



Journal of Current Trends in Nursing and Health Care

Therapeutic Waiting Areas: A Study of Perceptions of Patients and their Companions in Hospitals

**Research Article by
Dr. Lateef Ademola Lawal**

TABLE OF CONTENTS

INTRODUCTION

ABSTRACT	01	MEASURE	03
LITERATURE REVIEW	02	SURVEY PROCEDURE	03
POSITIVE DISTRACTIONS, CONNECTIONS TO NATURE, AND IMPACTS ON PATIENTS AND STAFF HEALTH OUTCOMES	02	METHOD OF DATA ANALYSIS	04
CONNECTION TO NATURE	02	RESULTS	04
NATURE AND NATURAL ELEMENTS	02	DISCUSSION	06
DAYLIGHTING	02	CONCLUSIONS	07
INDOOR LANDSCAPING AND GREENERY	03	AUTHOR CONTRIBUTIONS	07
ART	03	FUNDING	07
MATERIALS AND METHODS	03	DATA AVAILABILITY STATEMENT	07
PARTICIPANTS	03	CONFLICTS OF INTEREST	07
		REFERENCES	07

Therapeutic Waiting Areas: A Study of Perceptions of Patients and their Companions in Hospitals

**Lateef Ademola Lawal¹,
Charles Yakubu Makun²,
Rukaiyat Adeola Ogunbajo³,
Taiwo Obideyi⁴**

^{1,2,4}Department of Architecture,
Federal University of Technology
Minna, Nigeria

³Department of Estate
Management and Valuation,
Federal University of Technology
Minna, Nigeria

Abstract

The waiting area has an influence on patients and their companions and plays an important role in accessing medical services. Research suggests that hospitals are stressful environments, with high levels of uncertainty, fear, and anxiety. While the impact of healing and therapeutic features on patients' in waiting areas of health-care settings is known in Western cultures and contexts, there has been little or no research focused on the therapeutic features in waiting areas, particularly in Nigeria. This present study examined the perceptions of the features of therapeutic waiting areas and their effects on patients' hospital experience, stress, and perceived relaxation. A survey questionnaire was employed to collect data from patients and their companions at two hospitals in North Central, Nigeria about their perceptions of therapeutic features in the waiting areas. The data were analysed using standard statistical methods. The results from this study demonstrated the significant importance of having well-designed waiting areas/rooms equipped with appropriate furniture in healthcare settings for the comfort of patients' and carers. Additionally, views of nature, waiting areas with easy access to natural greenery, the presence of large windows, and calming and relaxing colours were identified as features that improve visual connection to nature and increased positive feelings and moods. The study, the first in a series of waiting room studies in Nigeria, provides valuable insights that can be useful for designing waiting areas in healthcare facilities. It also has the potential for fostering comfortable waiting areas for the wellbeing of patients and users in healthcare environments.

Keywords: Healthcare Environments, Patients, Therapeutic Features, Views of Nature, Waiting Areas

Introduction

Waiting areas are important healthcare spaces that can impact the patient experience. Waiting in healthcare settings is an aspect of the "servicescape" in which patients' and staff interact, and healthcare services are provided [1]. According to Pati and Nanda [2], wait times are unpredictable, and make less for a less pleasant hospital experience for patients and families. In addition, waiting area can influence service users' perceptions of the quality of care, as well as their satisfaction with health outcomes [3]. Patients and their families spend time in hospital waiting areas before receiving treatments. Mark [4] observes that many patients find hospital visits very stressful, and encounters in the waiting rooms are marked by uncertainty, fear, and anxiety [5]. Patients' waiting time, and the stress that comes with it, may be reduced if the waiting area is designed to emphasise the psychological benefits of therapeutic features.

Existing research suggests that waiting periods have an impact on patients' health and wellbeing [6]. Improving the physical hospital environments may lead to improved mood and satisfaction among patients and families [7]. Furthermore, redesigning stressful events in waiting areas, with therapeutic elements, can promote improved mood, less stress and better wellbeing for patients and their companions. For example, Caspari and colleagues' [8] empirical study emphasised the importance of aesthetic surroundings in promoting patient health and wellbeing, and this aesthetic area has many different aspects that need to be considered [8].

Therapeutic healing environments have several attributes, such as nature, daylight, positive distractions, indoor greenery and plants, art images, and have received increased research attention [9,10]. Previous studies on waiting areas in hospitals have been generally inclined towards Western cultural context and focused on

*Corresponding Author:

Lateef Ademola Lawal, Department
of Architecture, Federal University of
Technology Minna, Nigeria.
E-mail: lalawal@futminna.edu.ng

Received Date: 07-05-2025

Accepted Date: 13-05-2025

Published Date: 17-06-2025

different aspects of therapeutic features, however, research focusing on waiting areas of hospitals in Nigeria is important, but understudied. Significant research investigations should focus in the waiting area because this is where healthcare service users' judge the quality of care and health outcomes [3].

This study was conducted to address the knowledge gap about the preferences of therapeutics features in waiting areas, particularly in the Nigerian context. Investigating the perceptions of therapeutic waiting areas and their impact on patients' stress and perceived relaxation could help to improve the wait times and satisfaction in healthcare settings.

The current study aims to determine the perceptions of therapeutic features in healthcare facility waiting areas and their effects on patients' stress and perceived relaxation levels. The study sought to answer the question: "what are the therapeutic features in waiting areas that have an impact on stress, anxiety, and perceived relaxation for patients' and their companions in the waiting areas?"

Literature Review

Healthcare facilities are regarded as one of the most stressful environments, this is especially true for adolescents and young children patients in hospitalised settings, as well as for nurses [11,12]. The stressful tendency of healthcare facilities may be in part, experienced in waiting areas, where patients wait to access medical services. Considerations about improving the quality of environment in which healthcare is delivered gained attention, mostly with the Roger Ulrich's seminal work [13]. Ulrich's study on exposure to therapeutic surroundings discovered that patients recovered faster and were less stressed when they viewed nature from their bedsides compared to patients who did not. Consequently, the theory of supportive design was proposed [14]. Ulrich posits that a supportive design enables patients to cope better with the stress of illness and hospitalisation [15]. A supportive design comprising a sense of control, social support, and positive distractions [14] has been found to be valuable to alleviate stress and foster improved health outcomes for users [16].

An attractive waiting area that reduces the healthcare burden can benefit both patients and staff health outcomes. A study which examined three waiting rooms using Feng Shui elements and measured their comfort levels of waiting areas and correlated them with the effects of pre-experience and expectations found that the waiting area designed with Feng Shui was rated most comfortable than the other two waiting rooms, which were rated lower, and that awareness of external environment combined with expectation significantly influences comfort for patients [17]. These findings suggest that the interiors of healthcare facilities can influence patients' health outcomes. Healthcare administrators and medical personnel should consider the attractiveness of waiting areas and physical healthcare settings in order to promote a healthy and safe environment, while making wait times interesting, relaxing, and stress-free. The attractiveness or ambience of healthcare facilities is a concept under therapeutic environment, which is simply defined as a healing environment or setting that supports medical quality in the treatment of the physical body, as well as patients' psycho-social needs, all of which contribute to a patient's health outcome [18].

Positive Distractions, Connections to Nature, and Impacts on Patients and Staff Health Outcomes

Research investigations focused on positive distractions in healthcare environments are suggested to have beneficial

health outcomes for patients and staff. A positive distraction is an environmental feature that induces positive feelings by diverting attention away from stressful or anxious thoughts [19]. Indoor nature exposure, views of nature, colour and artworks, music, and ambient scent are all examples of positive distractions that can have an impact on the physical health and well-being of patients and staff. Within the context of waiting areas in healthcare facilities, positive distractions have been examined by previous studies. Mediums such as viewing TVs were found to be the most calming distraction for children and reduced stress [2] in waiting areas of cardiology and dental care. Existing studies which investigated pictures of nature and other nature-related distractions were found to mitigate pain and the number of times medications is required [10]. A similar study by Dijkstra et al. [20] also found that the presence of plants in hospital rooms gave a sense of home and comfort in patients, which reduced stress and anxiety.

Connection to Nature

Views of nature, natural light and images of nature within healthcare facilities promote calm feelings and a sense of well-being for patients', staff, and significant others. According to Smith [21], connection to nature has a positive effect by reducing the psychological effects of stress on the nervous system, decreasing pain perception, and improving stress recovery. Similarly, Ulrich [14] found out that natural views influence patients' well-being. Pretty [22] described the relationship between nature and health and identified three levels of engagement in which nature can influence human health and well-being. The first is to view nature through a window, in a book, or in a movie; the second is to be in the presence of nearby nature, and the third is to actively participate in nature through gardening or farming [22]. Existing research in the intensive care unit (ICU) has also found that the natural environment had the highest restorative effect on both the physiological and psychological states of patients [23]. In general, access to greenery connects patients to nature as a source of positive distractions, resulting in reduced stress and anxiety. The next section will present a review of the following elements: nature and natural elements, daylighting, and indoor landscape and green spaces.

Nature and Natural Elements

Nature has always played a significant role in creating a healing environment [24]. Research studies have found that nature has the potential to reduce negative emotions, lessen stress [24], and contribute to improved positive emotions [15]. Previous research has shown that a dosage of nature is linked to anxiety reduction in patients and family [21], assisting with pain management, and reducing the need for analgesics [13]. Moreover, evidence indicates that nature significantly contribute to improved health outcomes related to post-operative problems associated with stress [10, 14-15]. Besides the presence of real nature, paintings that portray natural scenery and sights help ameliorate tension and stress [14]. Placing of television screens in places where patients undergo painful treatments, in such a manner that they produce both visual and audio nature, has been shown to lessen discomfort [10]. Overall, views of nature, images of nature exhibited on walls, the use of natural materials, and the presence of plants in patient rooms have the potential to foster beneficial impacts for patients' and staff well-being.

Daylighting

Research evidence has suggested that adequate lighting can foster increased patients' satisfaction, and the presence of daylight reduces pain and the incidence of depression.

Patients suffering from depression could have their length of stay reduced through morning daylight [10]. Daylight in patients' rooms plays a key role in the health and wellbeing of patients, aiding both recovery and rehabilitation [21]. Notably, daylight has beneficial impacts on overall patients' health since it provides comfort on a visual and psychological level as well as pleasantness and calming effects.

Careful use of natural lighting in therapeutic settings produces vibrant, inviting, and appealing interior spaces and decreases tension and anxiety [25]. Furthermore, daylight fosters a positive atmosphere, saves energy, improves occupant comfort, lessens feelings of isolation, and makes patients feel less depressed [26]. Bright artificial light has been shown to be effective in improving mood and decreasing depression [10]. Artificial lighting can also add to a visual environment; bright indirect lighting is considered to prevent glare [27]. Overall, patients and staff feel better with appropriate illumination and lighting, which promotes better health outcomes, satisfaction, and wellbeing.

Indoor Landscaping and Greenery

Bringing nature to the indoors of the hospital environment has become a frequently used approach in areas where there is minimal presence or a lack of nature in the surrounding environments. For example, existing research suggests that including indoor natural scenery, such as visual trees, greenery, and cultivated fields help in lowering anxiety and enhancing favourable therapeutic impact on patients [15]. Additionally, the presence of greenery near the bed or the view of green spaces through windows strengthens the patient's visual connection to nature and fosters an aesthetic experience that lowers stress, enhances well-being, and elevates the patient's recovery [22]. Moreover, the presence of indoor plants and gardens in healing environments enhances patients' quality of life and can motivate them to engage in outdoor exercise [28].

Art

The presence of art in healthcare settings can serve as positive distractions for patients [29]. A study which investigated contemporary art collection at an institution setting found that artwork collection had a significant positive effect on the patient experience, self-reported stress, and on comfort and expectations [30]. Artwork, rendered in nature forms, can promote wellbeing for patients and medical personnel. Art provides an aesthetically pleasing healthcare environments, enhances patients' mood and facilitates interaction between staff, patients and their family or friends [31].

Materials and Methods

This study was a quantitative research, utilising a survey questionnaire for data collection. The study population consisted all eligible patients, families or visitors who were found sitting or standing in the waiting areas of the selected hospitals. The two hospitals for the study were located in the Federal Capital Territory (FCT), Abuja, Nigeria.

Participants

The study was conducted with the cooperation of the patients, families or visitors who were present in the waiting areas of the selected hospitals. In total, the participants included 16 males and 44 females. Out of this number, 45 were patients, seven were their friends, and eight were family members. The participants' ages range from 15 to 59 years. Figure 1 shows that 16 of the participants were between the ages of 15 to 29,

40 were between the ages of 30 and 44, and only four were between the ages of 45 and 59.

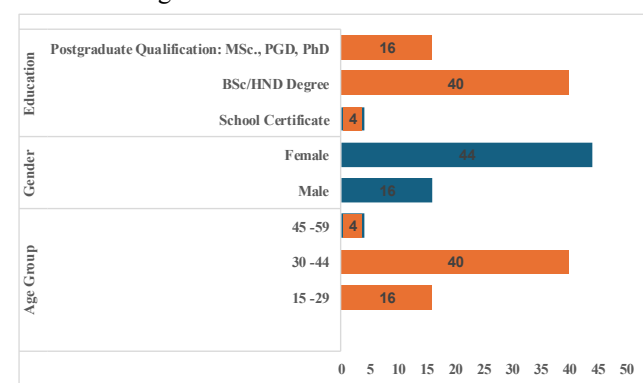


Figure 1: Participants Characteristics by Gender, Age, and by Education Qualification

Measure

The authors created and validated a structured questionnaire for data collection before proceeding to hospitals to meet the participants. The survey questions were written in simple and direct English that the participants could understand. After receiving explanations on the purpose of the present study, participants were asked to imagine features that could be used in waiting areas to reduce stress for patient, increase perceived relaxation and improve hospital experiences. The participants were then given a survey questionnaire to complete. A total of sixty (60) participated and filled out the survey. The participants responded to each survey item on a 5-point Likert scale ranging from "1 = Not at all important" to "5 = Very important". Similarly, some questions were presented in a form that asked participants to rank them on a "agree or disagree" basis. Similarly, the options prompt is anchored at "1 = strongly disagree" and "5 = strongly agree". Table 1 displays the details of the participants characteristics.

Table 1: Participants' Characteristics

Characteristics/Age	15-29 Years	30-44 Years	45-59 Years	Total
Sex		N		N (%)
Male	6	8	2	16(26.7)
Female	10	32	2	44(73.3)
Patients	13	25	7	45(75)
Family members	2	5	1	8(13.3)
Friends	1	4	2	7(11.7)
Education Levels				
Secondary School Leaving Cert	2	2	-	4(6.7)
Bsc/HND degree	6	30	4	40(66.7)
Masters, PGD/PhD	1	12	3	16(26.7)

Survey Procedure

The survey was administered to the participants through pen-and-paper based approach from 15 to 20 November 2022. Administering the survey questionnaire to the participants using the traditional approach while they fill out the survey is an approach that was widely used before the emergence of the internet-based surveys [32,33]. According to research evidence, there are no significant differences in how traditionally based questionnaires were answered versus internet-based

questionnaires [34]. Therefore, a paper-based approach is an effective method to reach out to the hard-to-reach population, particularly when access and time are limited. Overall, 60 participants completed and returned the survey questionnaires.

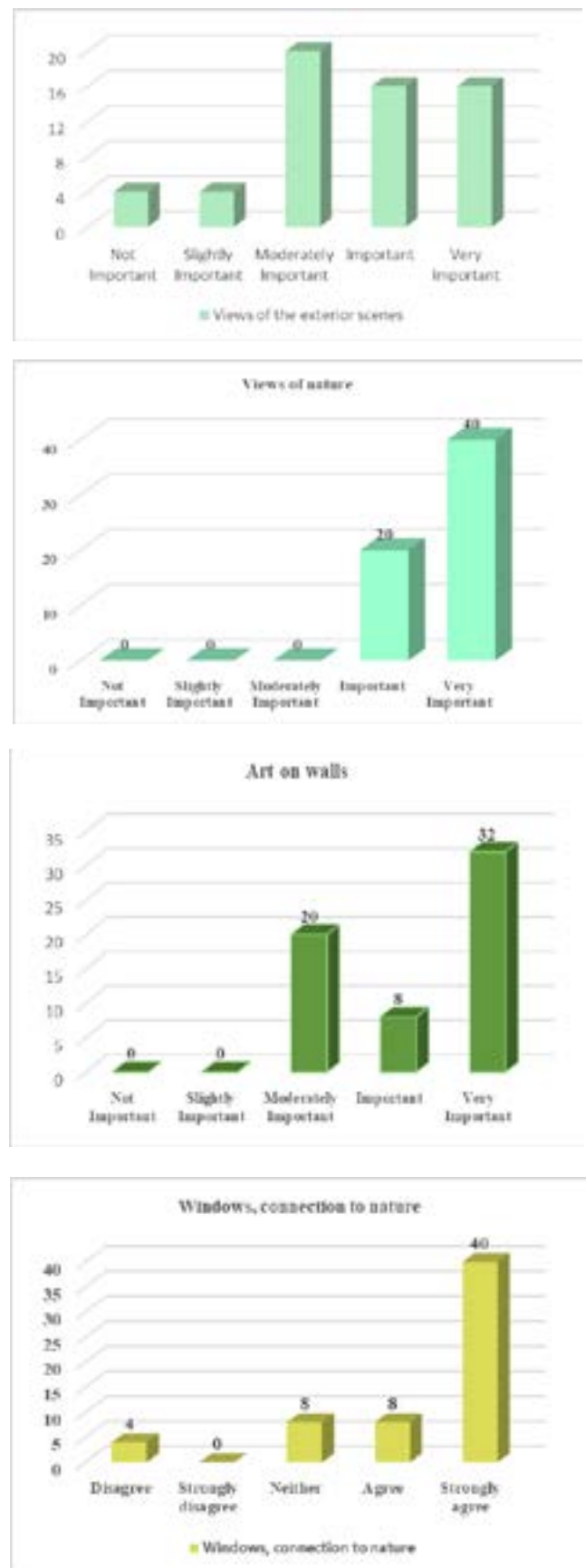
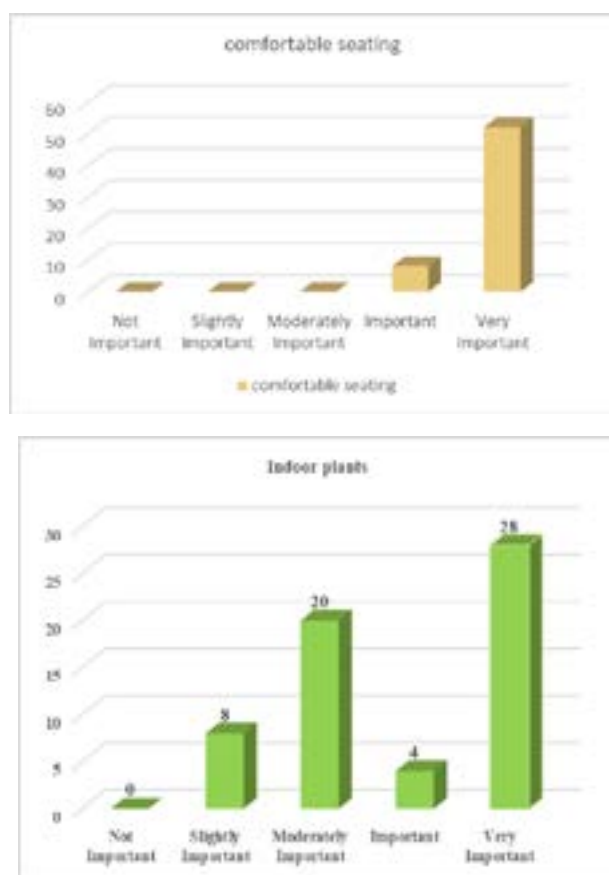
Method of Data Analysis

Descriptive analyses were conducted on responses regarding the perceptions of therapeutic features in hospital waiting areas. Completed surveys were exported to Microsoft Excel and analysed with SPSS version 24 and Excel. The relative importance index was calculated using the survey's data means and weighted means scores. This paper presents the preliminary findings from a series of waiting rooms studies focusing on therapeutic waiting areas in Nigeria. The subsequent findings would be discussed in another publication.

Results

The descriptive statistics of the ratings of the perceptions of the features of therapeutic waiting areas are illustrated from Figures 1 to 6 and from Figures 8 to 15.

In addition, Table 2 displays the preference ratings of therapeutic waiting areas along with their calculated weighted mean scores, indicating an important index for the perceptions of the therapeutic design features for hospital waiting areas. As shown in Table 2, the presence of comfortable furniture for seating in a waiting area received the highest weighted mean score of ($M = 4.87$). Not surprisingly, "views of nature" was ranked second with a weighted mean score of ($M = 4.70$) and unit design of waiting areas was ranked the third with a weighted mean score of ($M = 4.67$).



Figures 1-6: Descriptive Statistics of the Ratings of the Perceptions of Therapeutic Features

Furthermore, a significant observation of the results indicates that many of the items were also ranked very high, with a weighted mean score of 4 and above. This suggests the

therapeutic importance of the design elements in stress reduction for patients and their companions. These items include “images of nature has a calming effect on moods” ($M = 4.6$), “presence of greenery around a waiting area helps reduce patients stress and anxiety” ($M = 4.53$) as well as “large windows from waiting area fosters visual connection to nature ($M = 4.4$).

Table 2: Participants Ratings of the Perceptions on Therapeutic Features on Stress and Perceived Relaxation

Perceived Relaxation				
S/N	Survey item	Total	Important index	Rank
1	Provision of comfortable seating in the waiting area/ room	292	4.87	1st
2	Views of nature; scenes, gardens, or flowers	282	4.7	2nd
3	Well-designed waiting area contributes to patients and their family comfort	280	4.67	3rd
4	Images of nature have a calming effect on mood	276	4.6	4th
5	Presence of greenery around a waiting area helps reduce patients' stress and anxiety	272	4.53	5th
6	Large windows foster visual connection to nature	264	4.4	6th
7	Nature-rich surroundings foster patients' hospital experience	264	4.4	6th
8	Material and type of furniture in the waiting area enhance relaxation	264	4.4	6th
9	Daylight entering a waiting area helps reduce stress	256	4.3	9th
10	Calming colours (green, yellow) promote positive moods	260	4.3	9th
11	Presence of TVs screens fosters positive distractions for patients and users	252	4.2	11th
12	Wall decorations with art and nature images	252	4.2	11th
13	Presence of waterscape has a soothing effect on patients	236	3.93	13th
14	Provision of indoor plants in waiting areas	232	3.87	14th
15	Views to the outdoor scenery from the windows	222	3.7	15th

Similarly, three therapeutic features in the survey items had the same mean score of 4.4; ‘large windows foster visual connection to nature’, ‘nature rich surroundings foster positive

hospital experience”, and “material and type of furniture in the waiting area”. Additionally, “daylight entering the interiors of waiting areas” and “calming colours promote positive moods” were ranked similarly ($M = 4.3$). These three environmental features have links with feelings, emotional wellbeing, and the potential to alleviate stress in hospital environments.

Almost all the survey items, with the exceptions of “presence of waterscape (such as aquariums, water bodies) has a soothing effects on patients” ($M = 3.93$), and “views to the outdoor scenery from the windows” ($M = 3.7$) were ranked 4 and above (see Figure 2). The presence of waterscape was ranked a bit lower compared to other environmental design features. First, a plausible explanation for these results on aspect of waterscape was that hardly could waterscape or a mimicking water fountain be found in Nigeria healthcare facilities. The participants may likely to have reasoned that that was a lofty goal to pursue. Second, responses regarding views to the outdoor scenery, was somewhat low, in part, due to a relatively sparse vegetation and lack of inviting surroundings in the selected hospitals. Even though the participants ranked this feature as important ($M = 3.7$), it is likely that there was little conviction that the outdoors could be improved to provide a better therapeutic waiting experience. Figure 7 shows the summary of the topmost therapeutic features for hospital waiting areas that are likely beneficial to reduce stress and anxiety, foster improved mood and relaxation levels.

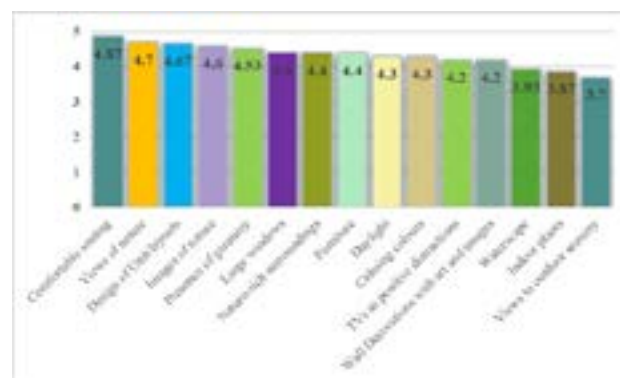
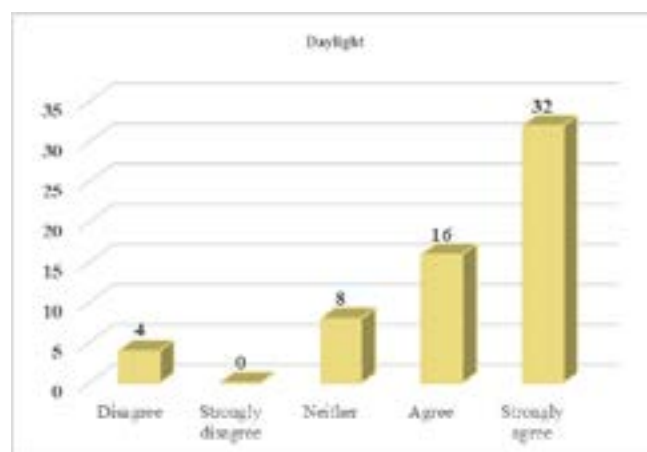
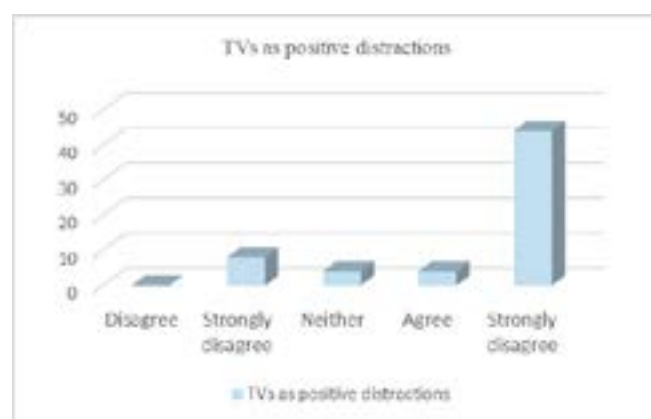
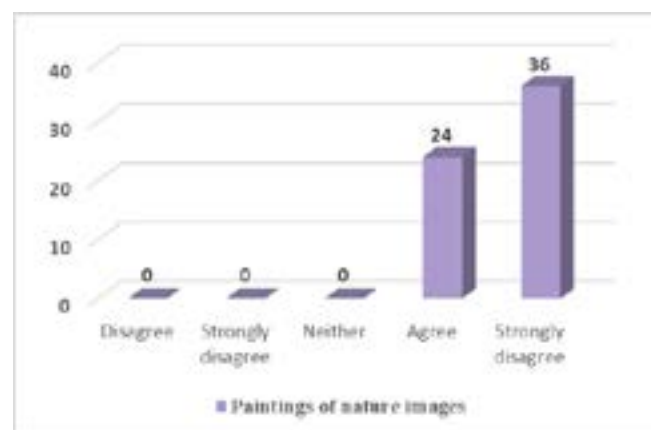
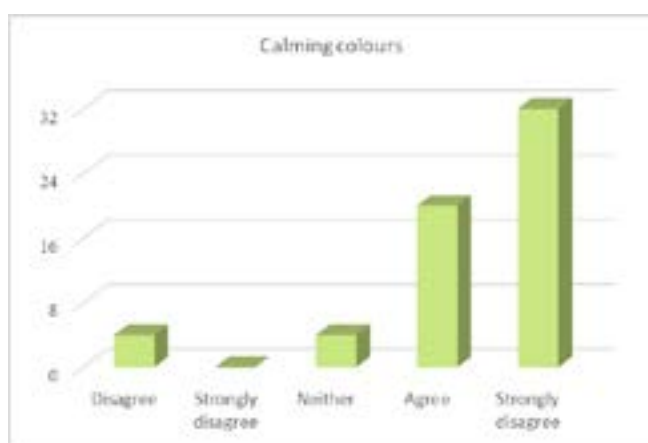
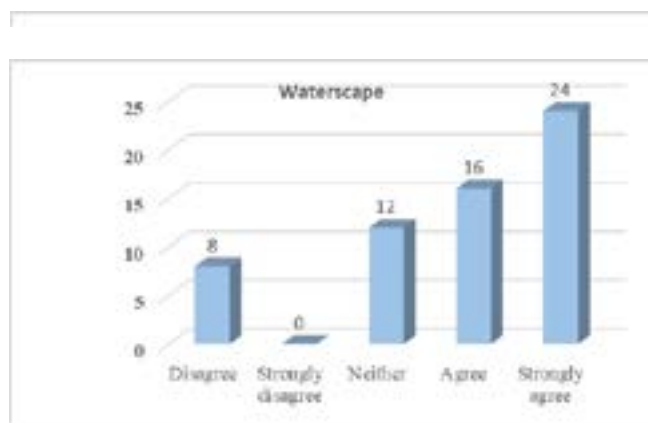


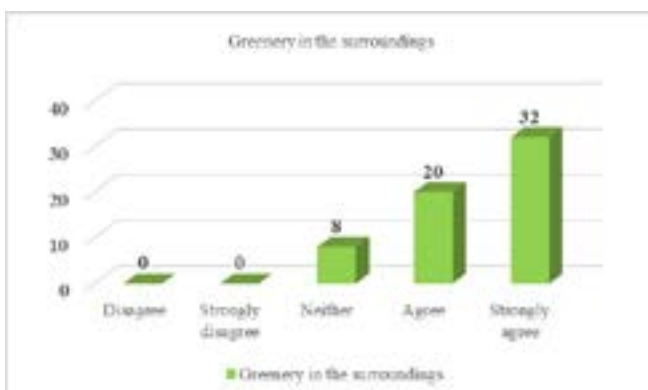
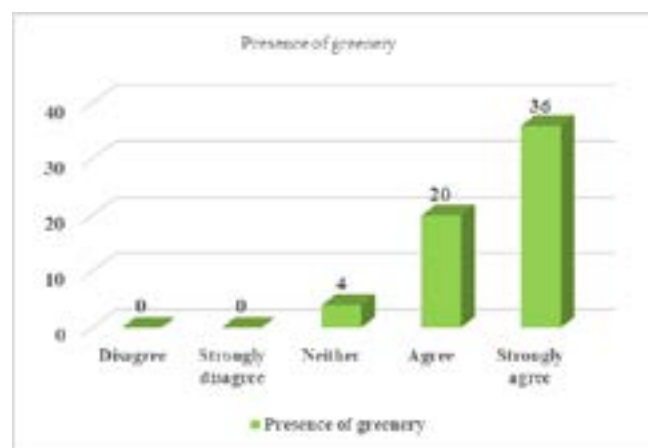
Figure 7: Relative Important Index of Perceptions of Therapeutic Features in Waiting Areas





Figures 8-13: Descriptive Statistics of The Ratings of The Perceptions of Therapeutic Features

Figures 14-15: Descriptive Statistics of The Ratings of The Perceptions of Therapeutic Features



Discussion

Previous research has shown that healing and therapeutic environments benefit patients, staff and healthcare users, by reducing stress and anxiety levels, promoting positive mood and fostering restoration and wellbeing. The current study found a range of therapeutic environmental features in waiting areas can help to promote psychological wellness and perceived relaxation in stressed patients. Many participants preferred comfortable seating, which allowed patients and their companions to relax while waiting for medical personnel to attend to them. Inadequate seating in the waiting area can be aggravating and cause stress and anxiety for patients who are already stressed and weak due to illness. A study conducted in the waiting area of one Chinese healthcare setting found that the size of the waiting area, including seating had a significant impact on patients' hospital waiting experiences of patients [35]. In addition, the present study found that a well-designed layout/unit, which contributes to patients and family comfort, is an important feature for hospital waiting experience. Qi et al. [36] conducted an evidence-based study on appropriate waiting environments in three paediatric clinics. Their research discovered that improving the design of waiting area in paediatric clinics, with a focus on functional layout, had a significant positive impact on satisfaction. Moreover, a study focused on the affective design of waiting rooms in six primary health centres in Sweden found that the most desired feeling in the interiors is "calm," with design elements such as good seating arrangements, colour, and greening contributing to the feeling [37].

Furthermore, views of nature, including greenery and natural

surroundings, were thought to have therapeutic value. Nature's health benefits have been extensively studied in a variety of settings, including a hospitalisation setting such as in post-surgical wards [13,38], residential rehabilitation centres [39], urban natural environments [40], and hospital's waiting rooms. All of these studies confirmed nature's beneficial effects on stress reduction, positive emotions, and psychological wellbeing. Thus, these findings provide support for the positive effects of green spaces and nature.

The findings about nature-rich surroundings in waiting areas were confirmed in a study that exposed patients to an unobstructed view of nature from their bedrooms. The study found that having an unobstructed view of the natural surroundings improved self-reported physical health during rehabilitation [40]. Furthermore, a study that assigned employees to a post-surgical unit of a large hospital, found that the majority of staff with limited contact to outdoor nature have a limited ability to reduce stress through nature contact exposures, which affects their perceived levels of work stress and health outcomes for staff who were assigned to the post-surgical unit [38]. The current study also found that images of nature have a calming effect on mood, and that greenery around a waiting area contributes to reduced stress and perceived anxiety for patients and companions.

Heldi et al. [41] concluded that daylight has been linked to improved recovery rates, pain relief, improved mood, and a reduction in the need for analgesia in patients. Employees, benefitted from daylight because it reduced errors, fatigued them less, and increased their job satisfaction level. The current study's findings suggest that daylight through windows reduce stress. Furthermore, calming colours in waiting areas promote positive feelings among patients. However, existing research on colours is diverse, spanning gender, age demographics, and settings [42-44], implying that preferences vary depending on contexts.

Positive distractions in a healthcare setting can boost patients' mood and wellbeing by making them feel more relaxed. Pati and Nanda [2] used a plasma TV screen to introduce five distraction conditions in the waiting area of a paediatric hospital's dental and cardiac clinics, and then assessed attention, behaviour, and activities of the children. Their findings revealed that distraction conditions were significantly associated with calmer behaviour. Additionally, Jiang's [19] study of positive distractions and play opportunities in paediatric healthcare settings identified themes of positive distractions, including art and environmental aesthetics, sound and lighting, access to nature among others. The author concluded that positive distractions improve behavioural and emotional wellbeing, reduced stress and anxiety, and improve the healthcare experience and satisfaction. Previous research has shown that exposure to art in healthcare settings reduces anxiety and depression, and that art when carefully considered can promote wellbeing [45]. The present study found that positive distractions using TVs display screens, and art were perceived to provide significant positive distractions in waiting areas.

Conclusions

This study examined the perceptions of therapeutic features in healthcare facility waiting areas and their effects on patients' stress and perceived relaxation levels. The findings generally showed that providing comfortable seating in waiting areas, views of nature, and well-designed unit layouts in waiting areas had a significant impact on patients' stress and perceived relaxation levels. The findings also demonstrate that having large windows, with views of nature greenery, and nature-rich

surroundings promotes the visual connection of patients' and companions to nature and the outdoors, thereby improving patients' hospital experiences in waiting areas.

The study's findings offer architects and designers insights and strategies in creating a more welcoming and inviting waiting environments, ultimately improving the emotional wellbeing of patients and their companions. The findings also have implications for healthcare managers' awareness of features in waiting areas that can benefit patients by improving the physical environment and reducing stress associated with healthcare settings. Further research might investigate individual therapeutic elements in healthcare waiting areas and how they affect patients' stress, anxiety, and perceived relaxation.

Author Contributions

The first author did the conceptualisation; the writing - original draft preparation. The second author did the review, the third author did initial data analysis, while the last author did data collection. The first author did data curation, editing and organised the final manuscript. All authors have read and agreed to the published version of the manuscript.

Funding

This work is not supported by any external funding.

Data Availability Statement

The data is available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

References

1. Bitner M J (1992) "Servicescapes: the impact of physical surroundings on customers and employees". *The Journal of Marketing* 5: 57-71.
2. Pati D, Nanda U (2011) Influence of positive distractions on children in two clinic waiting areas. *HERD: Health Environments Research & Design Journal* 4: 124-140.
3. Liddicoat S (2020) The therapeutic waiting room: Therapist and service user perspectives on the psychologically supportive dimensions of architectural space. *HERD: Health Environments Research & Design Journal* 13:103-118.
4. Mark M (2003) Patient anxiety and modern elective surgery: A literature review. *Journal of Clinical. Nursing* 12: 806-815.
5. Pearson S, Maddern GJ, Fitridge R (2005) The role of pre-operative state-anxiety in the determination of intra-operative neuroendocrine responses and recovery. *British journal of health psychology* 10: 299-310.
6. Taylor SE, Repetti RL, Seeman T (1997) Health psychology: what is an unhealthy environment and how does it get under the skin? *Annual review of psychology* 48: 411-447.
7. Leather P, Beale D, Santos A (2003) Outcomes of the appraisal of different hospital waiting areas. *Environmental Behavior* 35: 842-869

8. Caspari S, Eriksson K, Nåden D (2011) The importance of aesthetic surroundings: A study interviewing experts within different aesthetic fields. *Scandinavian journal of caring sciences* 25: 134-142.
9. Ulrich RS, Quan X, Zimring C, Joseph A, Choudhary R (2004) The role of the physical environment in the hospital of 21st century: A once-in-a-lifetime opportunity. Concord, CA: The Center for Health Design.
10. Ulrich RS, Zimring C, Zhu X, DuBose J, Soe HB, Choi YS, Joseph A (2008) A review of the research literature on evidence-based healthcare design. *HERD: Health Environments Research & Design* 1: 61-125.
11. Eisen SL, Ulrich RS, Shepley MM, Varni JW, Sherman S (2008) The stress-reducing effects of art in pediatric health care: art preferences of healthy children and hospitalized children. *Journal of Child Health Care* 12: 173-190.
12. Nejati A, Shepley M, Rodiek S, Lee C, Varni J (2016) Restorative design features for hospital staff break areas: A multi-method study. *HERD: Health Environments Research & Design Journal* 9: 16-35.
13. Ulrich RS (1984) View through a window may influence recovery. *Science* 224:224-225.
14. Ulrich RS (1991) Effects of interior design on wellness: Theory and recent scientific research. *Journal of Health Care Interior Design* 3: 97-109.
15. Ulrich RS (2001) Effects of healthcare environmental design on medical outcomes. In *Design and Health: Proceedings of the Second International Conference on Health and Design*. Stockholm, Sweden: Svensk Byggtjänst 49: 59.
16. Andrade CC, Devlin AS (2015) Stress reduction in a hospital room: Applying Ulrich's theory of supportive design. *Journal of Environmental Psychology* 41: 125-134.
17. Bazley C, Vink P, Montgomery J, Hedge A (2016) Interior effects on comfort in healthcare waiting areas. *Work* 54: 791-806.
18. Watkins N (2010) *Therapeutic Environments*. National Institute of Building Sciences.
19. Jiang S (2020) Positive distractions and play in the public spaces of pediatric healthcare environments: A literature review. *HERD: Health Environments Research & Design Journal* 13: 171-197.
20. Dijkstra K, Pieterse M, Pruyn A (2006) Physical environmental stimuli that turn healthcare facilities into environments through psychologically mediated effects: Systematic review. *Journal of Advanced Nursing* 56: 166-181.
21. Smith J (2007) *Health & nature: the influence of nature on design of the environment of care*. The Center for Health Design ASLA, LEED AP.
22. Pretty J (2004) How nature contributes to mental and physical health. *Spirituality and Health International* 5: 68-78.
23. Gerber SM, Jeitziner MM, Sängster SD, Knobel SE, Marchal-Crespo L, Müri RM, ...Nef T (2019) Comparing the relaxing effects of different virtual reality environments in the intensive care unit: observational study. *JMIR perioperative medicine* 2: e15579.
24. Van den Berg AE (2005) Health impacts of healing environments; a review of evidence for benefits of nature, daylight, fresh air, and quiet in healthcare settings. *UMCG*.
25. Meenakumar P (2017) The effects and impact of light on patients and staffs in hospitals. *International Journal of Engineering Technology, Management and Applied Sciences* 5.
26. O'Connor M, O'Brien A, Bloomer M, Morphett J, Peters L, Hall H, ... Munro I (2012) The environment of inpatient healthcare delivery and its influence on the outcome of care. *HERD: Health Environments Research & Design Journal* 6: 104-116.
27. Arneill AB, Devlin A (2003) Perceived quality of care: The influence of the waiting room environment. *Journal of Environmental Psychology* 22: 345-360.
28. Park SH, Mattson RH (2009) Ornamental indoor plants in hospital rooms enhanced health outcomes of patients recovering from surgery. *The journal of alternative and complementary medicine* 15: 975-980.
29. Herweijer- van Gelder M (2016) Dutch hospitals: Spatial qualities that influence the well-being and health of patients. *A+BE Architecture and the Built Environment*. TU Delft Open.
30. Karnik M, Printz B, Finkel J (2014) A hospital's contemporary art collection: effects on patient mood, stress, comfort, and expectations. *HERD: Health Environments Research & Design Journal* 7: 60-77.
31. Suter E, Baylin D (2007) Choosing art as a complement to healing. *Applied nursing research* 20 :32-38.
32. Fang H, Xian R, Ma Z, Lu M, Hu Y (2021) Comparison of the differences between web based and traditional questionnaire surveys in pediatrics: comparative survey study. *Journal of Medical Internet Research* 23: e30861.
33. Alessi EJ, Martin JI (2010) Conducting an internet-based survey: Benefits, pitfalls, and lessons learned. *Social work research* 34:122-128.
34. Ritter P, Lorig K, Laurent D, Matthews K (2004) Internet versus mailed questionnaires: a randomized comparison. *Journal of Medical Internet Research* 6: e103.
35. Xuan X, Li Z, Chen X, Cao Y, Feng Z (2021) Study of the physical environment of waiting areas and its effects on patient satisfaction, experience, perceived waiting time, and behavior in China. *HERD: Health Environments Research & Design Journal* 14: 108-123.
36. Qi Y, Yan Y, Lau SS, Tao Y (2021) Evidence-based design for waiting space environment of pediatric clinics—Three hospitals in Shenzhen as case studies. *International Journal of Environmental Research and Public Health* 18: 11804.
37. Ayas E, Eklund J, Ishihara S (2008) Affective design of waiting areas in primary healthcare. *The TQM Journal* 20: 389-408.
38. Trau D, Keenan KA, Goforth M, Large V (2016) Nature

- contacts: employee wellness in healthcare. *HERD: Health Environments Research & Design Journal* 9: 47-62.
39. Raanaas RK, Patil GG, Hartig T (2012) Health benefits of a view of nature through the window: A quasi-experimental study of patients in a residential rehabilitation center. *Clinical rehabilitation* 26: 21-32.
 40. Depledge MH, Stone RJ, Bird WJ (2011) Can natural and virtual environments be used to promote improved human health and wellbeing?. *Environmental science & technology* 45: 4660-4665.
 41. Salonen H, Lahtinen M, Lappalainen S, Knibbs LD, Morawska L, Reijula K (2014) The impact of windows, daylight and views of nature on health and wellbeing in healthcare facilities. In *The International Sustainable Built Environment Conference 2014*.
 42. Balabanoff D (2023) Color, light, and birth space design: An integrative review. *Color Research & Application* 48: 413-432.
 43. Park JG, Park C (2013) Color perception in pediatric patient room design: American versus Korean pediatric patients. *HERD: Health Environments Research & Design Journal* 6: 10-26.
 44. Dalke H, Little J, Niemann E, Camgoz N, Steadman G, Hill S, Stott L (2006) Colour and lighting in hospital design. *Optics & Laser Technology* 38: 343-365.
 45. Daykin N, Byrne E, Soteriou T, O'Connor S (2008) The impact of art, design and environment in mental healthcare: a systematic review of the literature. *Journal of the Royal Society for the Promotion of Health* 128: 85-94.