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A Literature Review on the Benefits of Healing Gardens

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Abstract: Healing gardens can be traced back to the Greeks at the end of the sixth century B.C. when they used healing centers in temples with the specific usage of natural spring water. Despite the well-known benefits of healing gardens, most healthcare facilities do not include them as part of their process to cure. Thus, this paper aims to explore and provide evidence for the potential benefits of healing gardens for health and well-being in healthcare facilities. Several important research has examined the advantages of healing gardens in hospitals. In addition, there has been an increase in the use of salutogenic and biophilic design approaches in healthcare environments over the last decade. Through a literature review and analysis of successful healing gardens, this paper demonstrates the importance of healing gardens for physical, mental, and emotional health and recommends their incorporation in healthcare facilities as a standard policy.
Keywords: Garden, biophilia, healthcare facilities, salutogenic.

Introduction

The salutogenic paradigm of health emphasizes comprehending the sources of health rather than solely concentrating on the roots of illness (Mittelmark & Bull, 20139. Health promotion research should also examine affirmative aspects of well-being. This philosophy coincides with the ethos of healing gardens, which aim to design surroundings that foster tranquility, stress reduction, and a sense of well-being (Eriksson, 2017).

The idea of connecting health and gardens has been present since ancient times, with evidence dating back to the Middle Ages, the Roman Empire, and the Persian Empire (Marcus & Barnes, 1999). Monks in the medieval period believed that hospitals should be situated in areas of natural beauty to aid in the rehabilitation process. While modern scientists explain this connection through semiotics, inborn reflexes, and restorative experiences, ancient myths also highlight the bond between man and garden. The Garden of Eden, Paradiszia of the Persians, and Arcadia of ancient Greece are just a few examples. The allure of enclosed gardens in myths throughout the world can be attributed to a yearning for beauty (Stigsdotter & Grahn, 2002). However, over time, the relationship between healing and nature was suppressed, leading to a gradual separation between the attention given to the body and the spirit.

The concept of a healing garden is gaining popularity worldwide and this is where the concept of biophilia becomes relevant, as it highlights the inherent human need to connect with nature. Physical surroundings can have an unconscious influence on people, in this context, incorporating the principles of biophilia in designing healing gardens can have a significant impact on the visitor's well-being and overall experience (Newman, 2014). Biophilic design is a philosophy that advocates for the use of natural systems in the construction of environments or the incorporation of natural elements such as images, drawings, and structures to evoke a sense of being in nature. The benefits include cooling of spaces (especially as the urban heat island effect increases with climate change), increased capture of rainwater to avoid flooding, reduced energy needs in buildings due to the insulation provided by plant life, improved biodiversity, and improved health (Gills & Gatersleben, 2015;).

Given the proven biopsychosocial benefits of human interaction with nature, the concepts of salutogenesis and biophilia have been used as a tool to the applicability of healing gardens in hospital environments to improve the well-being, comfort, and productivity of people who are constantly visiting them. Therefore, the objective of this literature review is to show the importance of healing gardens in improving physical, mental and emotional health and propose policy recommendation for healthcare facilities.

The History of healing gardens

The concept of healing gardens has roots dating back to the earliest large cities in Persia, China, and Greece, where it was believed that viewing nature could reduce stress. This idea is supported by a variety of contemporary theories, including cultural and evolutionary positions, which suggest that natural scenes tend to reduce stress while settings lacking nature hinder recovery from stress (Ulrich & Parsons, 1992). Healing gardens have existed in ancient Egypt as a means to seek refuge from harsh environmental conditions. In addition, the elaborate design and careful selection of plants in

monastery and medival gardens were believed to alleviate patient's pain. (Golestani & Zahedan, 2017).

During the Middle Ages, monastery gardens were utilized as therapeutic and healing spaces in hospitals. Patients' rooms were strategically situated to overlook the hospital gardens, providing them access to sunshine, seasonal flowers, rest areas, and footpaths. An excellent example of this design can be seen in the Saragossa hospital in Spain, built in 1409, which inspired landscape designers of that time. Instead of being confined to their rooms, patients at Saragossa were treated in the hospital garden and could interact with one another outdoors throughout the day. The European Romanticism Movement of the 18th century brought about significant changes in the design of hospital facilities and grounds. The theory linking medical therapy to the presence of a natural environment around hospitals was revived. Romanticism aimed to unify human emotions with morals and nature. However, in the 20th century, advancements in medical science, urbanization, technological developments, and other economic forces led to the neglect of the external areas of many hospitals (Anthopoulos & Georgi, 2011) so, the concept of nature as a healing aid had been completely lost, and nature "landscaping" was reduced to a mere green decoration. However, in the 1990s, the idea of healing gardens regained interest and reemerged in the research field of sustainable landscape. Over the last few years, healing gardens are gaining popularity as a result of the challenging living and environmental conditions that people are facing worldwide (Pouya & Demirel, 2015).

The benefits of healing gardens

At the beginning of humanity, evolution occurred through adaptive responses to natural conditions and stimuli, such as sunlight, plants, animals, water, and landscapes. However, with the new technological era, there is an idea that humans can ignore their association with nature. In reality, the depletion of the natural environment leads to a modification of individual's perception (Zhong et al., 2022).

In 1980, the biologist Edward O. Wilson defined biophilia as "the inherent human inclination to affiliate with natural systems and processes, especially life and life-like features of the nonhuman environment" (Kellert & Calabrese, 2008). Biophilia, a concept that is founded on the principles of salutogenesis, is inherent because it doesn't arise from experience, and emotions because it has the potential to influence aspects related to psychology and well-being.

Theories developed in the literature of environmental psychology, the Attention Restoration Theory and the Stress Recovery Theory, suggest that some environments are stressful, some are not, and there are those that help people recover from stress and mental fatigue. Environments that evoke positive emotions are generally those that capture people's attention in a non-demanding and non-stressful way, allowing for a quick recovery from mental fatigue. In contrast, urban environments tend to be very demanding, stressful or boring. Therefore, biophilia suggests that environments can become more positive by incorporating natural elements (Gillis & Gatersleben, 2015).

It has been proven that contact with nature: improves healing and recovery from illnesses or surgeries; maintains ideal physical and psychological health; reduces social problems; improves cognitive functions in concentration and memory-related tasks; provides healthy child development; among others (Panagopoulos et al., 2020). Besides that, contact with natural environments is related to an increase in serotonin levels, the neurotransmitter responsible for improving mood and well-being. Thus, it induces a lower perception of pain in patients, and it is possible to observe reductions in the use of painkillers and drops in healthcare spending (Zhong et al., 2022). Given the various arguments in favor of the benefits of nature presented by the concept of biophilia, healing gardens have emerged as a way to incorporate this philosophy into healthcare settings, making them a potentially valuable resource for health centers. The term "healing gardens" is commonly used to describe gardens that are designed to promote health recovery. However, the concept of "healing" within the context of healthcare is not limited to curing a specific illness but encompasses an improvement in overall well-being, including spiritual and physical aspects. As a result, many healthcare institutions have increasingly incorporated therapeutic landscape design into their facilities (Pouya & Demirel, 2015).

Healing gardens in healthcare facilities

Recently, healthcare facilities are adopting a patient-centered perspective, considering not only their physical needs but also social and psychological. Modifying hospitals through the humanization of spaces and mainly through reconnection with nature offers therapeutic support that can positively impact patient's physical and psychological well-being. It can also help in their acceptance of diagnoses, and rapid recovery. In addition to the benefits related to patients, creating more green spaces can improve an organization's efficiency levels and contribute to economic benefits, either by increasing workers' well-being or reducing health-related costs (Totaforti, 2018). Designing a healing garden requires prioritizing the emotional state of the person in the space. The goal is to create an environment that reduces stress, and promotes comfort, safety, and invigoration. Since there is a connection between the mind and body, the design of the garden should aim to alleviate negative feelings by promoting positive emotions such as being soothed, comforted, distracted, interested, hopeful, thoughtful, safe, and even invigorated (Eckerling, 1996).

Ulrich (1993) observed significant beneficial effects for those who could see a natural landscape from their window. Specifically, patients with a room overlooking a green area had a shorter post-operation hospital stay and required less analgesic medication compared to patients in similar rooms overlooking a built environment. Ulrich's research indicates that viewing

greenery and nature reduces hospitalization time by 8%. Furthermore, plants in hospital rooms and rooftop gardens have been shown to enhance patient's psychological response to treatment, resulting in lower levels of pain, anxiety, and fatigue.

The former hospital of Sant Pau 1916-2009 (Figure 1) is an exemplary showcase of the benefits to incorporate nature into healthcare facilities. The gardens were thoughtfully designed to provide patients with a peaceful and serene environment. Native species of water-resistant trees and plants were strategically placed to withstand temperature changes, while winter gardens with sunlit trees and summer gardens with shady trees and plants created a comfortable atmosphere. These gardens not only enhanced the hospital's aesthetic appeal but also improved the air quality, making the space healthier. Today, the gardens still retain the original architect's layout with 60 varieties of trees, including an array of aromatic plants, the gardens support a high level of biodiversity.

Figure 1: The UNESCO World Heritage Sant Pau Hospital in Barcelona, Spain.

The Emergency Pediatric Unit of Hospital Aliança in Salvador, Brazil (Figure 2) features a healing garden that provides a therapeutic environment for children who are hospitalized. The garden is designed to encourage exploration and movement of the patients, with sculptures of animals, caves, flowers, small rivers, benches, swings and trees. For children who are confined to a hospital bed, this garden provides an opportunity to get outside and interact with nature, which has been shown to have a positive impact on well-being and rapid recovery. The garden is also a place for families to gather and find relief during what can be a stressful and challenging time.

One of the applications of healing gardens is therapeutic horticulture. This practice is worldwide in various healthcare environments, for example, in intensive and palliative care. This use is extensively studied among adults with visual impairment, elderly individuals with diagnosed dementia, and individuals with autism or sensory deficits (Soderback et al., 2004). Various types of plants have been tested to identify which are most beneficial in psychological and physiological contexts. Results indicate that small, green, and mildly fragrant plants were most ideal for health and well-being. Therefore, it is important to have areas that focus on providing external air, onsite food production, daylight, and circadian lighting (Abdelaal, Soebarto, 2019). That kind of biophilic environment can stimulate three stages of recovery or restoration: (1) understanding the pain or illness (comprehensibility); (2) gaining confidence that coping resources are available (manageability); and (3) becoming motivated to cope (significance) (Abdelaal, Soebarto, 2019).

Figure 2: Emergency Pediatric Unit of Hospital Aliança in Salvador, Brazil

The Khoo Teck Puat (KTP) Hospital in Singapore, is the world's first biophilic hospital. This structure features a green roof built to hold additional weight, allowing for the cultivation of vegetables, fruit trees (a total of 140 trees), and aromatic plants. The hospital manages the garden, and the produce is sold in the hospital canteen to offset the cultivation expenses. The structure is known as a "hospital in a garden" and includes green walls, balconies, and gardens on various levels, including lakes with 92 different fish species, so every bed and office is encompassed by plants. While the evidence for better healing rates is not fully analyzed, anecdotal evidence reveals that people recover more quickly and are happier in KTP. The environment reduces blood pressure and heart rates as soon as people enter. So far, CEO Liak Teng Lit states that KTP has discovered 32 butterfly species and 24 bird species living in the green spaces. The green roofs and landscaped areas capture and re-use about 12% of rainwater. KTP's energy consumption is 30% lower than comparable new hospitals, saving $1 million annually. However, the health productivity benefits of biophilic elements outweigh the financial savings (Newman, 2014).

The Rehabilitation Clinic at Danderyd Hospital in Sweden uses horticultural therapy to 46 patients between the ages of 18-65 with brain damage (Söderback et al., 2014). Horticultural therapy includes the following forms: imagining nature, seeing nature, visiting a hospital healing garden, and most importantly, real gardening. It was expected to influence healing, relieve stress, increase well-being, and promote social participation and re-employment for people with mental or physical illness. The design of the outdoor environment, adaptations of gardening tools, cultivation methods, and plant materials were integrated into the Horticultural Therapeutic Garden. The therapy program

aims to mediate mental healing, promote recreation, encourage social interaction, stimulate the senses, facilitate cognitive reorganization, and provide sensory-motor function training. It includes an evaluation of pre-vocational skills and teaching of ergonomic body positions. The garden features a diverse array of plant materials that bloom in various seasons, attract birds and butterflies, and have leaves or grass that sway gently in the breeze. Gardening with the aim of sensory stimulation or integration is believed to provide patients with severe brain damage and reduced consciousness with sensory stimulation via responses to different plant materials. This study confirmed that horticultural therapy leads to emotional, cognitive, and/or sensory-motor functional improvement, increases social participation, health, well-being, and greater life satisfaction.

Conclusion

Given the essential role of healing gardens in promoting positive health outcomes, there is a pressing need to recognize them as a crucial component of healthcare policy. As we move towards a more modern healthcare system, it is essential to remember our past, in ancient civilizations, and the importance of connecting with nature. Even in instances where space constraints limit outdoor garden's feasibility, innovative solutions such as biophilic spaces inside the building can be incorporated, as demonstrated by the "Covent Garden" at a modern hospital in Portugal (Figure 3).

Figure 3: Algarve Private Hospital - Gambelas - HPA Health Group in Faro, Portugal.

By integrating healing gardens into healthcare centers, we can enhance patients and staff's physical and mental health, contributing to the overall improvement of healthcare outcomes. Considering these benefits, it is crucial to rediscover nature's therapeutic effects and leverage them to create more effective healthcare policies, particularly as many hospitals have yet to fully recognize and integrate healing gardens into their practices. Just like Kaitlyn Gillis (2021) said: "By moving beyond thinking of nature as a place to go, and instead integrating it throughout cities, using nature as a foundation to be built around and not vice versa, people will benefit".

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References

Abdelaal, M.S. and Soebarto, V. (2019), Biophilia and Salutogenesis as restorative design approaches in healthcare architecture. *Architectural science review*, 62(3), 195-205.

Anthopoulos, P.K. and Georgi, N.J., (2011), Landscape preference evaluation for hospital environmental design. *Journal of Environmental Protection*, 2, 639-647

Eckerling, M. (1996), Guidelines for designing healing gardens. *Journal of Therapeutic Horticulture*, 8, 21-25.

Eriksson, M. (2017), The sense of coherence in the salutogenic model of health. *The handbook of salutogenesis*, 91-96.

Gillis, K. and Gatersleben, B. (2015), A review of psychological literature on the health and wellbeing benefits of biophilic design. *Buildings*, 5(3), 948-963.

Gillis, K. (2021), Nature-based restorative environments are needed now more than ever. *Cities & health*, *5*, S237-S240.

Golestani, S., and Zahedan, A. (2017), The Landscape of Hospital Areas. *MANZAR, the Scientific Journal of landscape*, *9*(38), 48-5.

Kellert, S. and Calabrese, E. (2015), The practice of biophilic design. *London: Terrapin Bright LLC*, 3, 21.

Marcus, C.C. and Barnes, M. (1999), Healing gardens: Therapeutic benefits and design recommendations. John Wiley & Sons.

Mittelmark, M.B. and Bull, T. (2013), The salutogenic model of health in health promotion research. *Global Health Promotion*, 20(2), 30-38.

Newman, P. (2014), Biophilic urbanism: a case study on Singapore. *Australian planner*, 51(1), 47-65.

Panagopoulos, T., Sbarcea, M. and Herman, K. (2020), A biophilic mindset for a restorative built environment. *Landscape Architecture and Art*, 17(17).

Pouya, S. and Demirel, Ö. (2015), What is a healing garden?. *Akdeniz Üniversitesi Ziraat Fakültesi Dergisi*, 28(1).

Söderback, I., Söderström, M. and Schälander, E. (2004), Horticultural therapy: the 'healing garden'and gardening in rehabilitation measures at Danderyd Hospital Rehabilitation Clinic, Sweden. *Pediatric rehabilitation*, 7(4), 245-260.

Stigsdotter, U. and Grahn, P. (2002), What makes a garden a healing garden. *Journal of therapeutic Horticulture*, 13, 60-69.

Totaforti, S. (2018), Applying the benefits of biophilic theory to hospital design. *City, Territory and Architecture*, 5(1), 1-9.

Ulrich, R.S. (1993), Biophilia, biophobia, and natural landscapes. *The biophilia hypothesis*, 7, 73-137.

Ulrich, R.S. and Parsons, R. (1992), Influences of passive experiences with plants on individual well-being and health. *The role of horticulture in human well-being and social development*, 93, 105.

Zhong, W., Schröder, T. and Bekkering, J. (2022), Biophilic design in architecture and its contributions to health, well-being, and sustainability: A critical review. *Frontiers of Architectural Research*, 11(1), 114-141.