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IMPACT OF BIOPHILIC DESIGN STRATEGIES ON WELLBEING: A REVIEW.

OMAGA ANGELA ELE-OJO; & LATEEF ADEMOLA LAWAL[1]
Department of Architecture, Federal University of Technology Minna, Nigeria.

Abstract:
Increasing urbanization and technological development continue to have impact on people's connection to nature and access to greenery and open spaces. Emerging from these concerns is a new set of design principles and practices where nature seems to play significant role, especially in the built environments. "Biophilic architecture." is a design approach that suggests that humans have an innate connection with nature and could assist to create healthy living and work space for human's comfort and wellbeing. A significant amount of literature in environmental psychology field provides empirical evidence that nature benefits humans, and that landscape and built environments can be designed to link humans and nature. The paper is aimed at providing a narrative review on biophilic design and human health outcomes. The initial review found that elements such as natural daylight, ventilation, and living architecture (green roofs and walls) which are integrated on or within a building envelope could be useful in creating well designed buildings capable of improving users' health and well-being. To achieve the status of a restorative-built environment, the study suggests that architects and designers need to shift focus on the value and the use of natural elements such as forest-like landscapes, natural water features, and natural light in their designs.

Keywords: biophilia, biophilic design, healing environment, nature, wellbeing.

INTRODUCTION

Biophilic design aims to satisfy people's demand for a naturally built world. The biophilic design extends the principle of biophilia by recognising that species on the earth's surface have been in existence in reaction to the natural environment rather than artificial causes (Söderlund and Newman, 2015). Humans are part of

the ecosystem and their emotions are closely connected to nature. Research suggests that humans prefer savanna-like landscapes thus leading to positive attitudes and immersing themselves in nature (Orians and Heerwagen, 1992) The pervasive practice of putting people in artificial environments such as hospitals, office buildings, schools, and shopping complexes with absence of nature and stimuli is evidence of the contemporary view that humans may be moving away from nature. Much of today's constructed environments lack natural materials, air, natural light, plants, environmental patterns, forms, or any other developed affinities for nature (Chen, 2017). As a result, these ecologically deficient homes promote weariness, illness symptoms, and poor performance (Chen, 2017).

Biophilic design features could be vital to connect with nature in contemporary buildings and cities. Biophilic design aims to promote human health and well-being, by satisfying human's inherent needs for nature. Numerous studies on biophilic design has shown the benefits of connection with nature on human health, individually and collectively as well as having significant influences on human interactions.

This current review is focused on the following questions: What is a biophilic design, and what is the relationship between biophilic design and health outcomes? The review evaluates both the empirical and evidence-based studies and describes the critical roles of biophilic environments and human health outcomes and wellbeing.

LITERATURE REVIEW

Biophilia and Biophilic design

The prefix "bio" refers to "relating to or using living things" and the term "philia" can be described as "a love or attract to something" (Pearson Longman, 2009). In the 1960s, Erich Fromm coined the word biophilia, which is defined as a human's emotional reaction and tendency toward something alive (Joye, 2007; Totaforti, 2018). On the other hand, biophilia was described by Edward in his book titled "Biophilia" as the tendency of humans to have close relationships and associate with natural structures and processes (Kellert et al., 2008). The concept of biophilic can literally be interpreted as a human's tendency to fall in love with natural life.

Edward Wilson (1984), human affiliation with nature had caused dramatic change in contemporary culture. Thus, biophilia's approach has been introduced in human daily life, including the architecture field. Over the last decade, the

biophilic has started to evolve and incorporate natural environments and components to encourage physical, social, intellectual, and psychological well-being. Biophilic design is a creative idea by combining nature, life and architectural work to fit a balance between humans and the environment (Al-Musaed, 2011). In addition, biophilic design can be described as a sustainable approach that integrates the natural elements into the contemporary building design (Hady, 2021). Natural systems rich with sensory variety such as patterns, textures, light, and colors can shape human behaviors. Hence, close connection between nature and humans will affect the emotions and psychology that are important in human wellbeing (Kellert et al., 2008).

Based on several findings by Kellert (2005), he explained that close interaction with nature has been shown to improve rehabilitation for the patients. In the workplace natural lighting, ventilation, and other natural features help to enhance worker efficiency, minimize tension, and increase motivation. Additionally, nature interaction has been related to improvement of cognitive functioning because the human brain functionally responds to visual patterns emitted by the natural elements. Biophilic design, also associated with nature, aims to provide basic living necessities and a healthy environment for humans by promoting human physical, health, emotional, intellectual, fitness, and well-being (Kellert, 2018).

Applying biophilic design strategies/elements in design could enhance an optimal environment for humans since it is associated with physical, behavioral, and social factors, thus promoting a healthy positive human-nature relationship. In short, the biophilic design approach, as a significant ideal building designs for humans establishes a critical point enhancing and fostering sustainable indoor habitats and ecosystems.

Biophilic design strategies

Several design techniques can be used in order to implement a biophilic design approach into a building design. The most famous theory of biophilic design application is from Kellert (2018), where he highlighted three essential elements and twenty-five related attributes of biophilic design. Kellert (2018) in his book explained the basic biophilic design application is divided into three types of nature interactions which (1) direct experiences with nature, (2) indirect experiences with nature and (3) experiences with space and place.

Direct experience of nature refers to direct interaction with environmental elements in the built environment, such as natural light, air, plants, water and

other natural elements. Meanwhile, relation with the symbolic nature or reference to specific patterns and processes typical of the natural world are the examples of indirect experiences of nature. Then, the experience of space and location can be explained as a physical environment that is equipped with characteristics that help to improve human health and well-being. Under these three experience groups, 23 biophilic design attributes have been listed in Table 2.1 (Kellert, 2018).

Table 1 Experience and attributes of biophilic design (Adapted from Kellert, 2018).

Direct Experience of Nature	• Light • Air • Water • Plants • Weather • Natural landscape and ecosystem • Fire
Indirect Experience of Nature	• Images of nature • Natural materials • Nature colours • Simulating natural light and air • Naturalistic shapes and forms • Evoking nature • Information richness • Age, change, and the patina of time • Natural geometrics • Biomimicry
Experience of Space and Place	• Prospect • Organized complexity • Integration of parts and whole • Transitional spaces • Mobility and wayfinding • Cultural and ecological attachment to place

Application of Biophilic design

Implementation of biophilic design requires an understanding of certain factors before it can be employed in a building design. Thus, studies on biophilic design are divided it into several topics such as patterns, attributes, and elements.

Kellert and Calabrese (2015) suggest that Biophilic design requires repeated and sustained engagement with nature, Biophilic design focuses on human adaptations to the natural world that over evolutionary time have advanced people's health, fitness and wellbeing among several other principles in order to achieve efficient practice of biophilic design and a healthy environment.

Basically, in the field of biophilic study there are several theories proposed by some researchers in their study. For example (Kellert et al., 2008), basic elements of biophilic architecture can be related to six biophilic design elements which are (1) environmental features, (2) natural shapes and forms (3) natural patterns and processes, (4) light and space (5) place-based relationships and (6) evolved human-nature relationship. Additionally, within the six elements of biophilic, the authors had found 70 design attributes. Browning et al., (2014) also developed "14 Patterns of Biophilic Design" as a tool to indicate the relationships between natures, human and design implementation into the built environment.

This review is focused on the first elements of biophilic design, which is "environmental features" and related attributes with human health. Eight attributes under the elements of environmental features including (1) color, (2) water, (3) air, (4) plants, (5) natural materials, (6) view, (7) landscape and (8) lighting are discussed.

Colour

Color can change the boring spaces into more meaningful and lively rooms (Kellert, 2018). Hence, colors are implemented into the building design in order to create effect on the natural setting. Basically, in the practice of biophilic design, muted "earth" tones or natural color is one of the effective biophilic color applications into spaces. However, bright color usage should be carefully applied in harmony to avoid distraction. The use of artificial, contrast and vibrant color in build spaces should be avoided because it can destroy harmony principle in nature (Kellert & Calabrese, 2015).

Figure 1: The human being prefers the natural colour of his environmental.
Source*:* https:// www.pinterest.com

Mobility and way finding is one of the important aspects in biophilic experience. Hence, color can serve as a guide to find the way in a particular space. Therefore, the use of a little color is able to attract the attention of users and help as a guide in the building. In a large-scale building such as hospitals and shopping malls, color is used on the wall and floor surface of the building to indicate function of the space (Helvacioglu & Olguntürk, 2010).

Water

Research has revealed that exposure to water can generate significant physical and mental benefits including reducing stress, boosting work performance, enhanced problem solving and stimulating creativity (Kellert, 2018). Water can create specific effects based on multiple senses such as senses of sight, sound, touch, taste, and movement (Kellert & Calabrese, 2015). As can be seen in Figure 2, water creates a biophilic experience and feeling that is beautifully attractive and emotionally exciting.

Figure 2: Cascading waterfall in Paley Park.
Source:https://www.raccontidiviaggio.it/wp-content/uploads/2018/05/paley-park.jpg

Several strategies have been used to integrate the water elements into building design such as fountains, ponds, water walls, waterfalls, rainwater spouts and aquaria. Water elements also can be integrated with digital LED lighting in order to create visual effect toward the occupants (Heath et al., 2018).

Air

Air is one of the main attributes in biophilic design application under the categories of environmental features. Natural ventilation is important for human comfort and productivity in a building. Furthermore, good quality ventilation can stimulate human senses such as feel and smell inside a space to create a positive effect on the users (Kellert et al., 2008). Basically, in design practice, people prefer to use natural ventilation over processed air. Thus, interaction with natural ventilation in the built environment can be enhanced by proper design of entrance and exit of natural air (Kellert & Calabrese, 2015). For example, design strategies such as operable windows, building orientation, vents and chimney stack effects can be used to increase natural ventilation inside the building.

Figure 3: Use of fresh air to enhance thermal comfort, The Khoo Teck Puat Hospital, Singapore.
Source:file:///C:/MS%20THESIS/FINAL%20DRAFT%20THESIS/14%20Patterns%20of%20Biophilic%20Design_files/fourteen-1000_04_Khoo-Teck-Puat-Hospital_Jui-YongSim.jpg

Plants

Plants are frequently adopted in biophilic design strategy to bring the direct experience of nature into the built environment. A blend of different plants within

the built environment could enhance comfort, satisfaction, well-being, and performance of the users' (Kellert et al., 2008). The therapeutic benefit of plants has been established in some building typologies such as hospitals, hotels, sacred spaces, and other settings (Kellert, 2018) because of their potential in stress reduction, and promoting recovery and healing of patients. .

Innovative plant systems have a profound potential to create interesting space in the building. For example, green walls, inner gardens and flower pots had been used within the building landscape. Small scale planting techniques can be done by introducing hanging plants, potted plants and window planters that are placed around the interior space of the building or integrated with furniture (Heath et al., 2018).

Figure 5: Using plants in different interior environment.

Figure 4: Using plants in different interior environment.

Source: https://www.oliverheath.com/biophilic-design-connecting-nature-improve-health-well.

Natural Materials

Material is an important aspect in building construction. Hence, selection of proper building material can affect the building appearance. For example, in the biophilic design application, natural materials possess visual and tactile qualities, Physical and psychological exposure to natural materials typically evokes a strong and frequently deeply satisfying and beneficial effect on humans (Kellert, 2018).

Prominent natural building materials such as Timber, stone, wool, cotton and leather widely used in interior and exterior designs (Kellert & Calabrese, 2015). For example, natural building materials can be applied to timber handrails, timber wall panels or cladding and biomimetic tiles finishing. Other than that, clay paint also can be used as a finishing on the wall surface to give a natural effect and at the same time help to absorb heat and moisture. The use of natural materials in biophilic design also can be applied on the floor surface as a medium

to indicate function of the space. For example, floor surfaces are differentiated in terms of texture, pattern or materials such as carpet, stone, timber and biometric in order to indicate function of the spaces (Heath et al., 2018).

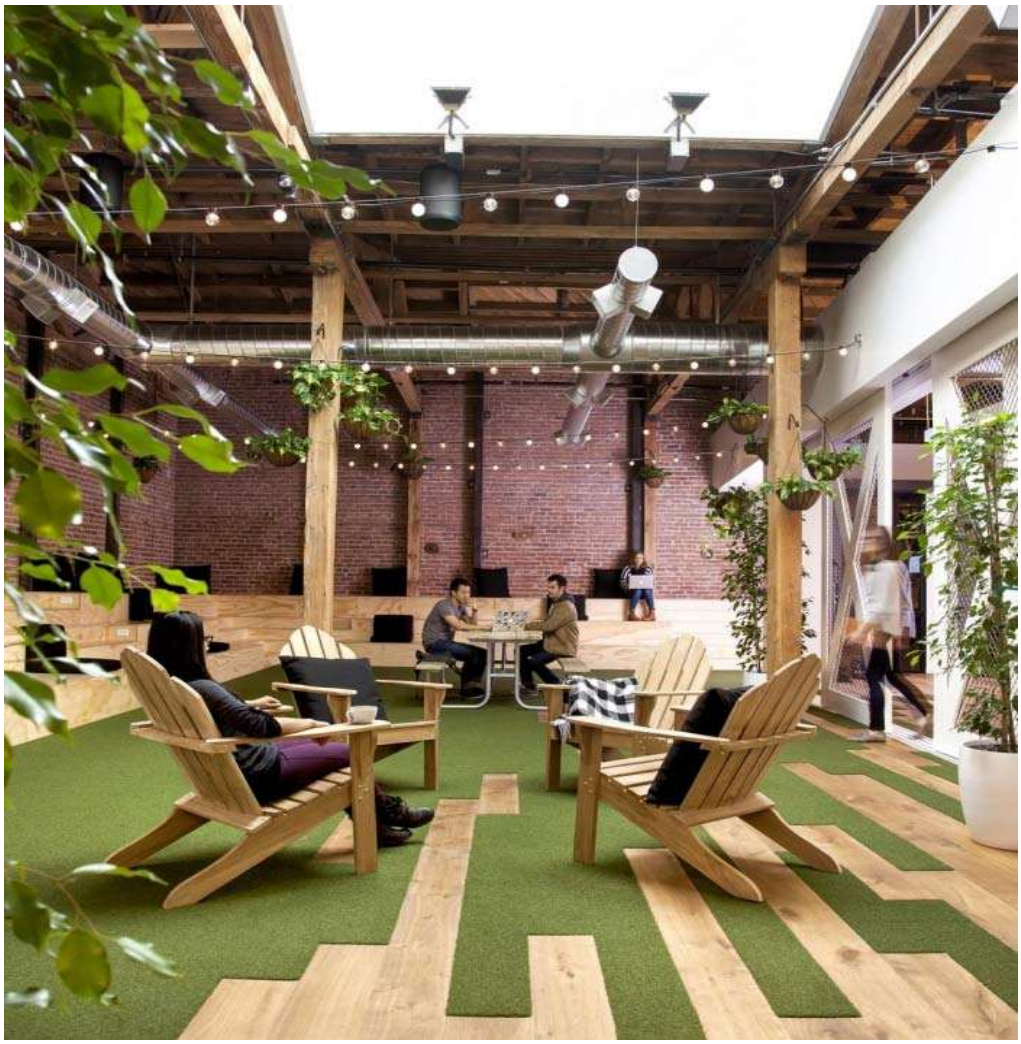

Figure 5: GitHub's San Francisco office exhibiting abundant wood and natural greenery

Source: https://www.terramai.com/blog/wp-content/uploads/2018/02/githubs-sf-office-green-building-materials.jpg

View

View is the ability to see something or to be seen from a particular place. View also allows humans to feel the surroundings for better, quality experience of the landscapes. In the biophilic design field, view of nature is frequently employed for enriching a contact between people and the natural world (Kellert, 2018).

Basically, people express a strong preference for exterior views, especially when the vistas contain natural features and vegetation. Design and positioning of furniture inside the building, such as benches or tables can be arranged facing towards the scenery of landscape. In addition, the position of the building opening should be designed to allow for natural views and to experience a sense of biodiversity from the space (Heerwagen & Hase, 2001).

Figure 6: View from a window towards the scenery.
Source: http://www.smartcitiesinsider.com/wp-content/uploads/2015/08/biophilic-design-702x336.jpg

Landscape

Natural landscapes consist of self-sustaining ecosystems such as interconnected plants, animals, water, soils and rocks. Natural landscape also is the typical biophilic strategies used to contact nature (Kellert & Calabrese, 2015). Basically, the practice of biophilic landscape design focuses on atrium, courtyards, entry areas, hallways, meeting rooms, and dining areas. Hence, orientation of these particular spaces must be sensitive towards the surrounding environment. Some design forms also resemble natural elements or biomimicry can be applied to the interior of a building such as the design of columns that resemble tree trunks. Design and arrangement of the plants in the landscape area also can be enhanced

by well arrangement, so that the plants canopy does not obstruct the view at eye level.

Figure 7: The view of natural landscapes from a window give positive effects on the wellbeing of interior occupants.
Source*:* https:// www.pinterest.com.

Lighting

The experience of natural light affects how people respond toward space, human health and wellbeing. In addition, natural light can also ease the navigation and contribute to user comfort and satisfaction (Kellert & Calabrese, 2015). Thus, to some extent it can influence building design in terms of building orientation, large adjustable windows as well as the introduction of innovative technology in building design such as chimney stacks, skylight, clerestories and light shelves (Kellert, 2005).

Several design techniques also had been used to control the natural lighting inside the building. The figure below shows the Yale Center for British Art in New Haven, incorporates natural light, softly illuminating the artworks and creating a dramatic impact as shown

Figure 8: The Yale Center for British Art in New Haven, CT, by Louis Kahn
Source: https://www.terrapinbrightgreen.com/reports/14-patterns/img/fourteen 100006_YaleBritArtMus_KKendall.jpg

Benefits of biophilic design.

As The fields of sociology, physiology, and psychology produce key knowledge about people's perception of space, mode of operation within it and establish their preferences, The majority of studies on the significance of biophilic design can be traced back to one or more of three central mind-body systems which are cognitive, psychological, and physiological, that are already confirmed to varying degrees to have an impact on the health and well-being of people and the role of the environment as a catalyst.

Multidisciplinary research has shown that being exposed to nature boosts productivity in intellectual and cognitive activities at work and in other environments (Bratman et al., 2019). Similar research has shown that an active connection with nature might help us refocus and recuperate from stress and mental exhaustion (Yassein & Ebrahiem, 2018).

Psychological health

Being adaptable, attentive, focused, emotional, and moody are all examples of psychological reactions (Bolten & Barbiero, 2020). This includes reactions to nature that influence managing stress and healing. Experiments in natural settings, for example, have been shown to produce more emotional healing, with fewer occurrences of tension, anxiety, rage, exhaustion, disorientation, and overall mood disruption compared to urban contexts with fewer natural properties (Aristizabal et al., 2021). Past experiences, cultural conceptions, and social conventions contribute to the psychological response mechanism, which may be acquired or passed down through generations.

Physiological health

Humans' auditory, respiratory, musculoskeletal, metabolic, and overall comfort are all part of the physiological reactions: nature influences muscle relaxation, diastolic blood pressure, and the management of stress levels (Bolten & Barbiero, 2020). Short-term stress with the potential of raising the heart rate and stress levels, such as that experienced while entering an unfamiliar place or staring down from an 8-story stairwell, is thought to be regulated by exposure to the natural environment. In this regard, the natural setting can ensure that the body remains robust and adaptable. Building design may cushion physiological reactions to external stresses, enabling biological resources to be restored before system harm occurs (Chen, 2017).

Cognitive functionality and performance

People's intellectual capacity and memory and the ability to reason, learn and produce rational or artistic judgment form part of cognitive functioning (Yin et al., 2018). Many repetitive activities, such as everyday documentation, reading, conducting computations or research, and working in highly interactive surroundings demand a person's concentrated attention. Directed attention consumes a lot of energy, leading to mental weariness and depletion of cognitive resources over time. Strong or consistent relationships with nature have been proven to give chances for mental repair, allowing for the opportunity to engage in higher cognitive processes after rest (Aristizabal et al., 2021). Consequently, people will tend to have a higher ability for concentrated activities while relaxed than when exhausted.

METHODOLOGY

This study employs a systematic review method alongside a narrative synthesis approach. Attention and great care was given to finding relevant studies with quality evidence, both published and unpublished. Web searches were conducted on Springer, Science Direct, Google scholar, Academia and Research Gate to identify, relevant literature on biophilic patterns of design, behaviours and environment, and research papers. In addition, additional materials were sourced from the references from articles of prominent, peer reviewed and scientific journals focused on environment, environmental psychology, health and architecture. A total of 47 articles were chosen; repeated articles, review articles, and irrelative content were excluded, resulting in 22 articles for the next step of the analysis, see Table. 2. After data collection, the papers were examined and extracted data addressed biophilic design applications and implications. We then use Microsoft Excel (Office 2013) to present the results into Table for clear, thorough, and simple information regarding the processes used to collect and analyse data.

Literature Search

Psychology, health, environment and architecture databases of Science Direct, Springer, Research gate and Google Scholar were searched using words and synonyms of 'Biophilia' or 'biophilic', 'Sustainable architecture', 'Built environment', 'Well-being', 'Restorative environment'. The quantity of available literature was limited to article titles and abstracts for appropriateness of database searches.

Article Selection

Articles and literature were screened in two stages: The first stage includes examination of titles and abstracts if they mentioned biophilia and whether they were published in peer-reviewed and scientific indexed journals in order to regulate the quality of research. Relevant articles, books and documentations were shortlisted based upon the above criteria. The second stage screening included a strict analysis of full text if: 1) The text mentioned E.O. Wilson's Biophilia hypothesis in relation to design adaptations 2) The text had systematic analysis of behaviour and psychology around biophilic built environments.

RESULT

This research has identified the essential items in developing a thorough understanding of biophilic design. It reviewed 22 articles on the definition, concept, application, elements, attribute, effect and benefit of biophilic design as shown in table 2. These studies were selected because they present evidence-based conclusions that natural patterns and elements, which are associated with biophilic design principles that support human adaptation, engagement, and immersion in nature, improve human health and provide multiple benefits for humans in a built environment (e.g., increase productivity and provide aesthetic appeal, emotional attachment, and physical and social dimensions) (Kellert, 2018).

Table 2: A brief description of review of 22 articles on biophilic design.

Author	Aim	Methodology	Conclusion
Wilson E.O, 1984	Evolutionary analysis of humankind's relationship to nature.	Comparative analysis of human behaviours, Intercultural comparison to test the biophilia theory and Psychological methods.	Biophilia hypothesis and development of the environmental movement in the United States.
Orians & Heerwagen, 1992	Discuss evidence relevant to the	Review	People still have aesthetic preferences for savanna-like

	savanna hypothesis.		environments and propose that habitat selection proceeds in three stages / each of these stages should be characterized by different cognitive and affective processes.
Heerwagen & Hase, 2001	Interpret the concept of biophilic design and the relationship thereof to human health and well-being, Characteristics of biophilic building.	Review of the literature supporting biophilia.	Incorporating the natural environment into buildings can have a positive influence on psychological, physical and social wellbeing.
Kellert, 2005.	Examines the interconnection of people and nature, and how the loss of this connection results in a diminished quality of life.	Review	Biophilic design foster beneficial contact between people and nature, thereby producing a positive environmental impact.
Joye, 2007	Integrating features of natural contents and structural landscape features in the built environment.	Review	Landscape and natural features are found to have positive effects on human functioning and can reduce stress.
Kellert, 2008	biophilic design frameworks	Review	2 Dimension, 6 Elements and 72

			attributes of biophilic design.
Kellert et al., 2008	Scientific support for the assumption that contact with nature is critical to human functioning, health and wellbeing.	Review	Biophilic framework of six biophilic design elements and 72 attributes.
Helvacioglu & Olguntürk, 2010	To validate if a proper colorized wayfinding element can actually aid observer-user to accomplish wayfinding tasks.	The study is based on 3 phases; a qualitative interview, a short-term memory test and point to point place findings.	Integrating colours into wayfinding elements such as signage system can be in the form of graphical information or aesthetical elements, in order to create a cognitive set of wayfinding elements, resulting in increasing legibility of environment.
Al-Musaed, 2011	Outlines a new movement that aims to create environmentally-friendly, energy-efficient buildings through Biophilic and Bioclimatic Architecture	Review of literature.	Biophilic and Bioclimatic Architecture will enable architects, engineers and other specialists to develop innovative, sustainable architectural designs.
Browning et al., (2014)	Serve as a catalyst for discussing biophilic design implementation so as to capture the	Review articles of (1) familiar precedents for patterns in the design	Good biophilic design could enhance productivity and performance and have a positive

	benefits afforded by biophilia in our design interventions.	community, (2) three nature-health relationships, and (3)three nature design relationships	impact on attention restoration and stress reduction.
Kellert & Calabrese, 2015.	Seeks to interconnect people and nature through the experiences and attributes of biophilic design.	Review articles on biophilia	Advocated the practice of biophilic design as a design strategy that seeks to interconnect people and nature based on three experiences and twenty-four design attributes.
Chen, 2017	This study aims to measure the impact of biophilic design on environmental awareness and nature connectedness, and prove whether this impact can enhance human health and wellbeing or not.	A mixed-methods approach that includes both qualitative and quantitative analysis was designed and applied in Serenbe, an intentional community of biophilic design in southwest of Atlanta.	The result demonstrated a significant positive correlation between health and wellbeing, environmental awareness, and nature connectedness.
Heath et al., 2018	To provide an understanding of the practical methods for implementing Biophilic Design	Case study and Literature Review	The biophilic design project has the potential to create positive spaces where we work, rest, play and gives an

			understanding of human behaviour.
Kellert, 2018	Benefits and principles of biophilic design in modern city and built environment.	Review	Biophilic design frameworks, 3 Experiences and 25 attributes of biophilic design.
Totaforti, 2018	Reconnecting individuals with the patterns and processes of nature particularly in healthcare spaces	Review	The humanization of healthcare spaces and contact with nature can empower the patient and have a positive impact by reducing stress and pain and improving emotional wellbeing.
Yassein & Ebrahiem, 2018	Address the current practices of biophilic design in interior spaces.	systematic review	Conceptual model that enriches and sustains the human-nature connection in interior spaces.
Yin et al., 2018	Testing restorative effect of biophilic elements on stress, anxiety and recovery time in Office Indoor environment.	Virtual reality (VR), eye-tracking and wearable biomonitoring sensors.	Participants in three spaces with biophilic elements had consistently lower level of physiological stress indicators, higher creativity scores and better recovery responses compare to those in the non-biophilic environment.
Bratman et al., 2019	Impacts of nature experience on cognitive	Review of literature on consensus across	Shows how ecosystem service assessments can be

	functioning, emotional well-being, and other dimensions of mental health	the fields of natural, social and health sciences.	expanded to include mental health, and provide a conceptual model for doing so.
Söderlund & Newman, 2015	The goal is to establish a scientific basis for biophilic design using the human, natural, economic, and social sciences.	This paper reviews the psychological and physiological evidence that explains the human-nature connection.	Evidence that biophilic architecture is practiced for significant social, environmental, and economic benefits.
Bolten & Barbiero, 2020	The aim of the present study is to develop a conceptual framework for Biophilic Design	comparative analysis of Biophilic Design described in the most scientifically relevant publications	Translation of natural pattern and elements into functional applications in built environment.
Aristizabal et al., 2021	Evaluated the impact of a multisensory biophilic environment on occupants' cognitive performance, stress, productivity, mood, connectedness to nature, and attention	Thirty-seven participants in three groups were exposed to three biophilic design interventions (visual, auditory, and a combination (multisensory biophilic of visual and auditory components)	The results demonstrate that immersive biophilic environments can improve occupant satisfaction and cognitive performance, while reducing stress. Cognitive performance improved in all biophilic conditions compared to baseline.

Hady, 2021	To present a new sustainable landscape approach by activating biophilic design patterns in order to increase landscape efficiency.	Case study of Egyptian biophilic design pattern and implement it to reach a sustainable landscape model.	Biophilic design patterns can increase the efficiency of a landscape site experience; the more varieties of the patterns are used, the more efficiency we get.

Source: Author, 2023.

CONCLUSION

This study demonstrates how buildings constructed with nature may help the building occupants in terms of their mental, health, and social well-being. Implementing natural elements into architectural forms improves psychological and physical behavioural patterns and well-being of individuals, incorporating biophilic design patterns in design of work and health spaces, could foster an improved connection of people to nature resulting in improved health, and wellbeing and importantly helping to create aesthetically pleasing built environments. The biophilic design may be thought of as a new design concept and is now visualised as a medium that bridges the gap between humans and the nature as it focuses on the end-results of naturally nurtured or inspired habitats and workplaces.

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