

# Impact of architectural design on mental health outcomes in psychiatric hospitals

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## ABSTRACT

The impact of hospital architecture on mental health outcomes in psychiatric care has gained increasing attention. This review examines vital architectural elements—natural light, biophilic design, and noise control—and their effects on patient well-being and recovery. Salutogenic designs, which focus on enhancing health and well-being, have reduced stress, improved mood, and supported cognitive function. Incorporating green spaces and natural materials can mitigate symptoms of depression and anxiety while enhancing the quality of care. Additionally, noise management and ergonomic workspace design improve the mental health of healthcare staff, reducing burnout and increasing efficiency. However, further research is required to understand the influence of less-studied design elements like geometric shapes and pareidolia. This review highlights the need for interdisciplinary collaboration between architects and healthcare professionals to optimize hospital designs that support recovery and well-being in psychiatric settings.

**Keywords:** Biophilic design, hospital architecture, mental health, natural light, noise control, psychiatric care.

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## INTRODUCTION

Mental health outcomes are strongly influenced by the environments individuals inhabit, especially in hospital settings where patients and staff spend considerable time. The role of architecture in healthcare, particularly psychiatric care, has evolved significantly over time. Early studies on the effects of hospital environments focused primarily on negative aspects, such as lighting, noise, and air quality, which contribute to stress and fatigue in patients and staff.<sup>1</sup> However, recent research has shifted towards exploring how salutogenic designs—those that promote health and well-being—can create environments conducive to mental health recovery.<sup>2</sup>

Understanding the relationship between hospital architecture and mental health outcomes is critical, especially in psychiatric care, where the built environment can either hinder or enhance recovery.<sup>3</sup> Elements such as natural light, biophilic design, noise control, and spatial arrangements have been shown to improve the mental well-being of patients, support staff efficiency, and contribute to overall hospital effectiveness.<sup>4</sup> While these design features benefit patients, staff well-being is equally essential in creating a healing environment. This review systematically examines these architectural elements and their proven impacts on mental health while identifying areas where further research is necessary to optimize hospital designs for psychiatric care.

## Need for the review

There is a substantial body of empirical research documenting

the influence of architectural features on mental health. However, significant gaps still need to be filled in understanding how different design elements impact psychological and physiological outcomes. While certain features like natural light, noise control, and access to nature are widely recognized as beneficial,<sup>5</sup> other design elements, such as geometric shapes, object affordances, and the effects of pareidolia remain speculative and lack empirical validation.<sup>6</sup>

The evidence indicates a valuable classification of architectural stimuli that affect human psychology and physiology. It emphasizes the need for more rigorous research to validate current claims, highlighting gaps in the field and encouraging further exploration. The focus on architectural elements with biological and evolutionary foundations ensures relevance across diverse cultural and individual experiences. By synthesizing insights from existing studies, this review enhances our understanding of how architectural design can influence mental health outcomes, particularly in psychiatric environments and underscores key directions for future research.<sup>7,8</sup>

### **Salutogenic architecture in psychiatric care**

Salutogenic architecture creates built environments that promote health and well-being by enhancing people's physical, mental and emotional resilience. It emphasizes positive, supportive design elements that reduce stress and encourage healing, particularly by fostering a sense of coherence, safety, and comfort. In psychiatric care, this approach aims to create spaces that support recovery and mental health through thoughtful architectural design. Research shows that indoor environmental quality (IEQ), including air quality, lighting, and noise levels, plays a significant role in shaping mental health outcomes.<sup>9</sup> Natural light has been shown to reduce stress and improve mood and concentration levels in patients and staff.<sup>10</sup>

Incorporating biophilic design—where nature is brought into the built environment—can mitigate adverse mental health outcomes such as depression, anxiety, and burnout. A study has shown that incorporating features such as natural materials, plants and water elements can help create a calming atmosphere, which is particularly beneficial in psychiatric settings where patients may experience elevated stress or anxiety.<sup>11</sup> Research emphasizes the importance of natural lighting and daylighting in psychiatric hospitals, suggesting that these design elements can enhance patient focus and reduce fatigue.<sup>12</sup> Similarly, studies on neuro-architecture explore how design elements such as curves and natural forms influence brain activity, showing that

these features can engage the brain and promote mental well-being.<sup>13</sup>

While natural lighting and biophilic design are well-established contributors to mental health, noise control is another critical factor. High hospital noise levels have been linked to increased stress and lower patient satisfaction. Therefore, designing psychiatric facilities with adequate soundproofing and noise management systems is essential to creating a calm and healing environment.<sup>14</sup>

### **Environmental risk factors in built environments**

The built environment's influence on mental health extends beyond the hospital's physical structure, including environmental risk factors such as noise pollution, poor air quality, and lack of green spaces. These factors can negatively affect mental health outcomes, particularly in psychiatric patients who are often more sensitive to environmental stressors. Evidence indicates that examining the relationship between environmental risk factors and mental health in a Chinese hospital, using clinical data and an outpatient survey, revealed that environmental degradation and the absence of green spaces significantly increase the risk of mental health issues, including anxiety and depression.<sup>15</sup>

Green spaces are essential for physical and mental well-being, and their integration into hospital design has become critical. Patients with access to green areas or views of nature generally report better recovery outcomes and reduced stress levels. A study explored the principles of Maharishi Vastu architecture, a holistic design approach that incorporates green spaces, natural light, and building orientation to promote health. This approach, rooted in traditional Vastu principles, has enhanced mental well-being by aligning building design with natural elements, emphasizing the importance of environmental integration in hospital architecture.<sup>16</sup>

### **Office design and mental health**

In addition to patient well-being, the mental health of healthcare workers is directly influenced by the design of their work environments. Studies have examined the relationship between workspace design and employee mental health indicators such as burnout, stress, and anxiety.<sup>17</sup> Features like natural light, ergonomic furniture, temperature control, and well-organized office layouts are associated with better mental health outcomes for employees, including reduced stress and improved overall well-being.<sup>18</sup>

Workplace design in healthcare facilities, especially

psychiatric hospitals, must prioritize the mental health of staff. High levels of stress and burnout among healthcare workers can negatively impact patient care. However, by creating workspaces that offer natural light, good ventilation, and private areas for rest and recuperation, it is possible to improve both patient and staff well-being. This improvement can lead to enhanced patient care and staff satisfaction, offering a promising outlook for the future of healthcare.

### **Healing architecture in pediatric and psychiatric facilities**

Healing architecture, which emphasizes the creation of spaces that promote recovery and well-being, is fundamental in pediatric and psychiatric facilities. In pediatric healthcare, design elements such as natural light, access to nature, and reduced noise levels are critical for creating a healing environment that supports physical and mental recovery. Several architectural features have been identified as positively influencing children's health outcomes, including the use of natural materials, soft lighting, and the integration of art and music into the hospital environment.<sup>19</sup>

Healing architecture is equally important in psychiatric settings. The role of green spaces in psychiatric hospitals has been shown to be significant, with patients who have access to outdoor areas or views of nature experiencing reduced stress and improved recovery outcomes.<sup>20</sup> Incorporating biophilic design elements, such as natural light and greenery, has been shown to reduce anxiety and depression in psychiatric patients, contributing to a more positive hospital experience.<sup>21</sup>

Design features such as single-bed rooms, which provide patients with greater privacy and control over their environment, have been shown to reduce stress and promote recovery in psychiatric hospitals. However, concerns have been raised about the potential drawbacks of single-bed rooms, particularly in forensic psychiatric settings, where patient supervision and safety are critical. It is essential to balance patient privacy with security needs in these facilities, ensuring that the design promotes patient safety and mental health recovery.<sup>22</sup>

### **Design challenges in forensic psychiatric facilities**

Forensic psychiatric facilities face unique challenges in designing secure and therapeutic spaces. These facilities must accommodate patients who require high levels of supervision while also providing an environment that supports mental health recovery. Design elements such

as outdoor spaces, private rooms, and communal areas play a crucial role in significantly improving mental health outcomes in these settings.<sup>23</sup>

At the same time, forensic facilities must incorporate security measures to ensure the safety of both patients and staff. Design features such as secure entry and exit points, high visibility for staff, and controlled access to certain areas are essential for maintaining safety in these settings. A study on the use of seclusion in psychiatric wards found that certain design elements, such as outdoor spaces and private rooms, were associated with lower seclusion rates. These findings highlight the importance of thoughtful architectural design in promoting mental health recovery while ensuring safety in forensic psychiatric facilities.<sup>24</sup>

### **Post-occupancy evaluations in psychiatric facilities**

Post-occupancy evaluations (POEs) are a critical tool for assessing the effectiveness of architectural designs in psychiatric facilities. POEs offer valuable insights into how well a hospital's design meets the needs of both patients and staff, and they can help identify areas where improvements are necessary. A POE conducted in a mental healthcare facility focused on staff perceptions of design innovations such as open communication centers and vibrant color schemes.<sup>10</sup> While the innovations were generally well-received, staff expressed concerns about the impact of open communication centers on patient supervision, highlighting the need to consider both patient and staff needs in hospital design carefully.<sup>25</sup>

Similarly, the Ward Atmosphere Scale (WAS) was used in a study to evaluate the impact of new psychiatric facility designs on the therapeutic environment. The study found that design improvements such as better lighting, noise reduction, and improved spatial organization enhanced both patient and staff experiences. However, it also revealed that some design features, like increased staff control, were perceived differently by patients and staff, highlighting the need for more nuanced design strategies that take into account the perspectives of both groups in psychiatric facility design.<sup>26</sup>

### **Staff well-being in psychiatric facilities**

While much of the research on hospital architecture focuses on patient outcomes, the well-being of healthcare workers is equally important. High levels of stress and burnout among healthcare staff can negatively affect patient care, highlighting the need for work environments that support mental health. A study found that well-designed healthcare environments, incorporating features such as natural light,

ergonomic furniture, and noise control, can significantly reduce burnout and improve job satisfaction among staff.<sup>11,27</sup>

Design innovations such as wayfinding strategies and open communication centers have been found to improve staff interactions and job satisfaction in psychiatric facilities. These findings highlight the importance of creating healthcare environments that not only support patient care but also prioritize staff well-being, as both are essential for the overall success of a healthcare facility.<sup>10</sup>

## CONCLUSIONS

Hospital architecture, particularly in psychiatric care settings, is a crucial factor in shaping mental health outcomes for patients and staff. The integration of biophilic design elements, such as natural light, green spaces, and natural materials, has shown promise in reducing stress, anxiety, and depression. However, the potential of these design features can only be fully realized through more empirical research. This research is essential to understand how to optimize these design features to meet the specific needs of different patient populations, such as pediatric and forensic psychiatric patients.

Interdisciplinary collaboration between architects, clinicians, and researchers is essential for developing evidence-based design strategies that enhance mental health outcomes in psychiatric care facilities. Future research should identify the most effective design elements for promoting mental well-being and improving the hospital experience for patients and staff.

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## AUTHORS' CONTRIBUTIONS

KBT and RK contributed to the primary concept of the study, conducted the literature search, and prepared the first draft of the manuscript. GSC, MK, and KK meticulously handled the writing of the manuscript scientifically, critiqued the subject content, edited the language, and addressed plagiarism issues. All authors read and approved the manuscript.

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