

The Role of Sustainable Architecture in Human Health and Well-Being: A Review.

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ABSTRACT

The perception that sustainable architecture, human health and well-being are related is beginning to gain attention. This is because the human physical, psychosocial, and spiritual well-being are positively affected by built spaces which serve as healthy or therapeutically or medicinal environments to users. This theoretical discourse has identified strategies for designing architecture for health and well-being through some considerations that include; biophilic design, human centered design, knowledge-based design, and socially responsible design. This article concludes that the architect needs to have sustainable education, adapt the identified strategies into design of all spaces and improved knowledge on architecture for health and well-being. Thus, this article recommends future research to explore other methodologies for contextualization and possibilities.

Keywords: Architecture, human health, Sustainability, well-being.

INTRODUCTION/BACKGROUND

Good Health and Well-Being has been given the third central position on the 17-itemed Sustainable Development Goals' (SDGs) Agenda. This therefore, suggests the significant role of human health and well-being to any form of sustainable development. For several years designers have also shared the belief that there is significant relationship between human health, well-being and the built environment (Barbero & Toso, 2010; Bhamra, Lilley & Tang, 2011). Yet, it is only recently that research activities have acknowledged and commenced in this area of discourse (van der VOORDT, 2022). Hence, the relevance of this theoretical discourse is in its alignment with the sustainable agenda driven by the SDGs.

Research has observed that, one of the most influences on architectural design is achieving holistic health. Whilst, holistic health has been described to encompass – physical, mental, social, and emotional aspects of human's life (Hill, 2020). Thus, health and well-being have significant impact on architectural design decisions.

The study by Rice & Sara (2020) carried out during the corona pandemic, concludes that, architecture has profound implications on human health and planetary well-being and further suggest that, the built environment is currently an important determinant of health and well-being. This conclusion further suggests an increased awareness on the connections between Architecture, health and well-being in recent times.

LITERATURE REVIEW

Sustainable Architecture, Health and Well-Being

Due to the global sustainable agenda, architecture like all other disciplines have employed the use of

sustainable design processes as the methodology for strategic interventions in the built environment into socio-spatial-ecological systems for improved sustainability and human well-being (Barbero & Toso, 2010; Bhamra, Lilley & Tang, 2011; Rice & Sara, 2020). As such, architects design to create positive impact on human health, well-being and the environment through ‘eco-design’ or ‘green design’ as sustainable design strategy (Jo, 2014; Rice & Sara, 2020).

Sustainable design strategies are aimed at improving the environmental impact of design processes on the environment (Allu, & Ebohon, 2014; Rice & Sara, 2020). In pursuit of sustainable architecture for health, four sustainable measures are employed and often these measures are combined as; biophilic design (nature) approaches, Human-centered design, knowledge-based and socially responsive design measures (Siepl-Coates, 2013). Thus, establishing the interconnect of sustainable architecture with health and well-being.

Strategies For Promoting Sustainable Architecture for Health and Well-Being.

Each of the four identified architectural design strategy for health and well-being is hereby discussed in this section as follows;

- **Biophilic design (nature) approaches:** Biophilic design is relatively a new topic but in the last decade, biophilic (nature) design have received global attention in the practice of architecture, especially in response to growing environmental challenges and health concerns.

Biophilic design emerged as a natural strategy for sustainable architectural solution for physical space developments, one of which is the SDG 3, which is to ensure healthy and to promote well-being for all (Zhong, Schroder, & Bekkering, 2022).

Table 1 highlights the sustainable architectural challenges, the benefits of biophilic design solutions and their corresponding design elements. Interestingly, the benefits highlighted on Table 1 are all related to human sensors earlier discussed – physical, mental, social, and emotional aspects of human’s life. These are specific to the users and not necessarily on the buildings themselves. Thus, observation validates the summation of Kraus (2016) who states that, “*Health and well-being are no longer centered solely on health care facilities but are shifting into all building typologies*”.

Table 1. Benefits of Biophilic Design for Health and Well-Being.

SDG 3	Sustainable architectural challenges	Benefits of Biophilic design/sources	Most Relevant Biophilic Design Elements
Good health and well-being	<ul style="list-style-type: none"> • Healthy and comfortable indoor environment • Non-toxic substances and environment • Obstruct disease transmission and bacterial contact • Physical exercise spaces 	<ul style="list-style-type: none"> • Reduce air pollution and optimise air quality (Aydogan and Cerone, 2020). • Optimise thermal comfort (Africa et al., 2019; Hoelscher et al., 2016). • Provide psychological restoration (Berto and Barbiero, 2017; Gillis and Gatersleben, 2015; Lee et al., 2015; Yin et al., 2018). • Reduce stress (Browning et al., 2014) • Increase healing rates (Abdelal and Soebarto, 2019). • Enhance positive emotions (Mandasari and Gamal, 2017). • Encourage physical activity (Korpela et al., 2017; Wallmann-Sperlich et al., 2019). 	<ul style="list-style-type: none"> • Air • Daylight • Plants • Landscape • Images • Materials, texture, and colour • Prospect and refuge • Enticement (peril and mystery)

- **Human-centred design:** This is derived from holistic architectural innovations, robust research and analysis to change positively communities' lives rather than for merely good intentions. Human-centred design outcomes are developed from concepts of ethnography, cognitive psychology and human sociology (Siepl-Coates, 2013; Voegeli, 2020). Simply described as – “It is about them and for them”

According to Voegeli (2020, p.1) “...buildings fulfill the most basic human needs like shelter and security, architecture impacts the emotional state of any person who interacts with it. Whether it's intended or not, a building can provoke a range of emotions such as belonging, awe, fear, or hope”. Voegeli went further to opined that, humans are highly sensitive who react and respond to their environmental conditions positively or negatively. This argument has been supported by recent research which notes that, architecture creates physiological responses in humans that can induce long-term health and well-being (Rice & Sara, 2020; Zhong, Schroder, & Bekkering, 2022), when designs are human-centred.

- **Knowledge-based design:** Encourages architectural designers to learn and generate design from outcomes of research and from other specialists whose work is focused on human health issues because such outcomes can make significant and importance decisions input into specific architectural design solutions (Siepl-Coates, 2013; van der VOORDT, (2021). Additionally, technology-oriented focus on methods and tools for the support of product development are equally encouraged.

Knowledge based architectural design also engage the use of technology-oriented methods, processes and tools for sustainable product development for health and well-being-built spaces (Li & Lachmayer, 2018; van der VOORDT, (2021). There is also the possibility of knowledge-based design to create new building types that will readily address the challenges of health and well-being for all categories of users.

- **Socially responsible design:** This design strategy seeks inclusive sustainable design solutions within the framework of a larger political and societal patterns, whilst addressing primary and secondary functions of all categories of users (Siepl-Coates, 2013; Kadyirov, Emanova & Yao, 2021). It is therefore, deducible to infer that, the intention here is to create a sustainable purposeful future space that elevate human health, well-being and improve the quality of life for all users holistically (body, soul, and spirit).



Source: Image courtesy of HKS Inc. <https://www.hfmmagazine.com/articles/2434-how-architecture-can-help-progress-population-health> Accessed (11/11/2022).

Figure 2. The Peninsula Estate in Porto Cervo, Sardinia, Italy—on the market through ImmobiliSarda is a spectacular example of Modernist architecture, combining clean lines with access to its breathtaking surroundings.



Source: <https://www.christiesrealestate.com/blog/building-health-the-link-between-architecture-and-well-being/> Accessed (11/11/2022).

Figure 3. Flooded with natural light and facing a living wall of plants, a stairwell at the Washington, D.C., law office of Nixon Peabody invites staff to use it—and illustrates a new trend in design that could provide both a mental and physical boost.



Source: <https://www.nationalgeographic.com/environment/article/surprising-ways-green-buildings-improve-health-sustainability> Accessed (11/11/2022).

Challenges To Advancing Sustainable Architecture For Health And Well-Being.

All aspects of human activities are prone to challenges and so it is with promoting human health and well-being in the context of sustainable architectural practices. Firstly, not many architects are knowledgeable about the implications of their design to human health and well-being during their training, or even in continuing education courses and practice (Dannenberg and Burpee, 2018, Yagasawa, 2020). Again, few people have in-depth understanding of how the psychology of designed spaces can affect human behavior and human health (Basil, 2021).

Secondly, on the other hand, some architectural designers who are knowledgeable would rather aim for the minimum requirements/standards provided rather than go for the optimal standard (Howard, 2017), especially for sustainable design engagements. Thirdly, recent research notes that, there is underutilized information in health-conscious design in the design studio environment/training (Siepl-Coates, 2013; Rice

& Sara, 2020). This means there is a gap of conscious attempts to enshrine sustainable architecture for promoting human health and well-being into the architectural education.

Fourthly, architectural design for health and well-being projects incur initial costs but have long term unquantified benefits (Capolongo, 2014; Dannenberg and Burpee, 2018). However, these benefits are not readily realized by building owners or users/occupants at the early years of building use and therefore seem unprofitable. Fifthly, the benefit of good architectural design for health and well-being are majorly not tangible except for its sustainable elements which are quantifiable (Capolongo, 2014). These challenges could be surmountable where policies, standards and professional monitoring and evaluation are established.

CONCLUSION AND RECOMMENDATIONS

This review article has established the interconnection between sustainable architecture, human health and well-being. The strategies discussed demonstrates the potential and the way forward for sustainable architecture to promote human health and well-being with embedded conscious design approach and intent. The discourse has also uncovered the challenges for advancing sustainable architecture for health and well-being. However, solutions lie in the education of future architects to understand the processes and strategies required for designing holistically.

Architects on the hand, need to deepen their knowledge, apply optimal strategies highlighted rather than minimum standards for health and well-being of all categories of users. This is because sustainable health architecture is not only meant for health care facilities but for all types of buildings and to all categories of user, and to impact positively on their psychological, physical, mental and emotional well-being. Thus, the formulation and establishment related policies and implementational contextual structures are encouraged.

This article is also intended to bring to fore discussions on sustainable architecture, health and well-being and their interconnections. It is also to spur further research using other methodologies for validation and contextualization.

Thus, the recommendations therein for architectural educators and practicing architects include;

1. To embed health and well-being in design studios and general architectural education and practices.
2. To develop guidelines and standards that will promote conscious practices that would connect architecture, health and well-being.
3. To encourage continuous research on the role of architecture on health and well-being at all levels.
4. To promote research collaborations and build public awareness on the interconnects between architecture and health related disciplines and concerns.

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