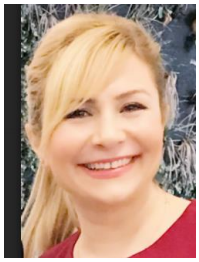
Evaluation Of Healthy Buildings And Well Building Standards Within The Architectural Framework



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Received: 05.12.2025, Accepted: 19.12.2025
DOI: **10.17932/IAU.ARCH.2015.017/arch_v011i2004**

Abstract: *Globally, with the rapid changes occurring in daily lifestyles, the built environment has become a significant factor for human health and well-being. Although physiological and psychological functions have been dependent on nature throughout evolution, approximately 90% of human life is spent indoors. Today, largely due to urbanization, people have become disconnected from nature. As this disconnection from nature has become more pronounced, architecture has gained significant importance in recent years in creating healing environments that support human health and well-being by aiming to establish a relationship between nature and humans. In architecture, biomimicry and biophilic design are approaches that aim to improve health and well-being by protecting human health and offering healthy design solutions. Healthy buildings are part of the green building concept. A healthy building is also created with sustainable design features. In this context, sustainable buildings are a holistic approach that encompasses the concepts of biophilic design, green buildings, and healthy buildings. Healthy building practices are regulated by various more targeted certification programs that provide specific, science-based standards to guide implementation. The WELL Building Standard, approved by the Green Building Certification Institute, is one such program. The WELL building standard is a new and unique performance-based rating system focused on the health and well-being of building occupants. The WELL Building Standard (WELL) is a set of standards developed for the well-being of all building types in terms of sustainability. This standard is a performance-based system that certifies features affecting human health through seven key areas: air, water, nutrition, light, fitness, comfort, and mind. It is based on medical research that examines the built environment where people live and work and its impact on the health or well-being of the users of these environments. The study uses a descriptive and conceptual synthesis model for qualitative literature review. This study was selected to reveal the evolution, definitions, and interconnections of fundamental concepts such as "healthy building" and "WELL Building Standard" and to synthesize information from various disciplines within a consistent framework. Healthy building design concepts were examined using the comprehensive framework of the WELL Building Standard, which brings together evidence from the disciplines of architecture, public health, and environmental psychology. The aim of the study is to evaluate the feasibility of using health-focused criteria within an architectural framework by presenting and evaluating comparative analyses of health and well-being-focused building design standards, healthy building standards, and the design criteria in the WELL Building Standard.*
Keywords: *Health, WELL Building standard, Well-being, Biophilic Design, Sustainable Building, Green Building, Healthy Building.*

Mimari Çerçevede Sağlıklı Binaların ve WELL Bina Standartlarının Değerlendirilmesi

Özet: *Dünya genelinde, günlük yaşam tarzlarında meydana gelen hızlı değişimlerle birlikte, inşa edilmiş çevre insan sağlığı ve refahı için önemli bir faktör haline gelmiştir. Fizyolojik ve psikolojik işlevler evrim boyunca doğaya bağımlı olsa da insan yaşamının yaklaşık %90'ı iç mekanlarda geçmektedir. Günümüzde, büyük ölçüde kentleşme nedeniyle insanlar doğadan kopmuştur. Doğadan kopukluk daha da belirginleştikçe, Mimarlıkta, doğa ve insan arasında ilişki kurmayı amaçlayan insan sağlığını ve refahını destekleyen iyileştirici ortamlar yaratmada mimarlığın rolü son yıllarda büyük önem kazanmıştır. Mimarlıkta, biyomimikri ve biyofilik tasarım, sağlık ve refahı iyileştirmeyi amaçlayan insan sağlığını koruyan ve tasarımda sağlıklı tasarım çözümleri sunan yaklaşımlardır. Sağlıklı binalar yeşil bina anlayışının bir parçasıdır. Sağlıklı bir bina aynı zamanda sürdürülebilir tasarım özellikleriyle oluşturulmaktadır. Sürdürülebilir binalar bu bağlamda, biyofilik tasarım, yeşil binalar ve sağlıklı binalar kavramlarını kapsayan bütüncül bir yaklaşımdır. Sağlıklı bina uygulamaları, uygulamaya rehberlik edecek spesifik,*

bilimsel temelli standartlar sunan çeşitli daha hedefli sertifikasyon programları tarafından düzenlenmektedir. Yeşil İşletme Sertifikasyon Enstitüsü tarafından onaylanan WELL Bina Standardı da bunlardan biridir. WELL bina standardı bina sakinlerinin sağlığı ve refahına odaklanan yeni ve benzersiz bir performans tabanlı derecelendirme sistemidir. Sağlıklı binaların sürdürülebilirlik açısından WELL Bina Standardı (WELL), tüm bina türlerinin refahı için oluşturulmuş standartlardır. Bu standart, hava, su, beslenme, ışık, zindelik, konfor ve zihin olmak üzere yedi temel alan aracılığıyla insan sağlığını etkileyen özellikleri onaylayan performansa dayalı bir sistemdir. İnsanların yaşadığı ve çalıştığı inşa edilmiş çevre ile bu çevrelerin kullanıcılarının sağlığı veya refahı üzerindeki etkisini inceleyen tıbbi araştırmalara dayanmaktadır. Çalışma, niteliksel literatür incelemesi için tanımlayıcı ve kavramsal bir sentez modeli kullanmaktadır. Bu çalışma, "sağlıklı bina" ve "WELL Bina Standardı" gibi temel kavramların evrimini, tanımlarını ve birbirleriyle olan bağlantılarını ortaya koymak ve çeşitli disiplinlerden elde edilen bilgileri tutarlı bir çerçeve içinde sentezlemek amacıyla seçilmiştir. Mimarlık disiplini ile, halk sağlığı ve çevre psikolojisinden elde edilen kanıtları bir araya getiren WELL Bina Standardı'nın kapsamlı çerçevesini kullanarak sağlıklı bina tasarımı kavramları incelenmiştir. Çalışmanın amacı, sağlık odaklı kriterlerin mimari çerçevede kullanılabileceğine dair, sağlıklı ve refah odaklı bina tasarım standartları ile sağlıklı bina standartları ve WELL Bina Standardı'ndaki tasarım ölçütlerinin karşılaştırmalı analizlerinin ile ortaya konularak değerlendirilmesidir.
Anahtar kelimeler: *Mimarlık, WELL Bina standardı, Refah, Biyofilik tasarım, Sürdürülebilir Bina, Yeşil Bina, Sağlıklı Bina.*

1.INTRODUCTION

Recent research indicates that most of society's life is spent indoors, averaging 16 hours per day on weekdays and 17 hours per day on weekends. It has been found that the time spent at home by young and elderly individuals has increased significantly. For children and the elderly, the time spent indoors is even higher, ranging from 19 to 20 hours per day [1].

Buildings play a vital role in human health due to their energy systems and changing climate conditions. This leads us to question how different architectural designs for buildings psychologically impact their occupants. In the 1990s, it was estimated that people in more than forty percent of indoor spaces suffered from health, comfort, and safety-related complaints and illnesses [2]. Fisk [3] identified only twenty percent of existing buildings as healthy.

Research has demonstrated that light exerts a significant influence on various physiological systems, impacting not only physical but also psychological and physiological functions. Insufficient lighting has been shown to disrupt sleep patterns, alter daily hormonal secretion, and affect body temperature, among other effects [4]. The general consensus is that well-being (also written as prosperity or well-being) is simply synonymous with health, happiness, and quality of life, and is also associated with comfort and health [5].

The terms biomimicry and biophilic design are approaches often used in regenerative architectural design aimed at improving health and well-being. While biophilia is more directly related to architectural and urban design, as well as interior design, biomimicry is relevant to technology and product development. These concepts address nature in different ways; biophilic design recognizes the health and well-being benefits of connecting with nature, while biomimicry recognizes the innovative potential of natural solutions [6]. Biophilic design is the design of buildings that reduce stress and increase occupant productivity and engagement by incorporating nature into their design. The idea behind biophilic design is to provide people with much-needed interaction with nature by incorporating natural features and systems into the built environment [7]. The concept of architecture biomimicry can be defined as a design approach that uses nature to solve human problems. The utilisation of the subject in question is twofold: firstly, in the context of health concerns, and secondly, in the context of the production of healthy buildings. (Figure 1), [8].

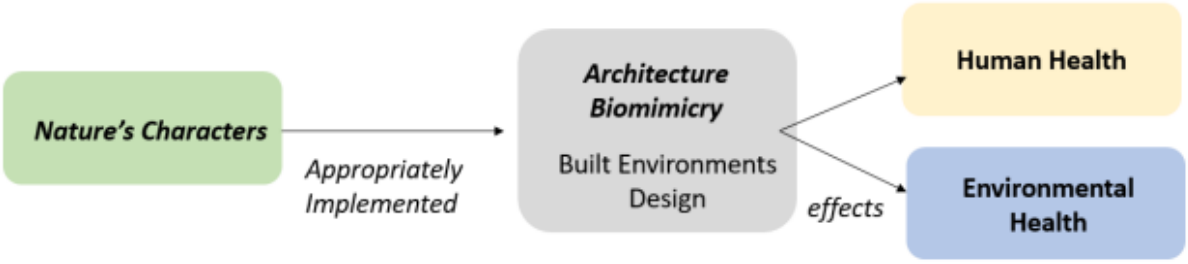

Figure 1. *The Concept of Healthy Buildings in Architecture and its Relationship with Biomimicry [8]*

The literature widely discusses biomimicry architecture, which can create a healthy and sustainable environment for healthy building criteria. Biomimicry architecture is also a subfield of sustainability, and the principle of sustainability supports the creation of healthy buildings for people and the environment. [8].

The frequent use of indoor spaces in society is a concerning trend for human health; one is the evidence that time spent outdoors is associated with better health and well-being; the other is that time spent indoors is negatively associated with several health problems [9]. The architectural profession faces many challenges in building healthier buildings. The primary concern pertains to a dearth of knowledge, underscoring the necessity for augmented research endeavours to elucidate the intricate interplay between built environmental factors and their repercussions on human health. The second is the lack of emphasis currently placed on learning about human health as part of the compulsory education curriculum for the architectural profession [10]. The concept of biophilia, has also gained widespread acceptance in architectural design, with architectural designs that promote daylight and views, access to outdoor spaces, and the integration of place-based natural and cultural spaces within the built environment gaining prominence. These designs spurred the "good building" movement in the mid-2000s [11].

Buildings that incorporate natural elements in their surroundings, developed with biophilic design, have helped provide people with a better place to think and work, because the “green” areas around them make them feel comfortable and at peace in the atmosphere they are in. In the context of the built environment, there is increasing interest among stakeholders in architecture in design approaches that promote healthy environments and support well-being. In architecture, the design of buildings is not limited to material selection, design, and implementation: architecture must provide a healthy environment for users by considering comfort and requirements, addressing health needs as a whole, including physical environmental factors, psychological comfort, and social well-being [12]. In recent years, studies that finally draw attention to healthy buildings and an increasing number of examples in architectural structures have brought the topic of healthy design to the forefront. The concept of healthy building design in architecture is crucial for enhancing the well-being of building occupants by focusing on the physical, psychological, and social aspects of health. Research in this field has demonstrated that the physical environment, including indoor air quality (IAQ), thermal comfort, and acoustics, plays a significant role in the physical health of people living or working in these spaces. These studies have shown that the physical environment, including indoor air quality (IAQ), thermal comfort, and acoustics, plays a significant role in the physical health of people living or working in these areas. In addition to physical needs, factors such as lighting, color scheme, and views are also priorities for users' psychological well-being [12].

Architecture plays an important role in ensuring the healthiness of buildings and preventing sick building syndrome for the well-being of users. The frequent use of indoor spaces in society is a concerning trend for human health; one is the evidence that time spent outdoors is associated with better health and well-being;

the other is that time spent indoors is negatively associated with a number of health problems [9]. The architectural profession faces many challenges in building healthier buildings. The primary concern pertains to a dearth of knowledge, underscoring the necessity for augmented research endeavors to elucidate the intricate interplay between built environment factors and their repercussions on human health. The second issue pertains to the absence of a discernible emphasis on the subject of human health within the prevailing compulsory education curriculum for the architectural profession. [10].

Sustainable buildings are holistic, encompassing the concepts of green buildings and healthy buildings, along with other social and economic responsibilities. The term "healthy building," dating back to the 1980s, is the result of major movements aimed at ensuring health and good conditions, representing a new principle or element of sustainability. Healthy buildings are the next step in green buildings and sustainable buildings.

When a healthy building is constructed, it can be said that a green and sustainable building has been constructed. A green building is a subset of sustainability and contributes to improving the well-being of users through its design features. A healthy building is created through green and sustainable design features [13].

Table 1. Brief of the comparison between the three concepts [13]

GREEN BUILDING	SUSTAINABLE BUILDING	HEALTHY BUILDING
Minimizes the environment impact due to the design procedures.	Look at a building's whole life cycle from crib to grave (including demolition or disassembly)	Look at a building's whole life cycle from crib to grave (including demolition or disassembly)
Hard to achieve suitable emphasis on human health	Hard to achieve suitable emphasis on human health	Support and protect health ethos for better wellbeing.
Focused on the current state	Focused on the distant future for the building and its components	Focused on the distant future for the building and its and occupants
Term used mostly for process or product that has little impact on the environment	In addition to the environmental strives to at least acknowledge the social and economic ramifications Sustainable is still focused on the environment instead of the building occupant	Term used mostly for process or product that has no negative impact on the environment and buildings occupants
Green isn't always sustainable	Sustainable is more than green design it is a higher degree So sustainable is always green	Healthy buildings are the next chapter of green and sustainable buildings It is the introduction of health and well-being as another element of green and sustainability
Green is a subset of sustainable	Sustainable includes green	Healthy is a green and sustainable building as well as it contributes to improving the mental state of its occupants through its design characteristics.

Sustainable green building methods focus on making buildings more energy efficient, but they do not directly improve the physical and mental health of the people who use them. There exists a considerable knowledge deficit concerning the practical integration of health-oriented tools, such as the WELL Building Standard, into the conventional architectural design process and the potential for this integration to enhance health outcomes. This study offers a tangible, evidence-based framework for action, addressing the essential gap between health evidence and design choices, and prioritizing human well-being within the built environment.

This study aims to contribute to the literature on healthy building design concepts and health-focused criteria by utilizing the comprehensive framework of the WELL Building Standard, which integrates evidence from the disciplines of architecture, public health, and environmental psychology.

2. LITERATURE REVIEW

2.1.Well being and Healthy Building

Well-being has become a significant area of interest for researchers and professionals across a range of disciplines in the built environment. The interactions between individuals, building features, and the relational dynamics within the context of the environment and the wider community are important in assessing well-being.

The definition of well-being is generally understood as a state characterized by a high quality of life encompassing physical, mental, emotional, social and, in some contexts, spiritual and self-actualization dimensions [14]. Well-being is defined as a concept encompassing “thinking, feeling, and functioning,” while at the environmental level, well-being relates to the quality of the individual's physical and social environment [15].

The term “healthy building” emerged in the 1980s and was not widely adopted for a decade. Initially, it was considered the opposite of the concepts of sick building, problematic building, or building prone to complaints. The widely accepted definition describes a situation where there is no evidence that buildings cause illness, and therefore no reason for people to become ill [16]. The International Conference on Healthy Architecture, held in the millennium, defined a healthy building as the way of experiencing the building's interior environment, including physical elements such as temperature, humidity, noise, light, and air quality, as well as subjective psychological elements such as spatial arrangement, color, and materials used [17]. The necessary components for healthy, high-performance buildings designed to provide high-quality air, temperature control, light, ergonomics, privacy, and interaction, as well as access to the natural environment. Health has been linked to [18]:

- Sustainable Air;
- Sustainable Temperature Control;
- Sustainable Light;
- Workplace Ergonomics And Environmental Quality;
- Access To The Natural Environment;
- Land Use And Transportation

A healthy building is defined as a building that safeguards its own health, protects the health of its surroundings, and places greater emphasis on the physical and mental health of builders and users throughout the building's life cycle [19]. The concept of a healthy building should be considered throughout the entire life cycle of the building design and in the post-use phase of the building [20]. This type of building is a new type of building that develops and evolves based on the entire life cycle of traditional

buildings, encompassing many dimensions such as comfort and health, living space, energy saving, environmental protection and ecological environment [18].

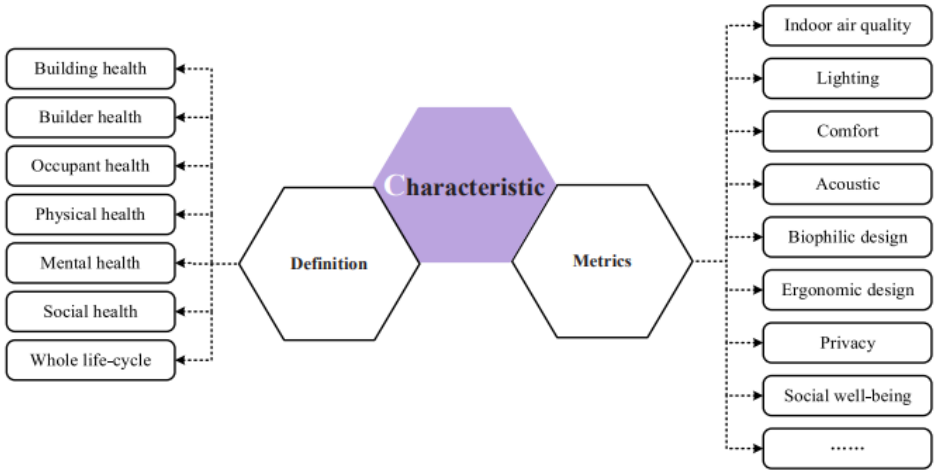

***Figure 2**. Characteristic of healthy building [9]*

The concept of healthy building, encompassing green building and sustainable building concepts, connects factors related to human health throughout the building's life cycle, including its interior and exterior environments, integrates various social resources, and is associated with the design, construction, and use phases. Modeling healthy building characteristics demonstrates what a healthy building is and the criteria it encompasses (Figure 2) [9].

Besides healthy building metrics, healthy buildings also have other indoor environmental issues such as biophilic design and ergonomic design [21]. Healthy buildings are meticulously designed and constructed with a focus on optimizing the health and well-being of their occupants [22].

A key aspect of healthy buildings is maintaining excellent indoor air quality (IAQ) through proper ventilation systems, effective filtration of pollutants, and management of volatile organic compounds [23]. Additionally, maximizing exposure to natural light while minimizing glare and providing balanced lighting levels is essential to enhance occupant well-being and support natural daily rhythms. Thermal comfort is achieved by maintaining optimal temperature levels throughout the building and reducing thermal fluctuations, which increases both comfort and productivity [22,23]. Effective sound insulation and noise control measures create quieter environments that increase concentration and reduce stress.

Healthy building is often measured by improvements in occupant health metrics. This can include reduced absenteeism due to fewer health issues, increased productivity and cognitive function, and enhanced overall well-being. Surveys and health studies are commonly used to assess these outcomes, providing evidence of the positive impacts of healthy building design on occupants [9]. Triggers represent the stimuli that drive the development of healthy buildings, including external and internal factors (Figure 3).

-Triggers for health problems

Many studies have shown that environmental problems such as global air, water and noise pollution lead to various health problems [23].

-Triggers for government

Regulations and policies are important drivers that require stakeholders to promote healthy building [24].

-Triggers for occupant

It is stated that a healthy building should prioritize the health needs of its occupants, thus meeting the physical, psychological and multi-level social needs of life [19].

-Triggers for building

Building-related health problems and sick building syndrome frequently arise, posing a concern for developers and residents. Indoor air quality, thermal comfort, lighting, and noise are considered important criteria in green buildings. Healthy buildings are recommended as a suitable complement to green buildings [25].

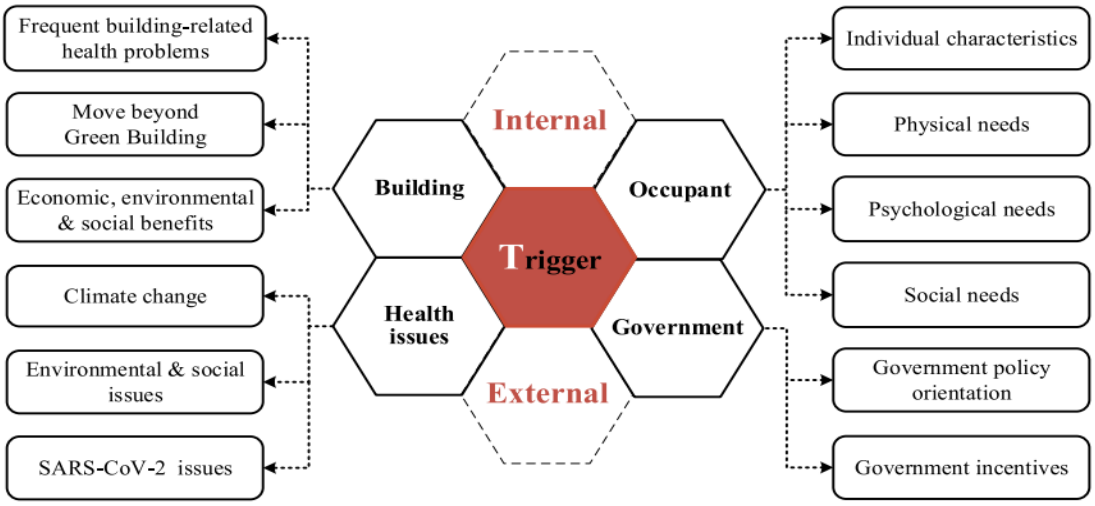

Figure 3. Triggers of the development of healthy buildings [9].

Healthy buildings can be achieved by taking precautions during the construction design and building process. For a healthy building, sound design and construction are essential for its technical functioning, mechanical stability and the basic safety of its occupants.

2.2.Well Building Stardard

Healthy buildings can be achieved through measures taken after the design, construction, and occupancy stages. Although "healthy building" is a new concept from the 2000s, it is implemented under the guidance of scientifically derived standards by certification programs such as WELL Building Standard.

The WELL Building Standard was launched in 2014 following a comprehensive expert peer review by the International WELL Building Institute (IWBI) and certified by the Green Business Certification Institute. WELL Building Standard is a new and unique performance-based rating system that focuses primarily on the health and well-being of building occupants. It aims to improve and protect the health and well-being of building occupants through on-site measurement, certification and monitoring of the built environment [25].

Although it will always be preferable to design a new healthy building from the 'ground up', these principles can be readily applied as retrofits to existing buildings. 9 Foundations, which are explored in detail (Figure 4) [26].

1. Air quality: Air quality requires the use of low-emission building materials and maintaining humidity levels between 30-60%.

2. Dust and pest control: Use vacuum cleaners with high-efficiency filters and antibacterial cleaning of surfaces.

3. Lighting and landscape use: Use lighting that provides as much daylight as possible and is enriched with blue light.

4. Moisture Control: Prevent moisture or mold growth by regularly inspecting roofs, plumbing, ceilings, and HVAC equipment.

5. Noise Control: Take measures to protect against outdoor noise and control indoor noise with mechanical equipment.

6. Ensuring safety and security: Ensuring safety and carbon monoxide standards and developing an emergency response plan.

7. Thermal health balance: Ensuring minimum thermal comfort standards for temperature and humidity.

8. Ventilation Quality: Ensuring that occupants meet or exceed local guidelines for building air quality.

9. Water Quality: Meeting relevant national standards and establishing an effective water treatment system.

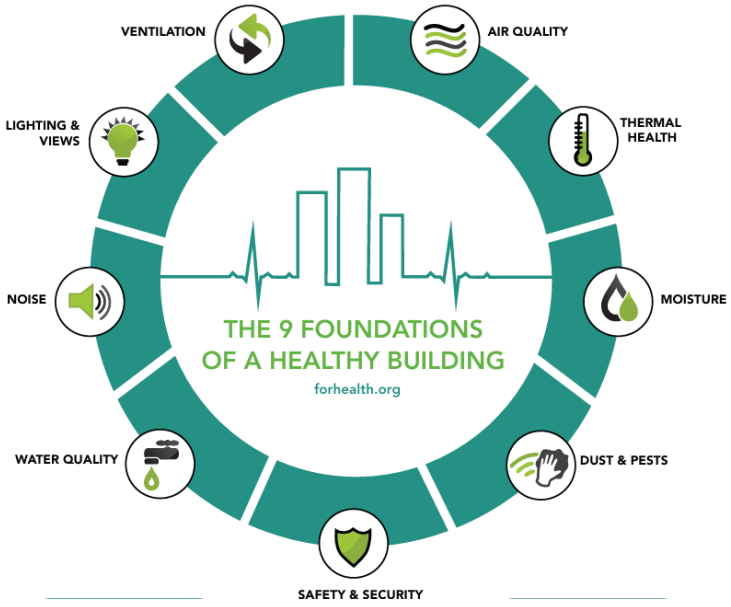

***Figure 4**. Healthy building from the 'ground up', these 9 principles [26].*

Healthy buildings emphasise occupant health and well-being, prioritising design features that enhance air quality, natural lighting, and overall comfort. Sustainable buildings on the other hand adopt a holistic approach, integrating environmental, social, and economic considerations to ensure long-term viability and resilience [27].

One of the many standards for evaluating healthy buildings is the WELL Building Standard (WELL) is an up and coming green building certification explicitly embracing comfort, health and well-being in the built

environment. The standard covers seven over-arching topics for which the indoor environment is evaluated by; Air, Water, Nourishment, Light, Fitness, Comfort, and Mind. Compared to well-established Green Building Certifications [28].

The WELL Building Standard is a performance-based system for measuring, certifying, and monitoring improved environmental features that affect human health and well-being, investigating how to optimize the design, operation, and behavior of places where people live and work [9]. The standard WELL is an environmental evaluating program to measure and observe the interior environment features which effect on well-being and health of human [29].

It is an integrated system re-inventing environment which built on its users, and transfer places lived by people who work and learn to create systems which aim to reinforce and improve well-being and human health. The standard relies on a group of medical research which discovers the relation between buildings and health affections on their users. This will help to establish built environments that work on improve nutrition, fitness, mood, and sleeping pattern [30].

Indoor air quality, temperature, humidity, and lighting are just some of the many criteria that contribute to a healthy building. Understanding these criteria will help ensure that buildings do not negatively impact occupants, employees, or the environment. The WELL Building Standard, developed by the International WELL Building Institute, comprises some of the more commonly cited criteria. (IWBI) [31].

The seven concepts of the WELL Building Standard are: Air, Water, Nourishment, Light, Fitness, Comfort, Mind. These concepts cover aspects like air and water quality, access to healthy foods, adequate lighting and views, opportunities for physical activity, thermal and acoustic comfort, and support for mental and emotional health. Another seven criteria for healthy buildings are also based on the WELL criteria that are compared below. (1) Good Air Conditioning Systems, (2) Material Health Control, (3) Lighting and Views, (4) Noise Control, (5) Good Building Plan, (6) Water Quality, and (7) Environmental Sustainability Contributes. [8].

The design process for healthy buildings is guided by concepts outlined in standards such as WELL. Table 2 shows the 11 concepts in the WELL Building standard [20].

Table 2. Eleven concepts in the WELL building standard [20].

1. Air	Promote clean air, and minimize human exposure to harmful contaminants
2. Water	Increase rate of adequate hydration in building users, reduce health risks due to contaminated water and excessive moisture, and provide adequate sanitation
3. Nourishment	Encourage healthy and sustainable eating patterns
4. Light	Promote exposure to light, and create lighting environments that improve sleep quality and positively impact mood and productivity
5. Movement	Encourage physical activity in everyday life by ensuring that movement opportunities are integrated into the fabric of the culture, buildings, and communities
6. Thermal comfort	Improve human productivity and provide a maximum level of thermal comfort among all building users
7. Sound	Bolster health and well-being by identifying and calibrating acoustical comfort parameters that shape the sound-scape of the built environment
8. Materials	Reduce human exposure, whether direct or through environmental contamination, to chemicals that may affect health during the construction, remodeling, furnishing, and operation of buildings
9. Mind	Promote mental health through policies, programs, and design strategies to address the diverse factors that influ-ence cognitive and emotional well-being
10. Community	Support access to fundamental healthcare, build a culture of health that accommodates diverse population needs, and establish an inclusive, engaged occupant community
11. Innovation	Include other strategies to create healthier environments, such as green building certification and carbon disclosure/ reduction

2.3. A Comparative Framework: Healthy Building Design with WELL Building Standards in Architecture

Architecture, acting as a "third skin," fundamentally influences human experience through physical and cognitive stimuli. A design paradigm focused on human health produces considerable social, economic, and environmental advantages [9]. The main challenge is to go from designing simple shelters to creating spaces that actively promote the well-being of their occupants. Well-being is a multidimensional state that includes a high quality of life in physical, mental, emotional, and social areas [14]. People often use the terms "healthy building design" and "well-being building design" interchangeably, but a closer look shows that they focus on different things and employ distinct evaluative frameworks.

Traditional healthy building standards mainly focus on reducing health risks and making sure people are comfortable. They often start because of specific problems, like Sick Building Syndrome (SBS), and their main goal is to stop people from getting sick or complaining [14].

The basic principles, like those described by Allen and Macomber [26], stress important operational and environmental factors: controlling sources of pollution and providing good ventilation to improve indoor air quality (IAQ), keeping mold and pests away, providing enough light, thermal comfort, and safe water quality. Most of the metrics are objective and environmental, like VOC levels in $\mu g/m^3$, lux levels, and temperature ranges. The main goal is to make the workplace safe so that people don't get sick or miss work [9,19]. This method is based on reducing risks and setting a neutral baseline for the health of the people who live there.

In contrast, standards that focus on well-being, like the WELL Building Standard, take a more proactive and holistic approach. They are based on medical and psychological research that aims not only to avoid harm but also to improve human potential [20, 26, 28]. They include all the necessary parts of a healthy building, but they also go far beyond that to include things that help people thrive. The WELL Building Standard's ideas about Mind, Nourishment, Fitness, and Light (with a focus on circadian rhythm) show how this change is happening [20, 28, 31]. These ideas are meant to help people feel better mentally and emotionally, lower their stress levels, encourage healthy behaviors, and support their mental and emotional health [20, 7, 15]. Metrics usually have both performance-based standards (like daylight simulation thresholds) and policy-based features (like making mental health support resources available and building accessible staircases to encourage movement). The goal is to move beyond a neutral state and have a positive effect on mood, cognitive function, productivity, and overall quality of life [9,20, 22] (Table 3).

Table 3. Comparison of Healthy and Well-Being Building Design Standards

Comparison Criteria	Health-Focused (Healthy) Building Design Standards	Well-Being-Focused Building Design Standards (e.g., WELL)	References
Core Philosophy & Goal	Prevention of illness, reduction of complaints, maintaining neutral/baseline health. "Do no harm" principle.	Enhancement of existing health, development of psychological and physical capacity, promotion of user "thriving."	[9, 14,16, 19,28, 22]
Primary Focus	**Physical environment & hazards:** Air quality, temperature, humidity, noise, lighting (for visual task), water quality.	**User experience & behavior:** Physical environment + Mental health, nourishment, physical activity, social connection, circadian rhythm, cognitive performance.	[15, 18, 26, 28, 31]
Design Approach	Control and mitigation of hazards (e.g., low-VOC materials, filtration). Reactive (response to problems).	Creation of opportunities for healthy behavior and positive experiences (e.g., attractive staircases, restorative spaces). Proactive (focus on potential).	[7, 19, 26, 28, 31]
Metrics & Measurement	Primarily **quantitative, objective, and environmental:** µg/m³ VOC, dB(A) noise levels, lux, temperature °C, bacterial count.	**Quantitative + qualitative and performance-based:** Daylight autonomy (sDA), circadian lighting design, accessible physical activity amenities, mental health support policies, and user satisfaction surveys.	[4, 15, 18, 23, 28, 31]
Timeframe & Impact	**Short-Medium Term:** Reduction of acute symptoms (headaches, allergies), decreased absenteeism.	**Long Term:** Reduction of chronic stress, increased life satisfaction and sense of belonging, sustained improvement in cognitive function and productivity.	[7, 9, 15, 16, 22]
Relationship with Nature (Biophilia)	Often indirect or at a basic level (e.g., ventilation for fresh air).	**Integrated as a core design principle.** Promotes direct and indirect connection through natural views, plants, water features, natural materials and patterns.	[7, 10, 18, 28]
Example Standards / Frameworks	Local building and health codes, ASHRAE Standards, WHO indoor environment guidelines.	**WELL Building Standard,** Fitwel, Living Building Challenge's "Health & Happiness" petal.	[4, 16, 19, 28, 31]

This relationship is both hierarchical and synergistic. To achieve better health outcomes, it is necessary to understand healthy building principles well. People cannot feel better in a place with poor air quality or excessive noise. However, excellent IAQ does not mean that people living there will feel better mentally or be more socially connected. The fundamental difference lies in the design goal and how results are measured. Healthy building standards ask, "Is this building safe and free from hazards?" Well-being standards ask, "Does this building actively help its occupants thrive, learn, heal, and connect?" To meet the latter, one needs to be more knowledgeable about behavioral science, biophilic design principles that address the human need to connect with nature [7, 11], and the commitment to meeting both physiological and psychological needs. Table 4 below shows how these two related but different paradigms compare in a structured way.

Table 4. Design Metrics Comparison in Healthy Building Standards and WELL Building Standard

Design Dimension/Criterion	Traditional Healthy Building Standards	WELL Building Standard	Architectural Design Response and Key Metrics
Air Quality (Air)	1. Use of low-emission building materials. 2. Humidity control maintained between 30-60% [26].	**Principles:** 1 (Air Quality) & 8 (Ventilation). 1. Source elimination and material health optimization. 2. Enhanced ventilation rates (exceeding prescribed minimums) 3. Advanced filtration (e.g., MERV 13+).	**Design Integration:** Specification of low-VOC, health product-declared materials; integrated design for cross-ventilation and dedicated outdoor air systems (DOAS); selection of high-efficiency HVAC filters. **Key Metrics:** VOC, PM2.5, and CO_2 levels (µg/m³); Air Changes per Hour (ACH).

Water Quality (Water)	Compliance with relevant national water quality standards [26].	**Principle:** 9 (Water Quality). 1. Integration of point-of-use or central filtration/purification systems 2. Regular water quality testing and monitoring protocols.	**Design Integration:** Provisioning filtration systems at building water mains or specific use points (kitchens, drinking fountains) in early-stage MEP planning. **Key Metrics:** Maximum contaminant levels for specific pollutants (e.g., lead, Legionella, total coliforms).
Lighting Design (Light)	Provision of ample daylight and/or high-intensity, blue-enriched lighting [26].	**Principle:** 3 (Lighting and Views). 1. Circadian lighting design supporting melatonin suppression and circadian entrainment. 2. Daylight autonomy (sDA) and visual connection to the outdoors. 3. Glare control strategies.	**Design Integration:** Building massing, orientation, and fenestration design optimized via daylight simulation (sDA, ASE); specification of tunable-white LED systems; integration of glare-control devices (louvers, fritting). **Key Metrics:** Spatial Daylight Autonomy (sDA300,50%); Equivalent Melanopic Lux (EML); Unified Glare Rating (UGR).
Thermal Comfort (Comfort)	Meeting minimum thermal comfort standards for temperature and humidity [26].	**Principle:** 7 (Thermal Health). 1. Provision for individual thermal controllability (local thermostats, operable windows). 2. Control of radiant temperature asymmetrical and draft risk.	**Design Integration:** Zoning strategies for HVAC controls; design for operable fenestration within façade systems; use of thermal mass and insulation to mitigate surface temperature fluctuations. **Key Metrics:** Predicted Mean Vote (PMV) / Predicted Percentage Dissatisfied (PPD) index; operative temperature range; local air speed.
Acoustic Performance (Comfort)	Protection from outdoor noise and control of indoor noise from mechanical equipment [26].	1. Maximum background noise levels (NC/RC curves) and reverberation time (RT) criteria 2. Sound transmission performance requirements for partitions.	**Design Integration:** Spatial programming for noise buffer zones; specification of sound-absorbing finishes (NRC); structural design for flanking noise control (STC ratings). **Key Metrics:** Background noise levels in dB(A); Reverberation Time (RT60); Sound Transmission Class (STC).
Physical Activity & Nourishment (Fitness & Nourishment)	Access to the natural environment [18].	1. Design of attractive, centrally located, and well-lit staircases to promote incidental activity. 2. Provision of infrastructure for healthy food preparation and storage (refrigeration, pantries) 3. Interior circulation design encouraging movement.	**Design Integration:** "Stairs-before-elevators" circulation hierarchy; dedicated spaces for food storage/prep in floor plans; design of internal active pathways. **Key Metrics:** Accessibility to primary staircases; availability and quality of spaces supporting healthy eating behaviors.
Mental & Emotional Well-being (Mind)	Access to views and green spaces [18].	1. Comprehensive integration of biophilic design patterns [7, 11]. 2. Dedicated restorative spaces and retreat areas. 3. Design features that reduce stress and foster a sense of community and place.	**Design Integration:** Application of direct (plants, water features, vistas) and indirect (natural materials, fractal geometries, dynamic light) biophilic elements; programming of contemplative niches and social hubs. **Key Metrics:** Diversity and intensity of biophilic design elements; accessibility and quality of designated restorative spaces.
Core Design Philosophy	**Reactive & Protective:** Mitigating existing health hazards to establish a neutral baseline. Focus on "do no harm." [16, 26]	**Proactive & Enhancing:** Augmenting physical and cognitive potential, promoting salutogenic behaviors. Focus on "enable thriving." [12, 28]	**Architectural Implication:** Traditional approaches provide a *prescriptive framework* for meeting minimum code requirements. WELL, offers a *performance-based guide and certification roadmap* that dictates targeted outcomes and user experiences, deeply informing design decisions [9, 31]

The WELL Building Standard, on the other hand, tells the architect "what performance outcome and user experience they need to achieve" (for example, a certain light level that supports circadian health and a spatial quality that encourages rest). Traditional standards tell the architect "what they need to provide" (for example, low VOC). This makes the architectural design process more than just choosing materials and systems. It also connects it to the quality of the space, the psychology of the user, and the behavioral sciences.

3. METHODOLOGY

This study employs a qualitative research design focusing on a comprehensive and critical literature review to evaluate the characteristics of healthy buildings within the context of the WELL Building Standard. The WELL Building Standard is a voluntary rating system developed in recent years to support, protect, and promote the health and well-being of building occupants. While studies on the application of WELL in buildings have been increasing, the system has not yet been fully adopted. This study aims to provide an overview of the current state and trends in the literature, the scope of the effectiveness of WELL use in buildings, and further information about this new standard. Articles examining healthy buildings from the perspective of sustainable green buildings and biophilic design were researched, reviewed, and examined in detail, and a comparative analysis was conducted. The main goal is to bring together what we currently know about architecture, public health, environmental psychology, and building science to create a clear, evidence-based picture of how health-focused criteria can be used in architectural design and to show how the WELL Building Standard fits into this picture.

3.1.Research Design: Qualitative Literature Synthesis

The study employs a descriptive and conceptual synthesis model for qualitative literature review [4, 14]. This design is selected to delineate the evolution, definitions, and interconnections of fundamental concepts such as "healthy building" and the "WELL Building Standard," while synthesizing insights from various disciplines into a cohesive framework [20]. The process is not intended to produce new primary data; rather, it focuses on organizing, assessing, and interpreting the existing corpus of academic and professional knowledge to establish conceptual clarity and a foundational evaluative framework for the discipline [9, 20,22].

3.2.Data Collection: A systematic search strategy and selection criteria

Data collection adhered to a structured protocol founded on established systematic search and selection criteria to guarantee transparency and replicability. A systematic search was performed across multidisciplinary databases such as Scopus, Web of Science, PubMed, and the Avery Index to Architectural Periodicals. This search was also conducted at the official resource library of the International WELL Building Institute (IWBI). The study was used keyword combinations like: ("healthy building" OR "well building standard") AND ("architecture" OR "design"); ("biophilic design" OR "salutogenic design") AND ("health" OR "well-being"); and ("indoor environmental quality" OR "IAQ") AND ("productivity" OR "cognitive function") [20].

The search primarily concentrated on literature published between 2000 and 2024 to encompass contemporary advancements, while seminal theoretical works essential to the field's foundation [8, 16] were included regardless of publication date.

The review included peer-reviewed journal articles, scholarly books, reputable industry reports, and standard documentation (for example, the WELL guidebook). Sources were chosen because they were directly related to:1) defining or assessing healthy buildings or the WELL Building Standard) talking about biophilic design principles and how they affect health; 3) showing research on how the built environment affects the physical or mental health of people who live there (for example, [7, 15, 16].

Studies that concentrate exclusively on energy efficiency without considering occupant health, publications situated outside architectural contexts, commentaries based solely on opinion lacking empirical or theoretical support, and sources unavailable in English or Turkish were omitted.

3.3. Data Analysis: Thematic and Comparative Content Analysis

The fundamental concepts of the WELL Building Standard (Air, Water, Nutrition, Light, Fitness, Comfort, Mind) and core cross-themes such as Biophilic Design and Definitions of Healthy Buildings. A comparative

content analysis was conducted simultaneously [4]. Key documents, particularly the WELL Building Standard, general healthy building principles [18, 26], and literature discussing alternative green building certification systems referenced in the literature were reviewed. The aim was to conduct a structured comparative analysis that would directly compare the criteria and metrics of the WELL Building Standard with the broader healthy building characteristics found in the literature [14, 19]. This method allowed for an objective assessment of the Standard's scope, focus, and unique contributions.

3.4.Putting things together and mapping out the framework

The last step was to combine the results from both analytical methods. The thematic analysis identified characteristics, strategies, and metrics that were explicitly aligned with the structured concepts of the WELL Building Standard under the overarching "Healthy Building Concept" theme. This synthesis and mapping exercise constituted the principal method for assessing the comprehensiveness and specificity of the WELL Building Standard in relation to the complex dimensions of occupant health as delineated by current research [28, 31]. The result is a unified, analytical framework that emphasizes synergies and clarifies the role of the WELL Building Standard within the wider context of health-promoting architectural design.

3.4. Limitations of Methodology

This study is inherently constrained by the scope, quality, and accessibility of existing published research, given its literature-based review nature. It lacks primary data collection via case studies, post-occupancy evaluations, or surveys, which could provide additional empirical validation and contextual depth. Nonetheless, this methodological approach yields an essential and rigorous foundational synthesis, creating a distinct, evidence-based conceptual framework for subsequent empirical and applied research [9, 22].

4. CONCLUSION AND RECOMMENDATIONS

This study has assessed the concept of healthy building design using the extensive framework of the WELL Building Standard, integrating evidence from architecture, public health, and environmental psychology. The analysis produces three principal findings. First one is the WELL Building Standard which puts into action a mandate for holistic health. The WELL Building Standard offers a framework that includes approximately more health-focused criteria than basic green building standards; it provides improvements not only in energy efficiency and hazard reduction, but also in mental health, nutrition, fitness and cognitive support, by controlling adverse effects [20,28, 31]. To fully utilize the principles of the WELL Building Standard, they need to be integrated into the architectural design process from the very beginning, starting with programming and schematic design, through specifications and post-occupancy evaluation [24]. Evidence shows that buildings constructed according to these standards can increase occupant productivity and reduce absenteeism related to sick building syndrome [9, 20,22].

This study adds to the theoretical conversation by suggesting a Health-First Design Framework. This framework places occupant health not as a subordinate advantage of sustainable design, but as the principal aim and foundational principle. It further advances an integrated model that lets you compare how different standards deal with all aspects of human health. Finally, it offers an Evidence-Based Design Decision Matrix that helps architects choose the changes that will have the biggest effect on well-being [9, 14].

This study translates its findings into actionable tools for the profession to bridge the gap between theory and practice. It suggests a toolkit for architectural field for practical contribution. A checklist for a Health Impact Assessment (HIA) is a step-by-step guide for architects to use at each stage of a project to check their design choices against important WELL Building Standard ideas. A Template for Client Education and Involvement is a structured presentation that explains the value of healthy buildings by connecting design features to real health and financial benefits. Specification Guidelines for Healthy Materials is a

carefully chosen list of materials that are low in emissions and have been verified by standards like Declare Labels and Cradle to Cradle certification to make it easier to choose materials.

This research recognizes specific constraints. It has a global reach in terms of geography and culture, so WELL Building Standard strategies need to be adapted to fit the specific weather, laws, and social situations in each area. The conclusions are limited by the present availability of longitudinal data; additional long-term studies are required to accurately quantify the lifetime health benefits. Moreover, the inconsistency in industry adoption rates and the perception of upfront costs continue to pose substantial obstacles to widespread implementation, which this research can illuminate but not completely rectify.

Based on this investigation, important points for future research include strengthening the evidence base, conduct longitudinal (5–10 year) health impact studies in WELL-certified buildings. Also, creating more detailed cost-benefit analysis models for different types of buildings, like schools, hospitals, and offices. Looking into how digital twins can be used to model and predict health performance outcomes during the design phase. Looking into AI-assisted design optimization tools that can automatically suggest changes to designs to improve health metrics.

Healthy buildings are still in the work. They are not as well-developed as established green building movements in terms of policy, technical systems, and market maturity. But as health problems around the world get worse, the proof is clear: architecture is a key factor in health [16, 18]. The ongoing absence of compulsory health and well-being emphasis in architectural education and regulation signifies a significant knowledge deficiency [10].

The shift from stopping sick buildings to promoting health is a necessary change in the way architecture works. This study gives us both the proof and the tools we need to make this change possible. It makes the case for a future where space design is naturally measurable, restorative, and thriving, meeting the needs of everyone who lives there. To make this vision a reality, public health professionals, architects, and urban planners will have to work together in ways that have never been done before. By taking this integrated, health-first approach, architects can firmly establish their role as an important part of public health in the built environment. They can design not only shelters, but also things that make people feel better. The WELL Building Standard appears to be an innovative and user-centric framework that closely aligns with the fundamental characteristics of healthy buildings outlined in the existing literature, particularly those related to the physical and psychological well-being of users.

This study was obtained by conducting a literature review and making conceptual comparisons. It concludes that healthy buildings are an extension of green buildings. The future of green building development is about adopting and adapting the features of healthy building standards, and this will determine the future direction of architecture. In the event of widespread adoption, healthy buildings with smart technologies are expected to draw greater attention to ecological and ecosystem services, becoming the defining criterion for health.

REFERENCES

[1] Bonnefoy, X. R., Annesi-Maesona, I., Aznar, L. M., Braubachi, M., Croxford, B., Davidson, M., Ezratty, V., Fredouille, J., Ganzalez-Gross, M., van Kamp, I., Maschke, C., Mesbah, M., Moisonnier, B., Monolbaev, K., Moore, R., Nicol, S., Niemann, H., Nygren, C., Ormandy, D., Röbbel, N., & Rudnai, P. (2004). *Review of Evidence on Housing and Health*. Fourth Ministerial Conference on Environment and Health.

[2] Dorgan Associates. (1993). *Productivity and Indoor Environmental Quality Study*. National Management Institute.

[3] Fisk, W. J. (2000). Review of health and productivity gains from better IEQ. In *Proceedings of Healthy Buildings 2000, Helsinki, Finland* (Vol. 4, pp. 22–34).
[4] Obrecht, T. P., Kunič, R., Jordan, S., & Dovjak, M. (2019). Comparison of health and well-being aspects in building certification schemes. *Sustainability, 11*(9), 2616. https://doi.org/10.3390/su11092616
[5] Harari, M., Waehler, C., & Rogers, J. (2005). An empirical investigation of a theoretically based measure of perceived wellness. *Journal of Counseling Psychology, 52*(1), 93–103.
[6] Minucciani, V., & Saglar Onay, N. (2018). Evaluation of design approaches for well-being in interiors. *Journal of Engineering and Architecture, 6*(1), 112–122.
[7] Gillis, K., & Gatersleben, B. (2015). A review of psychological literature on the health and wellbeing benefits of biophilic design. *Buildings, 5*(3), 948–963. https://doi.org/10.3390/buildings5030948
[8] Chairiyah, R. (2023). Biomimicry Architecture for Healthy Built Environment: A Review of Existing Literature. IOP Conference Series: Earth and Environmental Science, 1218, 1-8. https://doi.org/10.1088/1755-1315/1218/1/012027.
[9] Liu, H., Xu, X., Tam, V. W. Y., & Mao, P. (2023). What is the "DNA" of healthy buildings? A critical review and future directions. *Renewable and Sustainable Energy Reviews, 183*, 113460. https://doi.org/10.1016/j.rser.2023.113460
[10] Rice, L. (2019). The nature and extent of healthy architecture: the current state of progress. Archnet-IJAR: International Journal of Architectural Research, 13(2), 244–259. https://doi.org/10.1108/ARCH-11-2018-0005
[11] Kellert, S. R., & Wilson, E. O. (Eds.). (1993). *The biophilia hypothesis*. Island Press.
[12] Quesada-García, S.; Valero-Flores, P.; Lozano-Gómez, (2023). M. Towards a Healthy Architecture: A New Paradigm in the Design and Construction of Buildings. Buildings 2023, 13, 2001. https://doi.org/10.3390/buildings13082001.
[13] Al Alwan H,and Saleh E. (2020). Similarities and differences between green, sustainable and healthy building concepts. Proceedings of the 1st international multi-disciplinary conference theme: sustainable development and smart planning. https:// doi.org/10.4108/eai.28-6-2020.2297889.
[14] Jarden, A., & Roache, A. (2023). What is wellbeing? *International Journal of Environmental Research and Public Health, 20*(6). https://doi.org/10.3390/ijerph20065006
[15] Watson, K. J. (2018). Establishing psychological wellbeing metrics for the built environment. *Building Services Engineering Research and Technology, 39*(2), 232–243. https://doi.org/10.1177/0143624418754497
[16] Joshi, S. M. (2008). The sick building syndrome. *Indian Journal of Occupational and Environmental Medicine, 12*(2), 61–64. https://doi.org/10.4103/0019-5278.43262
[17] Lin, Y., Yuan, X., Yang, W., Hao, X., & Li, C. (2022). A review on research and development of healthy building in China. *Buildings, 12*(3), 376–407. https://doi.org/10.3390/buildings12030376
[18] Loftness, V., Hakkinen, B., Adan, O., & Nevalainen, A. (2007). Elements that contribute to healthy building design. *Environmental Health Perspectives, 115*(6), 965–970. https://doi.org/10.1289/ehp.8988
[19] Mao, P., Qi, J., Tan, Y., & Li, J. (2017). An examination of factors affecting healthy building: an empirical study in east China. *Journal of Cleaner Production, 162*, 1266–1274. https://doi.org/10.1016/j.jclepro.2017.06.165
[20] WELL. (2018). The WELL Building Standard (v2). International WELL Building Institute. Delos Living LLC. Accessed 20.08.2025, https://v2.wellcertified.com/en.
[21] Chowdhury, S., Noguchi, M., & Doloi, H. (2023). Methodological approach of environmental experience design to enhancing occupants' well-being. *Buildings, 13*(2), 542. https://doi.org/10.3390/buildings13020542
[22] Santiago, Q., Pablo, V., & Maria, L. (2023). Towards a healthy architecture: A new paradigm in the design and construction of buildings. *Buildings*, 1-21.

[23] Clegg, F., Sears, M., Friesen, M., Scarato, T., & Russel, C. (2020). Building science and radiofrequency radiation: What makes smart and healthy buildings. *Building and Environment*, 1-15.
[24] Darko, A., Zhang, C., & Chan, A. P. C. (2017). Drivers for green building: A review of empirical studies. *Habitat International*, *60*, 34–49. https://doi.org/10.1016/j.habitatint.2016.12.007
[25] Xie, H., Clements-Croome, D., & Wang, Q. (2017). Move beyond green building: a focus on healthy, comfortable, sustainable and aesthetical architecture. *Intelligent Buildings International*, *9*(2), 88–96. https://doi.org/10.1080/17508975.2016.1139536
[26] Allen, J., & Macomber, J. (2020). *Healthy Buildings: How Indoor Spaces Drive Performance and Productivity*. Harvard University Press.
[27] Dauda, J. A. (2024). *Exploration of Healthy Building Concepts Within Green and Sustainable Building Practises*, SEED 2024 Conference, Leeds Beckett University, UK, 1-11.
[28] Rice, L., & Drain, M. (2020). The WELL Building Standard: A tool for advancing occupant health and well-being in the built environment. *Journal of Green Building, 15*(4), 43–60. https://doi.org/10.3992/1943-4618.15.4.43
[29] Darwish, B. H., Rasmy, W. M., & Ghaly, M. (2022). Applying "well building standards" in interior design of administrative buildings. *Journal of Art & Architecture Research Students, 3*(5), 67–83. https://doi.org/10.47436/JAARS.2022.124889.1073
[30] Mak, M. Y. (2017). Beyond sustainability: Shift from buildings towards human. In *Proceedings of the 23rd Annual PRRES Conference, Sydney, New South Wales*.
[31] Tan, C. Y. M., & Rahman, R. A. (2023). WELL Building: Key Design Features for Office Environments. *Journal of Architectural Engineering,29*(2), 04023011. https://doi.org/10.1061/JAEIED.AEENG-1544

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