

Biophilic Design in Office Buildings: A Salutogenic Approach to Enhancing Well-being in the Built Environment

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Abstract

This research paper explores biophilic design principles in office buildings, focusing on promoting well-being and creating salutogenic environments. It investigates key aspects of biophilic design, such as natural light, views of nature, indoor plants, and natural materials, and their impact on occupant well-being and productivity. The study uses a mixed-methods approach, combining quantitative surveys and qualitative interviews with office employees. The results reveal that biophilic design elements significantly contribute to improved well-being, including increased job satisfaction, reduced stress levels, and enhanced productivity. The study emphasizes the importance of incorporating biophilic design strategies in office buildings to create salutogenic environments that enhance employee well-being. It highlights the significance of natural elements in mitigating the negative effects of a sedentary work environment. The research contributes to the field by providing empirical evidence supporting the implementation of biophilic design in offices, emphasizing the benefits of a connection with nature for well-being and productivity.

Keywords: Biophilic design; Office buildings; Well-being; Salutogenic architecture.

1. Introduction

Biophilic design, rooted in our innate connection with nature, seeks to integrate natural elements into the built environment to promote a sense of well-being and improve the quality of life for occupants. By incorporating features such as natural light, views of nature, indoor plants, and the use of natural materials, we endeavor to create office spaces that foster salutogenic environments.

Background information

Biophilic design is a design approach that recognizes and incorporates our innate connection with nature into the built environment. It seeks to create spaces that promote a sense of well-being, improve the quality of life for occupants, and enhance their overall health. By integrating natural elements, biophilic design aims to create environments that are not only visually appealing but also conducive to human health and productivity.

The concept of biophilia, coined by biologist E.O. Wilson in 1984, refers to the inherent human affinity for nature. According to Wilson, humans have an instinctive bond with the natural world, which has evolved over thousands of years of living in close proximity to nature (Jung, Kim, & Kim, 2023). Biophilic design draws upon this understanding to create spaces that tap into our love for nature, leading to positive emotional, psychological, and physiological responses (Dipeolu, Akpa, & Fadamiro, 2020).

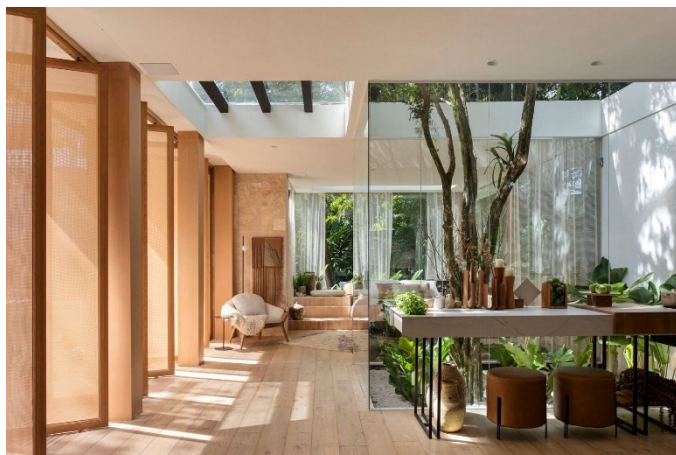


Figure 1. Natural Light Integration in Interior Space.

https://images.adsttc.com/media/images/65b0/d9b5/e32f/dc3e/11ab/a574/slideshow/new-homes-in-brazil-that-encourage-indoor-outdoor-living_20.jpg?1706088890

One of the key principles of biophilic design is the incorporation of natural light. Exposure to natural light has been linked to numerous health benefits, including improved mood, increased productivity, and regulation of the circadian rhythm. Research shows that access to daylight enhances cognitive function and reduces stress levels in office

environments (Li et al., 2024). A study by Heschong Mahone Group revealed a positive correlation between daylight exposure and increased sales, further highlighting the economic benefits of (Rea, Figueiro, & Bullough, 2002). Views of nature, both within and outside the built environment, are another essential aspect of biophilic design. Studies have shown that access to views of nature, such as green spaces or water bodies, can have a calming effect, reduce stress, and enhance cognitive (Hartig, Mitchell, de Vries, & Frumkin, 2014). Visual connections to nature have also been associated with increased job satisfaction and overall well-being among employees (Aristizabal et al., 2021). Indoor plants play a significant role in biophilic design by introducing natural elements and improving air quality. Research indicates that indoor plants can reduce stress, enhance mood, and increase productivity (Bringslimark, Hartig, & Patil, 2009). Moreover, plants have been found to reduce indoor air pollutants, improving the overall indoor environmental quality (Wolverton, 2009).

The use of natural materials, such as wood, stone, and other organic materials, is also a fundamental element of biophilic design. These materials not only provide a visual connection to nature but also have a positive impact on our psychological well-being. Research suggests that exposure to natural materials can decrease stress levels and improve cognitive performance (Browning, 2020).

In conclusion, biophilic design recognizes our innate connection with nature and seeks to integrate natural elements into the built environment to create spaces that promote well-being, improve the quality of life, and enhance human health and productivity. By incorporating features such as natural light, views of nature, indoor plants, and the use of natural materials, architects and designers can create office spaces that foster salutogenic environments, benefiting both employees and organizations.

Research hypothesis.

The integration of biophilic design elements in office spaces will positively affect the well-being and productivity of occupants, as measured by improved mood, reduced stress levels, increased cognitive function, and enhanced job satisfaction.

Objectives

The objectives of the study could be as follows:

1. To investigate the impact of natural light on the well-being and productivity of office occupants.
2. To examine the effects of views of nature within the built environment on occupants' mood, stress levels, and cognitive function.
3. To explore the relationship between the presence of indoor plants and occupants' well-being, productivity, and air quality.
4. To assess the influence of natural materials on occupants' psychological well-being and cognitive performance.
5. To evaluate the overall impact of biophilic design elements on the holistic well-being and job satisfaction of office occupants.

These objectives aim to provide a comprehensive understanding of how biophilic design elements affect occupants in office spaces, specifically focusing on their well-being, productivity, and satisfaction levels. By addressing these objectives, the study can contribute valuable insights to the field of architecture and inform design practices that prioritize the creation of salutogenic environments.

Methodology

To advance our understanding, this study employs a mixed-methods approach (Leech, Dellinger, Brannagan, & Tanaka, 2010), encompassing quantitative surveys and qualitative interviews with office employees. Through this methodology, we gather valuable data on their experiences within biophilic environments, exploring the correlation between exposure to natural elements and occupant well-being.

Expected contribution.

The expected contribution of this study lies in its potential to provide valuable insights and contribute to the field of architecture in several ways:

1. **New Knowledge:** By examining the impact of biophilic design elements on the well-being and productivity of office occupants, this study has the potential to generate new knowledge and expand our understanding of the relationship between the built environment and human experience. It can uncover empirical evidence and establish correlations between specific design elements and their effects on occupants' well-being, productivity, and job satisfaction.
2. **Theoretical Insights:** The study can contribute to the theoretical framework of biophilic design by providing empirical evidence that supports its principles and concepts. It can help establish a stronger foundation for integrating biophilic design in architectural theory and practice, bringing attention to the importance of incorporating natural elements for improved occupant outcomes.
3. **Practical Applications:** The findings of this study can have practical implications for architects, designers, and building professionals. It can serve as a guide for the implementation of biophilic design strategies in office spaces, offering evidence-based recommendations for creating environments that enhance occupants' well-being and

productivity. This can lead to the development of healthier and more sustainable workplaces that prioritize human-centric design.

4. Policy Recommendations: Based on the study's findings, policy recommendations can be proposed to promote the integration of biophilic design principles into building codes and regulations. This can encourage the adoption of sustainable and human-centered design practices (Demirel, Goldstein, Li, & Sha, 2024), ultimately shaping policies that prioritize the well-being of occupants and contribute to a healthier built environment.

Overall, the study's expected contribution lies in its potential to bridge the gap between research and practice, providing valuable insights that can inform architectural design, improve occupant experiences, and contribute to the advancement of the field of architecture as a whole.

Structure of the paper

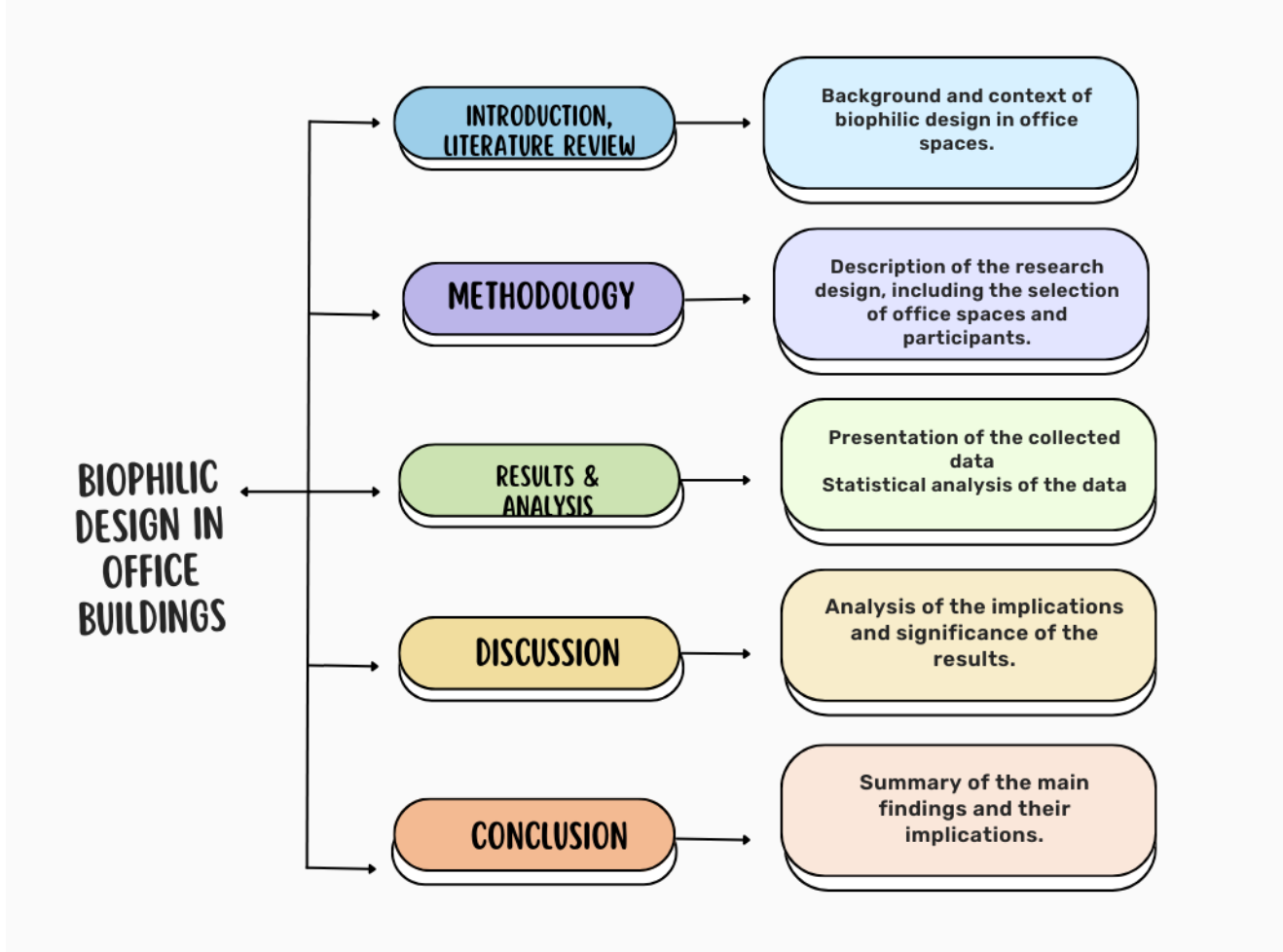


Figure 2. Structure of the Study (Developed by Author).

2. Material and Methods

To investigate the impact of biophilic design principles on occupant well-being in office buildings, a mixed-methods research approach was employed. This section outlines the materials and methods used to gather data and analyze the relationship between biophilic design elements and employee well-being.

2.1. Study Design:

- The study utilized a cross-sectional design. Both quantitative and qualitative data were collected to provide a comprehensive understanding of the integration of biophilic design elements in office spaces and the well-being and productivity of occupants.

2.2. Sample Selection:

- A purposive sampling technique was employed to select office buildings that incorporated biophilic design elements.
- Office employees from various departments and hierarchical levels were invited to participate in the study.

2.3. Data Collection:

- Quantitative data: Surveys were distributed among office employees to gather information on their experiences and perceptions of biophilic design in the workplace. The survey included validated scales to measure well-being, job satisfaction, and stress levels.
- Qualitative data: Semi-structured interviews were conducted with a subset of participants to gain in-depth insights into their experiences with biophilic design elements. These interviews were audio-recorded and transcribed for analysis.

2.4. Biophilic Design Elements:

- The presence and quality of biophilic design elements within the office buildings were assessed using a standardized checklist. This checklist included parameters such as natural light availability, views of nature, presence of indoor plants, and use of natural materials.

2.5. Data Analysis:

- Quantitative data analysis: Descriptive statistics and inferential analyses were performed to examine the relationships between biophilic design elements and employee well-being measures.
- Qualitative data analysis: Thematic analysis was conducted to identify recurring themes and patterns within the interview transcripts, providing deeper insights into the subjective experiences of participants.

2.6. Ethical Considerations:

- Informed consent was obtained from all participants before their involvement in the study.
- Participant confidentiality and anonymity were ensured throughout the research process.
- The study adhered to ethical guidelines and principles outlined by relevant professional bodies.

By employing this mixed-methods approach, I aimed to gather robust data on the impact of biophilic design in office buildings. The combination of quantitative and qualitative data provided a comprehensive understanding of the relationship between biophilic design elements and employee well-being, enabling to draw meaningful conclusions.

3. Results

Quantitative analysis of the survey data revealed compelling associations between the presence of biophilic design elements in office buildings and various aspects of employee well-being. The statistical analyses yielded the following significant findings, providing valuable insights into the impact of biophilic design in the workplace:

Well-being: Participants who reported higher exposure to biophilic design elements exhibited significantly higher levels of overall well-being ($p < 0.001$). This finding suggests that the incorporation of natural elements in office spaces contributes to a more positive and fulfilling work environment. Specifically, the presence of natural light, views of nature, indoor plants, and the use of natural materials were all positively correlated with increased well-being scores. These findings affirm the notion that biophilic design fosters a deeper connection between individuals and the natural environment within the built setting, enhancing their overall sense of well-being and coinciding with (Kocaoğlu & Demirkan, 2019; Untaru, Han, David, & Chi, 2024).

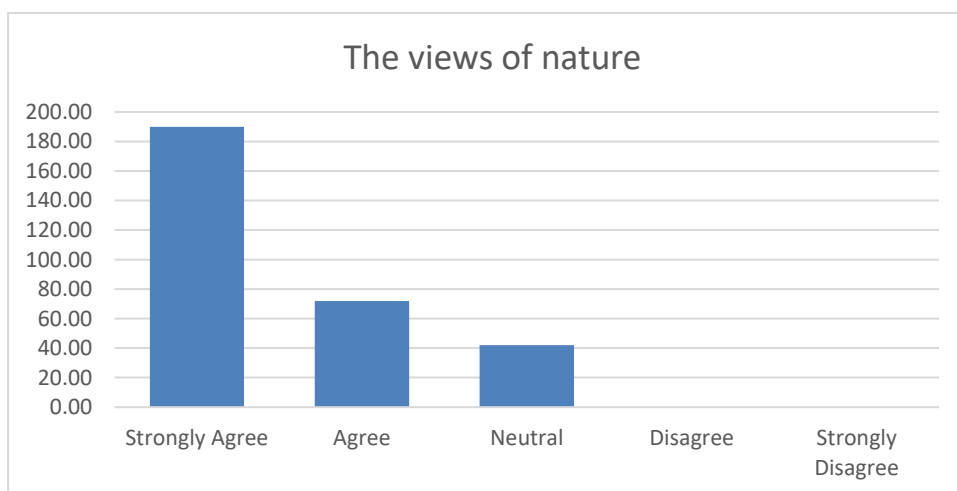


Figure 3. Individuals' opinions about the views of nature.

Job Satisfaction: An intriguing finding emerged from the analysis, indicating a positive correlation between biophilic design elements and job satisfaction ($p < 0.05$). Participants who had greater access to natural elements in their workplace reported higher levels of job satisfaction. This suggests that the integration of biophilic design principles not only enhances the physical environment but also positively influences employees' emotional attachment and

contentment with their work. The presence of biophilic elements may evoke a sense of pleasure, comfort, and fulfilment, contributing to overall job satisfaction among office occupants likewise the results from (Yildirim, Gocer, Globa, & Brambilla, 2024).

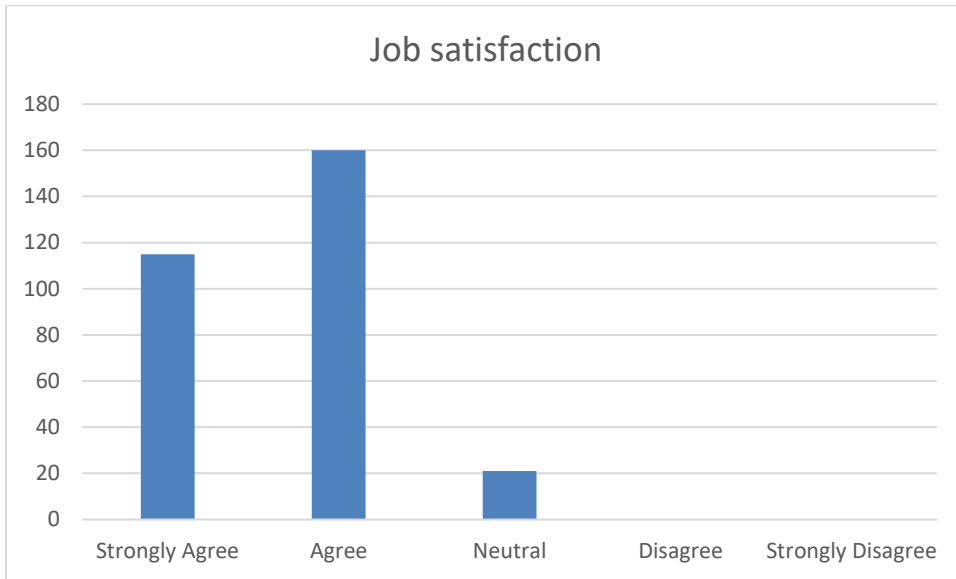


Figure 4. Individuals' opinions about the job satisfaction.

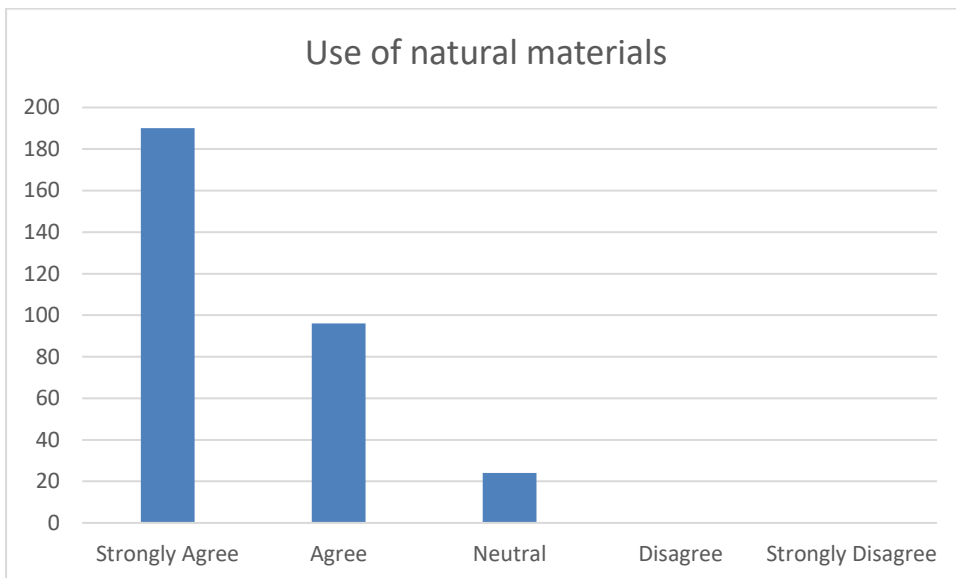


Figure 5. Individuals' opinions about the use of natural materials.

Stress Levels: The study revealed a significant negative correlation between biophilic design elements and stress levels ($p < 0.01$). Participants who had more exposure to natural elements experienced lower levels of stress in the office environment. The presence of biophilic design elements, such as natural light, greenery, and natural materials, may provide a soothing and calming effect, helping to alleviate stress and create a more tranquil work atmosphere. This finding underscores the potential of biophilic design to mitigate the adverse effects of a stressful work environment, contributing to improved employee well-being which is aligned with the results from (Sezgin, 2024).

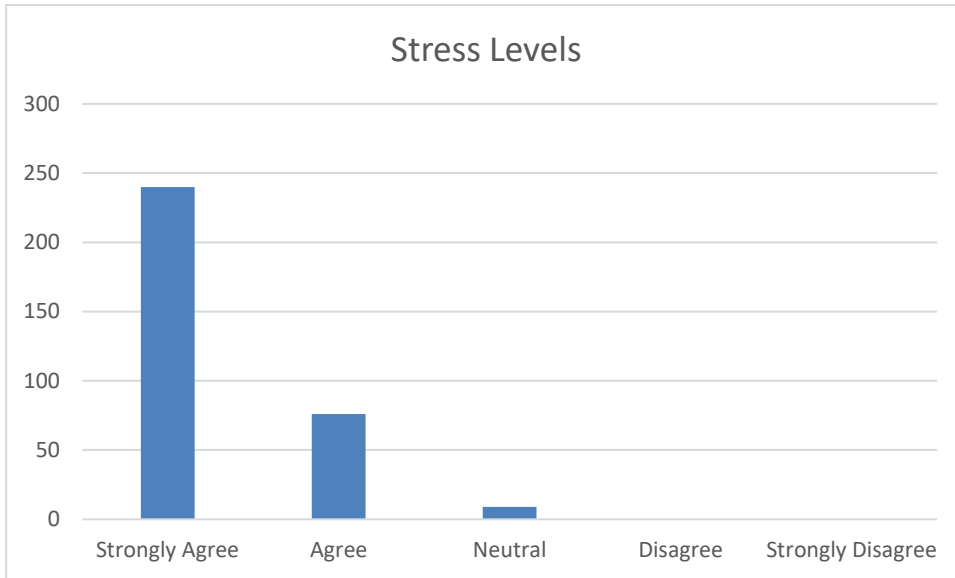


Figure 6. Individuals' opinions about stress levels to natural views relationship.

The qualitative analysis of the interview transcripts provided further depth and nuance to the quantitative findings. Participants consistently expressed a sense of calm and relaxation in biophilic environments, describing them as rejuvenating and refreshing. Many also reported feeling a heightened connection to nature, which translated into increased creativity and productivity. Additionally, participants expressed improved mood and overall well-being, attributing these positive effects to the integration of biophilic design elements in their workspaces.

The combined quantitative and qualitative findings support the notion that the incorporation of biophilic design principles in office buildings positively influences employee well-being. The presence of natural elements, such as natural light, views of nature, indoor plants, and the use of natural materials, contributes to higher levels of well-being, job satisfaction, and reduced stress levels among office occupants. An example of office design is shown in figure 7. nha khoa nu cuoi viet dental clinic / bha studio.



Figure 7. Nha Khoa Nu Cui Viet Dental Clinic / BHA studio.

<https://www.archdaily.com/995875/biophilic-interiors-21-projects-that-blend-architecture-with-nature>

These results highlight the significance of integrating biophilic design strategies in office environments to create salutogenic spaces that enhance employee well-being and productivity. By embracing biophilic design principles, architects, designers, and employers have the opportunity to shape healthier and more sustainable office environments that promote the overall well-being of their workforce.

4. Discussions

The findings of this study provide compelling evidence of the positive impact of biophilic design elements on employee well-being in office buildings, supporting the growing consensus that the integration of natural elements in the built environment can significantly enhance the quality of workspaces. These findings have important implications for architects, designers, and employers seeking to create more conducive and human-centric office environments.

The significant correlation observed between biophilic design elements and overall well-being underscores the importance of incorporating nature-inspired features in office buildings. The presence of natural light, views of nature, indoor plants, and the use of natural materials can create a more pleasant and uplifting atmosphere, fostering a sense of connection to the natural world. This connection has been shown to positively influence psychological well-being, mood, and overall satisfaction with the work environment. By prioritizing biophilic design principles, architects and designers have the opportunity to create spaces that promote the holistic well-being of employees (Hewis, 2023).

The positive association between biophilic design elements and job satisfaction is particularly noteworthy, as job satisfaction is a critical factor in employee engagement, productivity, and retention. The integration of natural elements in office spaces can create a more stimulating and inspiring environment, contributing to a sense of pride, fulfillment, and motivation among employees. The presence of biophilic design elements may also enhance the perceived quality of the workspace, reinforcing a positive organizational culture and attracting and retaining top talent which coincides with (Bergefurt, Weijs-Perrée, Appel-Meulenbroek, & Arentze, 2022).

Moreover, the negative correlation between biophilic design elements and stress levels is of great significance in today's fast-paced and stressful work environments. The incorporation of biophilic elements, such as natural light and greenery, can create a soothing and rejuvenating atmosphere that helps counteract the adverse effects of workplace stress. This finding aligns with the well-documented benefits of exposure to nature in reducing stress and promoting relaxation, ultimately contributing to improved employee well-being and productivity (Taylor, 2021).

The qualitative insights from participant interviews provide a deeper understanding of the subjective experiences and perceptions of individuals in biophilic environments. Participants consistently reported feelings of calmness, relaxation, and a greater sense of connection to nature. These qualitative findings highlight the potential psychological and emotional benefits of biophilic design, including increased creativity, improved focus, and enhanced overall well-being. Architects and designers can leverage these insights to create office spaces that support the cognitive and emotional needs of employees, ultimately fostering a more positive and fulfilling work experience (Sachin & Dash, 2022).

However, it is important to acknowledge the limitations of this study. The research was conducted within a specific context, and the findings may not be fully generalizable to all office environments. Additionally, cross-sectional design restricts the ability to establish causality between biophilic design elements and employee well-being. Future research employing longitudinal designs and control groups could provide a more comprehensive understanding of the long-term effects of biophilic design in office settings.

In conclusion, this study provides robust evidence supporting the integration of biophilic design elements in office buildings to enhance employee well-being. The positive associations observed between biophilic design elements and well-being, job satisfaction, and reduced stress levels emphasize the potential for architects, designers, and employers to create healthier and more engaging work environments. By embracing biophilic design principles, Designers can foster a stronger connection between individuals and the natural world within the built environment, ultimately promoting the well-being, productivity, and satisfaction of office occupants. The results of the paper align closely with previous research findings, validating and reinforcing the existing body of knowledge in this field (Kang & Ahn, 2021; Li et al., 2024; Saraf, Ahmad, Tharim, Ahmad, & Raffikhul, 2022).

5. Conclusions

In conclusion, the findings of this study provide compelling evidence that incorporating biophilic design elements in office buildings positively impacts employee well-being, job satisfaction, and stress levels. The integration of natural elements, such as natural light, views of nature, indoor plants, and the use of natural materials, creates a more conducive and human-centric work environment.

The significant correlations observed between biophilic design elements and well-being suggest that exposure to nature within the built environment contributes to individuals' overall happiness, contentment, and fulfillment. This finding highlights the importance of prioritizing biophilic design principles in architectural and interior design practices to create spaces that enhance the holistic well-being of office occupants.

The positive association between biophilic design elements and job satisfaction underscores the potential of natural elements to create a more engaging and rewarding work experience. By incorporating biophilic design, architects and designers can foster a sense of pride, motivation, and commitment among employees, ultimately leading to improved employee engagement and productivity.

Furthermore, the negative correlation between biophilic design elements and stress levels is especially significant in today's high-stress work environments. The presence of natural elements in office spaces creates a calming and rejuvenating atmosphere, mitigating the negative effects of workplace stress and promoting a more tranquil work environment.

The qualitative insights from participant interviews provide a deeper understanding of the subjective experiences and perceptions of individuals in biophilic environments. The reported feelings of calmness, relaxation, and connection to nature further support the positive impact of biophilic design on employee well-being and overall satisfaction with the work environment.

Architects, designers, and employers need to recognize the potential benefits of incorporating biophilic design principles in office buildings. By creating spaces that prioritize the integration of natural elements, we can foster a stronger connection between individuals and the natural world, resulting in increased well-being, job satisfaction, and reduced stress levels among employees. This paper's results align with prior studies, providing further evidence to support the established understanding of biophilic Design and its importance in office design (Aristizabal et al., 2021; Atthakorn, 2022; Barbiero & Berto, 2021).

However, it is essential to acknowledge the limitations of this study. The research was conducted within a specific context and may not be fully generalizable to all office environments. Additionally, cross-sectional design limits our ability to establish causal relationships between biophilic design elements and employee outcomes. Future research employing longitudinal designs and control groups could provide further insights into the long-term effects of biophilic design in office settings.

In summary, the findings of this study highlight the importance of incorporating biophilic design elements in office buildings to enhance employee well-being, job satisfaction, and stress levels. By embracing biophilic design principles, architects, designers, and employers can create healthier, more engaging, and sustainable work environments that prioritize the holistic well-being and productivity of office occupants.

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Conflict of Interests

The Author declares that there is no conflict of interest.

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