International Journal of Science and Research Archive
eISSN: 2582-8185
Cross Ref DOI: 10.30574/ijsra
Journal homepage: https://ijsra.net/

(RESEARCH ARTICLE)

Check for updates

Exploring Sensory Aspects of Hospital Environments Through User Perception

Elvir Nuhanović *

Independent researcher, Breza, Bosnia and Herzegovina.

International Journal of Science and Research Archive, 2025, 17(03), 1103-1110

Publication history: Received on 22 November 2025; revised on 28 December 2025; accepted on 30 December 2025

Article DOI: https://doi.org/10.30574/ijsra.2025.17.3.3367

Abstract

Hospitals are environments in which patients experience heightened physical and psychological vulnerability. Despite this, architectural design has prioritized clinical efficiency over human-centered spatial experience. Increasing evidence suggests that the built environment influences stress levels, comfort, and overall well-being. This study examines how the overall sensory environment of hospital shapes users' experiences, focusing on general sensory perception rather than isolated sensory elements. A survey was conducted among hospital users, including patients, visitors, and staff (n=223). The quantitative survey addressed demographic characteristics, sensory perceptions, and general impressions of the hospital environment. This paper analyses responses related to the total sensory experience of hospital spaces using descriptive statistical methods. The results indicate that most respondents perceived the hospital environment as having moderate to high impact on their overall experience. Additionally, the majority expressed a clear preference for hospitals designed with a focus on sensory comfort. These findings highlight the importance of integrating sensory-aware design strategies in healthcare architecture to support well-being and improve the overall hospital experience.

Keywords: Sensory Design; Evidence-Based Design; Healthcare Architecture; Biophilia

1. Introduction

1.1. The Problem and Subject of Research

The built environment plays a fundamental role in shaping human health, emotional state, and overall well-being. Such influence becomes particularly critical in healthcare settings, where patients experience heightened psychological and physiological stress. Hospitals therefore carry a unique responsibility in terms of architecture, that extends beyond clinical efficiency to include the emotional and sensory experiences of their users.

Throughout history, hospital architecture has been dominated by functional, sterile, and efficiency-driven design principles. While these approaches support medical workflows and hygiene standards, they often overlook the psychological impact of the physical environment on patients. Contemporary research in psychology, neuroscience, and medicine increasingly confirms that spatial conditions directly affect stress levels, emotional comfort, and well-being, making the role of architectural design in healing environments a growing area of interest.

Human interaction with space is inherently sensory. Sounds, visual impressions, smells, textures, and overall spatial atmosphere shape how individuals perceive and respond to their surroundings. In healthcare environments, these sensory stimuli may either contribute to feelings of safety, comfort, or calm, or intensify the already present anxiety in such spaces. Despite this, sensory perception has traditionally been addressed in architecture primarily as an aesthetic or technical quality rather than as an active contributor to health outcomes.

* Corresponding author: Elvir Nuhanović; ORCID: https://orcid.org/0009-0009-0410-6500 Email: elvir182@outlook.com

Although sensory engagement has long been present in architectural practice, it has rarely been systematically applied as a tool for enhancing patient well-being in hospital design. This gap highlights the need for an approach that recognizes sensory experience as a meaningful factor influencing psychological and physiological responses within healthcare settings.

The problem addressed in this research is the insufficient integration of sensory considerations and emotional needs in conventional healthcare design. Many of these facilities prioritize technical functionality while underestimating how the overall physical environment affects patient experience.

The subject of this research is the influence of general sensory experiences within hospital environments on users' perceived comfort and emotional response. By analyzing survey data collected from hospital users, the study examines how the overall sensory quality of the physical environment affects patient experience and explores the potential of a sensory-oriented design to support healing-oriented healthcare architecture.

1.2. Aim and Scope of the Research

The research stems from the idea that architects need to employ an active role in the interdisciplinary design of hospitals, where architecture is perceived as a space that actively takes part in the healing process, and not just a passive space for medical procedures.

The primary aim of this research is to identify and highlight the significance of incorporating sensory design in contemporary healthcare architecture, and to define architectural design strategies that can support patients' healing by positively affecting their mental and physical well-being. The research aims to show that healthcare architecture should not be limited to just technical and functional needs, but needs to incorporate emotional, sensory, and perceptional aspects of human experience.

1.3. Research Hypothesis

The main hypothesis of this research is that hospital environments perceived as sensory-supportive positively influence patients' overall experience and emotional comfort.

It is hypothesized that patients will report a more positive experience and higher levels of comfort in settings where the physical environment is perceived as thoughtfully designed with sensory comfort in mind. While existing literature addresses individual sensory factors, these elements are often examined in isolation rather than as a part of an integrated sensory experience.

Given the difficulty of directly measuring clinical healing outcomes in relation to sensory inputs, this study focuses on patient perception as an indirect indicator of environmental quality. It is therefore hypothesized that environments perceived as supportive of sensory comfort are associated with improved emotional responses, including increased feelings of safety and well-being and reducing stress.

Furthermore, the study hypothesizes that patients will express a clear preference for hospitals intentionally designed to support sensory comfort, indicating the perceived value of sensory-oriented architectural approaches in healthcare environments.

1.4. Contributions of Research

This study contributes to architectural and healthcare research by emphasizing general sensory experience as a critical factor in patient perception of hospital environments. Rather than treating sensory qualities as aesthetic considerations, the research positions them as integral components of human-centered healthcare design.

Within architecture discourse, the study supports the integration of sensory awareness into hospital design thinking. It offers empirical insight into how patients perceive the overall sensory quality of healthcare spaces, providing architects with evidence-based guidance for designing environments that support emotional comfort.

From a healthcare perspective, the research highlights the role of the physical environment as a complementary factor influencing patient experience. The findings demonstrate that patients place value on hospitals designed with sensory comfort in mind, reinforcing the importance of environment quality alongside clinical care.

Academically, the study contributes to the growing body of literature on sensory design by linking theoretical discussions with survey-based evidence. It provides a methodological foundation for future research that may examine individual sensory dimensions (visual, acoustic, or olfactory) in greater depth.

At a broader level, the research supports a more empathetic and humane approach to healthcare architecture, advocating for hospital environments that respond not only to functional demands, but also the emotional and psychological needs of their users.

2. Background

Despite architecture often being perceived as a discipline primarily concerned with the technical and aesthetic aspects of buildings, its connection to other fields, including medicine, becomes crucial when considering the direct impact carefully planned spaces have on their users. The influence is especially evident in healthcare environments, where architectural conditions can affect overall health outcomes and the recovery of patients.

The design and use of space play a significant role in shaping human experience, as prolonged exposure to the built environment has been shown to influence both physical and mental health, including increased levels of stress and depression [1]. These findings highlight the urgency of designing spaces with healing potential. However, hospital environments frequently neglect patient needs through the use of harsh artificial lighting, lack of daylight access, and limited visual connection to the outdoors. Such shortcomings can negatively affect patient perception and exacerbate an already vulnerable state [2].

Patients in healthcare settings are often exposed to high levels of emotional and cognitive stress, which increases their susceptibility to inform overload and environmental discomfort [3]. These insights underline the importance of integrating psychological considerations into healthcare architecture. Consequently, acknowledging sensory experience as a design parameter, recognizing that hospital users continuously perceive their surroundings through sight, smell, touch, represents a critical step toward more human-centered hospital environments. Recent literature reviews emphasize that sensory design is increasingly recognized as an essential component of healing-oriented healthcare architecture, though it remains insufficiently integrated in practice [4].

In response to these challenges, architects have increasingly incorporated principles of biophilic design, aiming to strengthen the human-nature connection and support psychological well-being [5]. However, research addressing the integration of biophilic elements within indoor healthcare environments remains limited [6]. Existing studies suggest that exposure to natural elements can positively influence well-being and emotional stability [7]. One of the most influential early studies by Ulrich in 1984 demonstrated that patients with views of natural settings through the window experienced shorter hospital stays compared to those without such views [8]. These findings reinforce the importance of sensory and environmental qualities in shaping patient experience and recovery.

3. Material and Methods

3.1. Introduction to the Methodology

The study investigates how the overall sensory quality of hospital environments influences users' experiences and perceptions of comfort. Rather than investigating individual sensory modalities in isolation, the research focuses on general sensory experience as perceived by hospital users.

The methodological approach is quantitative, based on a structured survey designed to capture users' perceptions of the hospital physical environment and its sensory qualities. The survey explores respondents' experiences of hospital spaces and their attitudes toward environments designed with sensory comfort in mind.

Data were collected through an online questionnaire distributed to participants with prior experience of hospital environments. A total of 223 respondents completed the survey. While the full questionnaire addressed multiple sensory dimensions, this paper analyzes only the questions related to overall sensory experience and the perceived impact of the physical environment, allowing for focused examination without redundancy across future studies.

The use of a survey-based quantitative method enables the aggregation and comparison of user perceptions, providing measurable insight into how hospital environments are experienced at a general sensory level. This approach supports

the identification of patterns in user responses and offers empirical grounding for discussions on sensory-oriented hospital design.

The methodological framework is informed by principles of Evidence-based design (EBD) and existing theoretical research on environmental perception and human well-being. By translating subjective sensory experiences into quantifiable data, the study contributes empirical evidence to ongoing discussions on human-centered healthcare architecture.

3.2. Survey

Within the framework of this research, an online survey was conducted to gain insight into the subjective experiences of hospital users, including patients, visitors, and staff, regarding the sensory quality of hospital environments. The survey examined perceptions of the overall sensory ambience, focusing on how the hospital environment influences comfort and user experience.

Although the full survey addressed multiple sensory dimensions, this paper analyzes only the questions related to general sensory experience and the perceived impact of the physical environment. This focused approach allows the findings to be presented without overlap with future studies examining individual sensory modalities in detail.

The survey was developed and administrated using Google Forms and distributed through online forums, primarily Reddit communities, targeting users from Bosnia and Herzegovina, Serbia, and Croatia. This method enabled broad participation across different social backgrounds, ages, and roles within the healthcare system.

Prior to participation, respondents were informed of the purpose of the research, the voluntary nature of the involvement, and the anonymity and confidentiality of their responses. Informed consent was obtained at the beginning of the survey. A total of 223 complete responses were collected over several weeks in April 2025.

The survey consisted of 19 questions, organized into thematic sections: Demographic information, visual perceptions, auditory experience, olfactory experience, tactile experience, and general impressions of the hospital environment and suggestions for improvement.

Of the total questions, 15 were close-ended using Likert-scale and multiple-choice formats to generate quantifiable data, while 4 open-ended questions allowed participants to provide personal reflections and suggestions.

For the purpose of this paper, analysis focused on the questions addressing the perceived influence of the overall physical environment on hospital experience, and attitude toward hospitals designed with an emphasis on sensory comfort.

The survey methodology aligns with principles of EBD by translating user perceptions into empirical data that can inform human-centered approaches to healthcare architecture.

4. Results and Discussion

4.1. Demographic profile

A total of 223 responders participated in the survey, and their main demographic data include age, gender, and their role in the hospital (patient, visitor, or medical staff).

The majority of responders consisted of young people, aged between 18 and 30 (168 responders; 75.3%), followed by responders aged between 31 and 45 (48 responders; 21.5%). A significantly lower number belongs to ages between 46 and 60 (5 responders, 2.2%), and over the age of 60 (2 responders; 0.9%). This distribution implies that the results reflect the perception of mainly the younger population, which could impact sensory preferences and aesthetic demands.

The majority of responders were female– 143 (64.1%), while 80 were male (35.9%). Such distribution reveals a slight dominance of female responders.

Regarding their role participants had in the hospital, the majority consisted of patients– 106 (47.5%), followed by visitors– 94 (42.2%), while 23 responders (10.3%), were medical staff. A distribution like this allowed for a holistic look

at sensory experiences within the hospital surroundings, from a viewpoint of those who stay there, visit someone, or work there.

4.2. Total Experience of the Sensory Environment

In terms of a general sensory experience, responders were asked to reveal how the overall physical environment of the hospital shaped their experience. A small percentage (6 respondents, 2.7%) reported that it had no impact at all, while 17 individuals (7.6%) suggested that it affected them slightly. A notable portion of 82 respondents (36.8%) reported a moderate effect, while 86 respondents (38.6%) stated that the environment played a key role on their experience. Furthermore, 32 individuals (14.3%) perceived the impact as very significant, underlining the strong role that physical surroundings play in the shaping of patients' comfort withing healthcare settings (Figure 1).

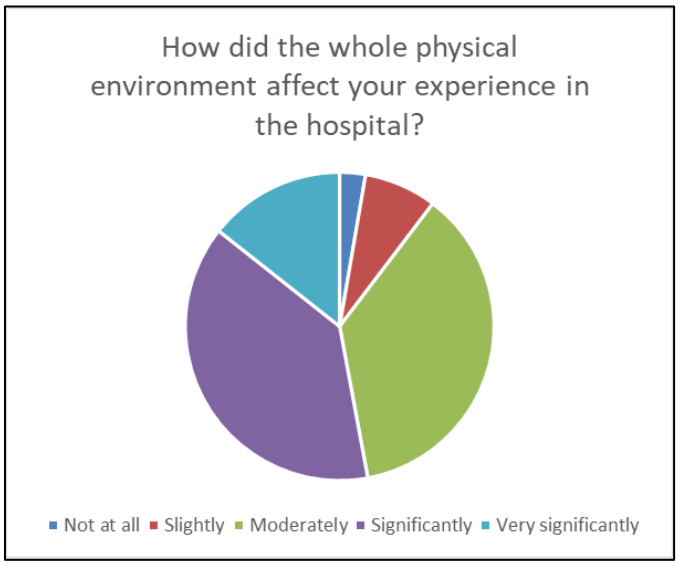

Figure 1 Whole physical environment rating

When asked whether they would feel more comfortable in a hospital designed with a focus on sensory comfort, the overwhelming majority responded positively: 132 individuals (59.2%) completely agreed, while an additional 79 respondents (35.4%) agreed with the statement. Responders who remained neutral represent a small portion of 7 respondents (3.1%), and only a negligible number disagreed (1 respondent, 0.4%) or completely disagreed (4 respondents, 1.8%). Such results indicate a very clear preference for hospital environments consciously designed to address well-being through sensory experiences (Figure 2).

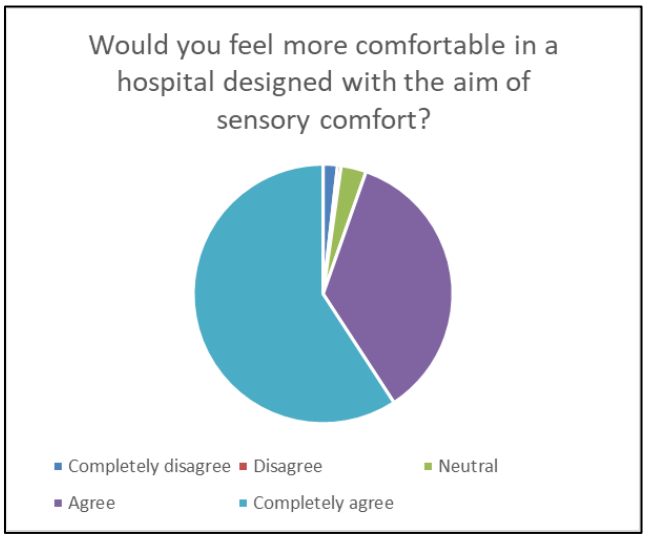

Figure 2 Opinion about sensory comfort

Although the main focus of the research was based on sensory elements, responses from the category of miscellaneous factors showed various social and environmental issues which highly influenced patients' perception of comfort in healthcare settings. When asked which features of the environment most negatively affected their experience, the two most frequently mentioned responses were staff behavior and overcrowding, where 22 participants mentioned overcrowding, referencing long wait times, a lack of spatial privacy, and congested hallways, and 16 individuals who expressed dissatisfaction with the behavior of medical staff. A smaller number noted poor hygiene conditions in shared facilities as a discomfort source.

A crucial information can be seen in the question where participants were asked to identify aspects of the environment which made them feel better, where 22 participants claimed that nothing had a positive impact on them. This finding points to a clear disconnect between architectural design and the real needs of patients. However, 21 participants mentioned that the staff contributed positively to their experience, when empathetic and attentive. Additionally, 6 respondents highlighted the importance of longer visitation periods, suggesting that the presence of loved ones plays an important role in the healing process.

In the section regarding suggestions, participants provided several insightful proposals which extend beyond standard sensory design. Among the most notable were the incorporation of interactive rooms aimed for creative expression or spending time with visitors, accessible outdoor spaces or balconies, customizable lighting, and temperature controls within patient rooms.

Table 1 Summary of General Sensory Experience in Hospital Environments (n=223)

Survey item	**Response Category**	**n**	**%**
Perceived impact on the overall hospital environment on experience	Low impact	23	10.3%
	Moderate impact	82	36.8%
	High impact	118	52.9%
Comfort in a hospital designed with sensory well-being in mind	Disagree	5	2.24%
	Neutral	7	3.14%
	Agree	211	94.6%

As seen in Table 1, the majority of respondents (52.9%) stated that the overall hospital environment had a high impact on their experience. Additionally, 94.6% believed that they would feel more comfortable in a hospital designed with sensory well-being in mind. These findings support the hypothesis that hospital environments perceived as sensory-supportive positively influence patients' overall experience and emotional comfort. The findings also highlight the necessity to design more sensory-oriented hospitals, with the aim of improving patient well-being.

Limitations

Despite careful planning, every research carries certain limitations. One of the limitations of this research is tied to the sample size, which is quite small and was not fully randomly selected. Such limitation can affect the general application of the results on a wider population. The majority of the responders were from Bosnia and Herzegovina, Serbia, and Croatia, meaning that the results are limited to one cultural or regional frame. Considering that different cultures and healthcare organizations have different values, there is a possibility that the conclusions of the research cannot be implemented on a global scale. Additionally, the survey was conducted online, excluding people who are not users of digital tools or social media. This is especially important considering that healthcare building users mainly consist of members of the older population. Furthermore, responses were given individually, which carries the risk of having subjective or unjust responses. The demographic analysis showed a concentration of younger participants, suggesting that the results could mainly reflect the preference of a younger demographic, rather than the broader population.

Regardless of all mentioned limitations, it is crucial to highlight that they were taken into consideration during all phases of the research process. Even with all mentioned limitations, this research still offers important insights in the relations between the design of hospitals, and the well-being of their users, and as such, can be employed as a foundation for further research about this topic.

5. Conclusion

Understanding the fragile conditions and complex experiences of patients in hospital settings, it is clear that architecture must not be understood purely as a physical framework for medical intervention anymore. Rather, it needs to be perceived as an active participant in the recovery process.

Key insights from the fields of medicine, psychology, and architecture gave insight into the relation between the recovery speed of patients and the quality of space. The survey, serving as the practical part, gave empirical basis for the understanding of real perceptions of the surroundings.

The results showed that the overall sensory experience in hospitals directly affect the well-being of patients. Furthermore, they showed that patients would feel more comfortable in healthcare environments that take into consideration the sensory experiences. Additionally, this research highlights the need for an interdisciplinary approach concerning the design of healthcare spaces. Architects, doctors, scientists, and even users need to become collaborators during the process of shaping spaces that are not just healing, but also supportive and intuitive. In this sense, the architect becomes one of the key agents implementing the process of care and healing.

In conclusion, in a time where healthcare systems face enormous challenges, it becomes clear that spatial quality can no longer be ignored. This research advocates for a turning point in the design of hospital spaces, where these challenges can be tackled through the incorporation of users into the design process with their needs and suggestions, research regarding the benefits of sensory design, as well as other disciplinary fields. In this way, hospitals can truly become spaces of healing, not just with the help of medical treatment, but also the design itself.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

Ethics represents a key role of every research, especially when it includes human participants. Respecting ethical standards is also a base that enables authentic and responsible research that puts human dignity in the focus of scientific research, not just a formality. In all phases of this research, including the distribution of the survey and the analysis of the results, ethical principles were present, with an approach based on privacy, anonymity, and the integrity of every participant.

The research is based on basic ethical principles found in the Helsinki declaration of the World Medicine Association (WMA), which defined ethical standards for medical research on humans, while also respecting autonomy, ensuring well-being of participants, and minimizing risk.

Statement of informed consent

The survey did not require any personal data, participation was clearly defined as voluntarily, and all participants gave consent. For an added measure of privacy protection, the research was designed to not include any disturbing or sensitive topics, and all data is stored with the principles of The General Data Protection Regulation (GDRP) and will not be shared with third parties.

References

[1] Cheng H, Hu Y, Reinhard M. Environmental and health impacts of artificial turf: a review. Environ Sci Technol. 2014;48(4):2114–29. doi:10.1021/es4044193.

[2] Jencks CH. The architecture of hope: Maggie's cancer caring centres. CiNii Research. 2010. Available from: https://cir.nii.ac.jp/crid/1130000796282520704.

[3] Shumaker SA, Reizenstein JE. Environmental factors affecting inpatient stress in acute care hospitals. In: Evans GW, editor. Environmental stress. Cambridge University Press; 1982. p. 179–223.

[4] Nuhanović E. Sensory experiences in healthcare architecture: a comprehensive literature review. World J Adv Eng Technol Sci. 2025;17(3):285–94. doi:10.30574/wjaets.2025.17.3.1558.

[5] Fromm E. The heart of man: its genius for good and evil. New York: Harper & Row Publishers; 1964. Available from: https://www.scirp.org/reference/referencespapers?referenceid=2321327.

[6] Yin J, Yuan J, Arfaei N, Catalano PJ, Allen JG, Spengler JD. Effects of biophilic indoor environment on stress and anxiety recovery: a between-subjects experiment in virtual reality. Environ Int. 2019;136:105427. doi:10.1016/j.envint.2019.105427.

[7] Sharam L, Mayer K, Baumann O. Design by nature: the influence of windows on cognitive performance and affect. J Environ Psychol. 2022;85:101923. doi:10.1016/j.jenvp.2022.101923.

[8] Ulrich RS. View through a window may influence recovery from surgery. Science. 1984;224(4647):420–1. doi:10.1126/science.6143402.