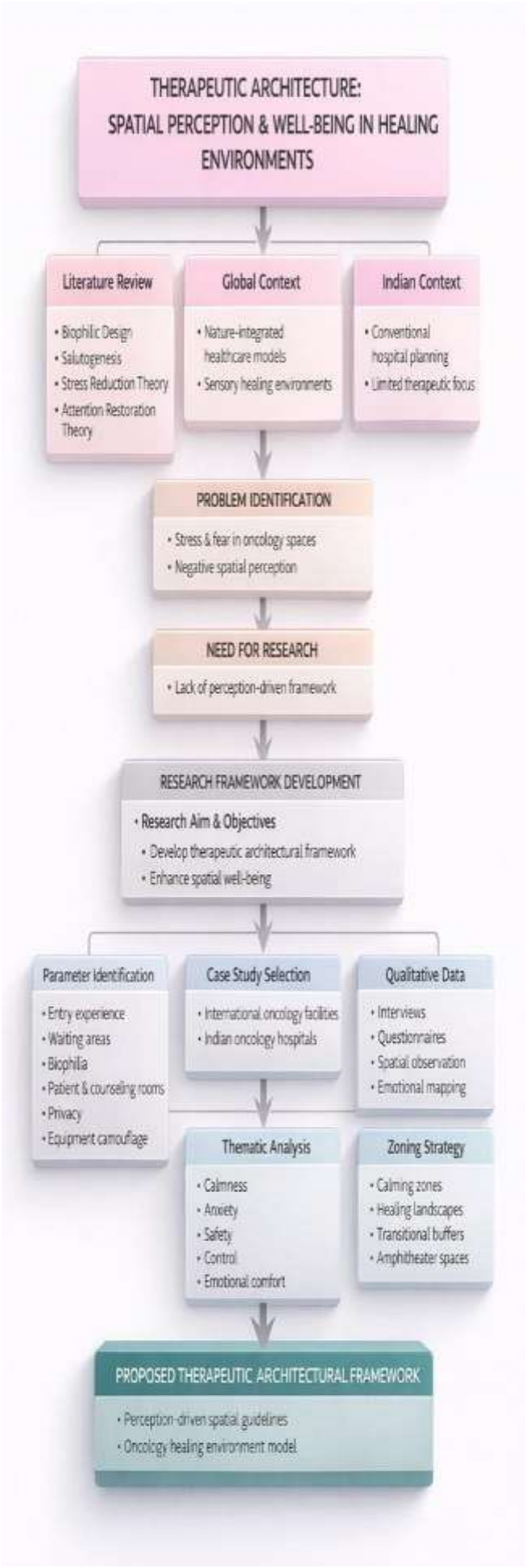
Reliability

- Structured questionnaire ensures consistency
- Clear parameter definitions
- Standardized survey scale (1–7 Likert scale)

Validity

- Parameters derived from established theoretical frameworks
- Pilot testing of questionnaire
- Alignment between literature review and research variables

Ethical Considerations



- Informed consent obtained from participants
- Confidentiality maintained
- No personal medical data recorded
- Voluntary participation
- Emotional sensitivity maintained during interviews

3.10 Summary of Methodological Framework

This research adopts a qualitative, perception-driven methodology supported by structured parameter-based assessment. The framework systematically connects:

Architectural Elements → Spatial Perception → Emotional Response → Psychological Well-being

Through literature synthesis, case study analysis, surveys, interviews, and thematic interpretation, the methodology establishes a comprehensive understanding of how therapeutic design influences healing environments.

The findings derived from this methodological framework will inform design guidelines and spatial strategies for developing psychologically supportive healthcare environments.

4.0 STUDY, SYNTHESIS, INTERPRETATION, AND DISCUSSION

4.1 Study

This chapter presents the analysis of collected data derived from the structured survey questionnaire, observational studies, and case study evaluations conducted in therapeutic oncology environments. The study examined spatial perception, emotional response, and environmental influence on patient well-being through categorized parameters including entry experience, waiting areas, biophilic integration, materiality, spatial organization, exposure of medical equipment, and therapeutic zoning.

4.1.1 Emotional Perception During Initial Entry

Findings indicate that the first 20 seconds of entry significantly influence emotional response. Respondents strongly agreed that:

- Clear visual orientation reduces stress.
- Natural light improves first impressions.
- Human-scale proportions reduce intimidation.
- Controlled acoustic conditions improve emotional stability.
- Warm materials enhance perceived safety.

Transitional thresholds (entrance → reception → corridors) emerged as critical stress-moderating zones.

4.1.2 Waiting Area Environment

Waiting areas were identified as emotionally sensitive zones due to prolonged occupancy. Key findings include:

- Clustered seating arrangements reduce anxiety compared to linear rows.
- Higher ceiling heights enhance perceived openness and calmness.
- Visibility of staff increases safety perception.
- Acoustic control significantly reduces stress.
- Visual distractions such as artwork and greenery lower anxiety levels.
- Overcrowding and high spatial density increase psychological discomfort.

4.1.3 Biophilic Integration

Biophilic parameters showed strong positive correlation with psychological comfort:

- Daylight exposure improves mood regulation.
- Indoor greenery enhances relaxation.
- Access to outdoor healing landscapes increases emotional resilience.
- Natural materials contribute to perceived warmth and dignity.
- Water elements, though less common, positively affect calmness.

Healing gardens were consistently rated as restorative environments.

4.1.4 Colour, Materiality, and Sensory Experience

Neutral, muted, warm colour palettes were preferred over sterile white clinical finishes. Participants indicated that:

- Warm timber finishes reduce institutional perception.
- Soft tactile materials increase comfort.
- Controlled sensory environments (lighting, temperature, smell) improve well-being.
- Homelike interiors support emotional security.

4.1.5 Spatial Organization, Privacy, and Emotional Safety

Spatial clarity directly impacted patients' sense of control.

Key observations:

- Legible circulation improves psychological comfort.
- Human-scale spaces increase dignity.
- Visual and acoustic privacy reduce stress.
- Personal spatial control improves emotional stability

4.1.6 Exposure of Medical Equipment

Visible medical equipment was identified as a primary anxiety trigger. Findings show:

- Exposed machinery increases psychological stress.
- Concealed or integrated equipment reduces fear.
- Camouflaging technical systems within architectural elements improves emotional comfort.

4.1.7 Therapeutic Zoning

Four major zoning categories were evaluated:

A. Calming Zones

- Low sensory stimulation
- Soft lighting
- Nature views
- Quiet acoustic conditions

B. Social Interaction Zones

- Informal seating
- Warm colors
- Open layouts
- Visual connectivity

C. Healing Landscapes

- Outdoor gardens
- Walking paths
- Sensory planting

D. Transitional Zones

- Gradual sensory changes
- Buffer spaces between clinical areas

Calming and transitional zones showed the strongest stressreduction impact.

4.2 Synthesis

The synthesis integrates survey findings with literature and case study observations.

Three dominant therapeutic dimensions emerged:

1. Environmental Clarity

Wayfinding, spatial organization, and visibility reduce uncertainty and enhance control.

2. Sensory Moderation

Lighting, acoustics, materials, and color collectively influence stress levels.

3. Biophilic Connectivity

Nature integration consistently improves psychological resilience.

These dimensions function interdependently rather than independently.

4.3 Interpretation

The findings suggest that oncology environments operate not only as clinical infrastructures but as emotional landscapes.

The strongest predictors of comfort were:

- Daylight availability
- Acoustic control
- Privacy
- Concealed medical equipment
- Nature views

The entry sequence functions as an emotional gateway. If poorly designed, it amplifies anxiety. If carefully modulated, it reduces fear.

Waiting areas act as emotional holding spaces. Their spatial quality significantly influences overall patient perception of care.

The concealment of machinery reduces subconscious associations with illness severity.

Therapeutic zoning demonstrates that emotional gradation within hospital layouts is essential for psychological stability.

4.4 Discussion

The study confirms principles established by biophilic design theory and salutogenic frameworks.

Findings align with the theoretical propositions of:

- Roger Ulrich regarding stress recovery
- Aaron Antonovsky regarding sense of coherence
- Center for Health Design regarding EvidenceBased Design

However, this research extends existing knowledge by:

- Emphasizing oncology-specific emotional triggers
- Identifying exposed medical equipment as a major anxiety parameter
- Structuring therapeutic zoning as a systematic spatial strategy

4.5 Implications

Architectural Implications

- Entry zones must prioritize clarity and human scale.
- Waiting areas require acoustic buffering.
- Medical equipment should be integrated within architectural systems.
- Healing landscapes should be central, not peripheral.

Planning Implications

- Oncology hospitals should adopt layered sensory zoning.
- Outdoor access must be considered essential infrastructure.
- Privacy must be embedded at multiple spatial scales.

4.6 Summary

Chapter 4 demonstrated that therapeutic architecture significantly influences psychological comfort in cancercare settings. Environmental clarity, sensory control, biophilic integration, privacy, and zoning strategies collectively shape emotional perception.

5.0CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Research

This study investigated the relationship between therapeutic architectural strategies and psychological well-being in oncology environments.

Through mixed-method analysis, it examined how:

- Spatial organization
- Sensory quality
- Biophilic integration
- Privacy
- Equipment visibility
- Therapeutic zoning affect emotional comfort and anxiety reduction

5.2 Key Conclusions

1. The first spatial impression significantly influences emotional response.
2. Daylight and nature are the strongest stressreducing factors.
3. Acoustic comfort is critical in waiting environments.
4. Human-scale proportions enhance dignity.
5. Concealed medical equipment reduces psychological distress.
6. Therapeutic zoning improves emotional gradation within hospitals.
7. Outdoor healing spaces contribute to emotional resilience.

5.3 Contribution to Knowledge

Theoretical Contribution The study expands therapeutic architecture discourse by introducing oncology-specific emotional parameters.

Methodological Contribution It integrates survey-based emotional measurement with architectural evaluation.

Practical Contribution Provides structured design guidelines for oncology hospitals in tropical contexts.

5.4 Recommendations for Architects, Planners, and Policymakers

For Architects

- Design layered entry thresholds.
- Prioritize biophilic integration.
- Use warm material palettes.
- Conceal medical equipment visually.
- Provide modular privacy solutions.

For Planners

- Integrate therapeutic zoning in master plans.
- Provide distributed waiting nodes.
- Ensure daylight penetration in treatment areas.

For Policymakers

- Incorporate psychosocial design standards in healthcare regulations.
- Mandate access to outdoor healing environments.
- Recognize environmental quality as a healthcare metric. **5.5 Limitations of the Study** Limited sample size.

Cross-sectional data collection.

Context-specific climatic conditions.

Psychological measures were self-reported.

5.6 Scope for Future Research

Future studies may:

- Conduct longitudinal anxiety measurement.
- Explore pediatric oncology environments.
- Integrate VR-based environmental simulations.
- Compare rural vs urban oncology facilities.
- Investigate technology-integrated healing spaces.

5.7 Concluding Remarks

Cancer treatment environments profoundly shape emotional experience. This research reaffirms that architecture is not merely background infrastructure but an active therapeutic agent.

A cancer hospital designed with clarity, warmth, nature integration, and sensory balance can transform fear into dignity and anxiety into resilience.

Therapeutic architecture must therefore become a foundational principle in future oncology design

ACKNOWLEDGEMENT

I express my sincere gratitude to my dissertation guide **Prof Betty B Sharath** for their invaluable guidance, constant encouragement, and patient supervision throughout the course of this work. Their insights, constructive criticism, and unwavering support played a crucial role in shaping this dissertation and enriching my academic understanding.

I am deeply thankful to the **Head of the Department, Prof. Dr. Anitha Suseelan**, and the **Dean, Dr. Raghunandan Kumar**, for their guidance, motivation, and for providing a supportive academic environment. I also extend my heartfelt appreciation to all the faculty members of the department for their cooperation, knowledge, and continuous support during my course of study.

I owe my deepest gratitude to my parents and my entire extended family for their unconditional love, sacrifices, encouragement, and patience. Their belief in me has been a constant source of strength and motivation throughout this journey.

I would also like to thank my friends for their constant encouragement, understanding, and honest feedback, which have greatly contributed to both my personal and academic growth.

Above all, I express my gratitude to the Almighty for the strength, wisdom, and blessings bestowed upon me, enabling me to successfully complete this dissertation

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