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Rehabilitation Centers as Healing Environment

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ABSTRACT: Healing is the process of re-establishing harmony within the organism. Illness implies a loss of this balance and the need for reintegration with the body's natural ability to heal and regenerate. While, the human body has the ability to heal when put in a healthy and positive environment.

Recently, the built environment is increasingly recognized to influence people and their wellbeing. But an integrated framework that is orientated towards architectural design is still missing.

This paper demonstrates the possibility of impact of place on human's health and examine the variable of healing environment applied in rehabilitation Center and analysis opinion of the architects. The method used in this research is a comparative study method with qualitative discussion. By the end, the principles of healing environment spaces are established such that healing represents a practical philosophy; it serves as the concept generator in the design process, and it has become a priority as a concept for interior architecture. The paper also aims to encourage the qualities and elements of the healing environment space according to its main requirements, and their effect on users' performance, enhancing architectural products to achieve high quality.

KEYWORDS: Healing Environment - Rehabilitation Centers – Healthy Building- Energy Balance Design - Optimal Healing Environment.

I. INTRODUCTION

More studies have found that humans need positive healing energies to enhance self-healing process, especially in Rehabilitation centers.

The International Union of Architects—Public Health Work Program, known widely as the Public Health Group (UIA-PHG), has recently made an important shift. From its traditional, relatively narrow emphasis on healthcare design, the PHG since 2020 is now focused broadly on design for health, of which healthcare is an important part, but only a part. The three dimensions of this new PHG vision are modeled after the three-fold program emphasis at Texas A&M University in the Center for Health Systems & Design: Design that protects health, design that develops better health, and design that restores health once it is impaired.

Historically, there have always been three important contributions to creating environments that are vital, and help the patients achieve consciousness and remain balanced and healthy: (1) the users themselves are seeking vitality and balance; (2) relationships and interactions between the users of the space are healing and regenerative; and (3) the space itself is alive, free of sources of negativity and toxins, and provides energy qualities that support aliveness and balance. These three factors create the 'healing energy matrix' that becomes a fairly permanent feature of space.

Rehabilitation centers are current trend.¹ Benefits of having such a physical environment on the physical and psychological wellbeing resulting in speedy recovery, are well proven.

II. REHABILITATION MEDICINE DEFINITION

The definition of Rehabilitation according to who in (2023) is “a set of interventions designed to optimize functioning and reduce disability in individuals with health conditions in interaction with their environment”.²

To start subtle and give context about what rehabilitation is all about and how architecture and physical environments play a major role in designing these sensitive spaces- rehabilitation is the process of aiding a person in obtaining the optimal degree of functionality, personal autonomy, and quality of life. Rehabilitation does not repair or undo the damage caused by illness or trauma; rather, it aids in the restoration of an individual’s health, efficiency, and well-being.

Because rehabilitation medicine is tailored to each individual’s needs, each program is unique. The following are some general therapy components for rehabilitation programs:

- Getting to the root of the problem and avoiding complexities.
- Taking care of the impairment and enhancing function.
- Responsive tools and a change in the environment.
- Teaching the patient and his or her family about the changes in their lifestyle and assisting them in adapting to them.

Rehabilitation facilities are now designed to be stimulating, friendly, safe, and easily accessible. Everything about the space, from the layout and equipment to the mix of open and private sections, is designed to encourage and promote achievement and inspiration.³

III. HEALTHY BUILDING

We as human beings have an inner connection with our environment by physical, mental, emotional and spiritual means. This connection can create a dynamic life that people can thrive from in every aspect. Through work, aging or learning, people are able to participate and contribute to this connection with our environment.

Technology, limited resources, building systems, codes and redundant medical practices are just some of the challenges that often contradict healing. First, healing environments must “do no harm.”. We cannot consider a healing environment without considering healthy design.⁵

In decades, many researchers studied the relation between health and place where People spend up to 90% of their time indoors. Indoor environment quality (IEQ) is an extremely important factor in the context of the health, comfort and performance of building users. Indoor environment quality has a significant impact on modern life around the globe. It is also the result of interaction between physical, chemical and biological parameters: temperature-humidity parameters, noise and vibrations, chemicals and odors, dust, light, electro-ion microclimate, non-ionizing radiation, and microbial contamination.⁶ where Pollutants have a negative effect on the health, performance and comfort of building users at given concentrations and exposure times. The long-term unsatisfactory indoor environment is associated with the Sick Building Syndrome (SBS). Sick Building Syndrome is defined as a group of symptoms that have no clear etiology and are attributable to exposure to building variables.

According to previous studies, basic factors influencing productivity, satisfaction and performance in indoor environments include indoor air quality and ventilation, thermal comfort, lighting and daylighting, noise and acoustics, space layout, biophilia and view, look and feel, location and amenities.⁷ Achieving such qualities to better attain a healing environment can also be directly tied into our everyday built environment.⁸

IV. HEALING ENVIRONMENT

Often inhabitants don’t think much about the built environment. They don’t think that it can affect us so much, and that it can be a source of disharmonies through physical, emotional, and mental stressors. What people often don’t realize is that we do have control of the stressors within our built environment. We have the capability to create our surroundings in a way that will encourage relaxation, relieve mental anxieties, create a higher self-esteem, and enhance the feeling of supportiveness⁸. This connection with our environment is key in keeping a balance within ourselves. As Venolia states, “At base, healing environments do two things particularly well: they connect us with vital, positive forces and they enhance our ability to respond to the anti-life forces we may encounter.” These forces that a healing environment brings are what that a promote wellbeing and repose.

Our environment can even help to keep us in balance or alternatively force us out of balance. How people choose to live their lives and what they let influence them are some things that can tip the scale in favor of one or the other. These influences and choices can often stress us to the brink, severing the harmony's connection with our environment. This connection links our health and wellness to the society in which we as individuals develop, thrive, and nourish. Each of us flourishes on this connection to society as it is woven together with families and communities that complete ourselves and enliven us. This connection when severed from our environment can set our state of being "out of whack," affecting our natural state of being. This natural state, when in check or harmonies allows our body to be in a healing, healthy state. As Hippocrates, the great philosopher and pioneer of early medicine stated, "The natural healing force within each one of us is the greatest force in getting well." With this in mind, one must truly be aware of their natural state in order to take full advantage of their inner healing force⁸.

To establish healing environments individuals must recognize that for every dimension of health or well-being there is a corresponding aspect of our built surroundings. Designers create these spaces and structures to cater to our physical, emotional, physiological, and psychological needs. Physically we create these shelters to respond to our call for protection from the elements and to be a comfortable place⁸.

V. OPTIMAL HEALING ENVIRONMENT DIMENSION

Samueli Institute in 2004 defines healing as "a holistic, transformative process of repair and recovery in mind, body, and spirit resulting in positive change, finding meaning, and movement towards self-realization of wholeness, regardless of the presence or absence of disease". Therefore, they coined the Optimal Healing Environment (OHE). An OHE stimulates whole aspect of human being by taking account the external factors which is the social relationship of human, and the internal factors such as the physical aspect, the psychological, the spiritual and the behavioral aspect to be healthy⁹. The dimension of Optimum Healing Environment can be seen in figure().



VI. HEALING ENVIRONMENT SPACES ACCORDING TO DIFFERENT ARCHITECTS

a. Erik Asmussen

The thoughts of Ar. Erik Asmussen create healing environment that stimulate all the senses and rebalance the body, soul and spirit. It focuses on healing through art of architecture, by the same healing qualities we experience in nature. By revealing unity between architecture, place and environment. An environment that have healing effect even when cure for illness cannot found.¹⁰

- **Color**

a powerful means to support building activities and the moods. Layer of white allows light that penetrate outer layers of colors to reflect outward, illuminating tones.

From inside, it enlivens and reveals material used. Soft transparent colors dissolves the boundaries of room. Light filled colors changes patterns according to sun.

- **Dynamic equilibrium of spatial experience**

the balance of contrast- constancy and change, up and down, in and out, symmetry and asymmetry, sheltered intimacy and expansive openness to create dynamically polarized spaces for sense of freedom.

- **Unity of form and function**

Building should express the inner spirit and activities inside. One should sense the function by its perceptible form. E.g. -a truly organic building must have qualities of nature rather than outward appearance. It should be experience as alive as nature is felt.

- **Polarity**

Architecture embodies endless plays of differences out- contrasts of color, form and material as link of opposites to create rhythmically alternating repetition. Pervasive presence of polarized spaces, colors, forms and material energies the building. Polarity shows direction and form.

- **Metamorphosis**

forming and transforming through gradual, stepwise progression of changing forms, that are different in shape but similar in kind. Use of metamorphosis of forms, surfaces, colors and spaces to give unity to buildings and building elements.

- **Harmony with nature and site**

building should be placed and shaped so that it creates apposite and useable outdoor space. By responding to existing site features, building should be differentiated from surrounding as well as connected to them. Architecture could help people to connect with healing power of nature and give feel of sense of belonging and hominess in natural world.

- **The living wall**

walls and windows should express combination of security and freedom. eg -culture house, Jarna provides sense of connectedness to world and isolation from distraction of outside world-by carved wooden walls and color glass windows.

b. Nikos A. Salingaros

Salingaros (2020) also explained that the positive effects of :

1) in close proximity and visible interactions with plants, animals, and other humans.

2) positive feedback on artificial insemination following geometric rules...".

There are 10 strategies listed by Salingaros (2020)¹¹.

- **Sunlight**

natural light on two sides of a room. Our eyes focus better and we can use our stereo vision to see three-dimensional depth. Circadian rhythms and vitamin D production need sunlight to function. Sunlight also has therapeutic qualities.

- **Color**

comes from both the hue of transmitted light, and pigments on surfaces. Many bright or intense colors affect our mood positively.

- **Gravity**

buildings need to reinforce the vertical axis and not appear about to fall down on our head. The balance mechanism of our inner ear checks for the horizontal and vertical, and triggers nausea and vomiting whenever those reference axes are violated.

- **Fractals**

forms that are subdivided in a regular manner going all the way down in scales. This is evident in all traditional architectures, which rely upon rich borders, frames, moldings, ornament, and the use of natural materials with ordered textures. People refuse to look at empty, non-fractal shapes and surfaces, since minimalism triggers emotional discomfort.

- **Curves**

balanced curves in a building's structure act independently, or together with bringing the curves of plants up close to and into buildings. Our eye and brain have specific curvature sensors, thus we seek curves all around us.

- **Detail**

meaningful and obvious details in our immediate surroundings. The eye was designed to look for and interpret details that are essential for our survival. We "read" intentions in the details of an animal or human face. That's why we respond to the details in natural materials such as wood, travertine limestone, colored marble, etc.

- **Water**

Seeing and hearing water helps to calm us. Probably an ancestral effect from our evolution, it is used extensively in Islamic architecture to promote psychological wellbeing.

- **Life**

lots of plants, non-threatening animals, and other people near us. Built structures blend with plants by having green courtyards, many interior mini-gardens as small as one square meter, and buildings with a meandering footprint that semi-encloses and protects outside trees so we can see them closely through windows.

- **Organized - complexity.**

intricate yet coherent designs, purposeful complication that is also accompanied by a high degree of organization. Abstract architectural ornament in the Islamic world exemplifies this effect. There are two opposite states that diminish this factor: either empty simplicity, or disorganization. Since the early days of humanity, realistic depictions of plants, animals, and people have been inseparable from other aspects of architecture. Experiments show that images of nature have healing effects similar to direct exposure to nature.

c. Ibrahim Karim

BioGeometry science uses many tools to stability with a frequency and functionally linked to the physical body, which makes the immune device inside the body works greater correctly and gives safety against any dangerous consequences of environmental pollution, visible as electromagnetic fields, and radiation. In addition to the geometric shapes makes use of the power of color, sound, movement, and different oscillation family members between them, which are also translated into angles and ratios and engineering relation.¹² This science has led to the discovery of similar sciences that existed throughout history and played the major role in ancient architecture.¹³

The main criteria in the forming process were based on energy quality. The nine design characteristics theorized to be present to identify this quality of Architecture, are mainly based on the integration between Energy and Physics of Quality, on one hand and Architectural design on the other hand, thus they include:

- **Earth energy design principles**

There are different types of vertical and horizontal patterns of earth energy that form an invisible energy structure. In any energy-balanced design, we use these patterns to design in harmony with the earth to create a special subtle quality of space inside and outside the building.

- **Sky linked design (verticality)**

The sky link design following the energy balance and BioGeometry principles, goes beyond just being a link uplifting the building upwards: it is essential to identify verticality and to link it with another grid system associated with the sky, and related to star locations in them. This linkage is achieved by resonance and alignment of the construction of certain parts of the building with these grids.¹⁴

- **Qualitative harmonics**

It is a purely qualitative dimensioning system based on the harmonizing subtle energy quality desired in a certain space. It is based on resonance of quality that is expressed in numbers, ratios, and angles. So, we gain a numeric expression of this quality to resonate with, and achieve its creation in architectural space.¹⁵

- **Design principles**

These design principles as stated by Dr. Karim, when integrated together, create this subtle energy quality of balance in a certain space. Among These principles are ;Rotation, Color placements, Interfacing, Shifting (hierarchy), Transparency.

- **Motion in design**

All types of motion create an effect on their surrounding environment. This background effect is in the form of compression waves, which are affected by the direction of motion and the sequence of motion through space. This motion creates a qualitative effect inside an empty space that generates BG3 energy quality which balanced the space¹⁶.

- **Qualitative scaling system**

It is a purely qualitative scaling system in the sense that it defines quality of space identifying points created by the design elements in their surroundings. It is based on integrated complex of mathematical equations that help emphasize this quality.¹⁴

- **Archetypal design codes**

In biogeometry studies, researches were carried on where resonance with archetypes was used to harmonize the designed space to reduce human stress and reach the timelessness subtle quality in all spaces of his presence. This was performed using an archetypal grid with certain angles and proportions from the patterns on which the designs are based.¹⁷

- **Material energy balancing.**

This is a methodology of balancing the building materials used in a building to change its subtle energy quality to manifest its balance and reach space harmony. This is applied by balancing a sample of every building material, by which it resonates with the source material to enhance its quality all over the space.¹⁶

- **Biosignature**

Biosignature is a linear diagram that is in resonance with the energy patterns of energy flow related to natural shapes and body organs. The flow of energy through the patterns enters into resonance with the functions of the organ they represent as similar patterns at tune causing a harmonic amplification which restores the correct balance within the organ; this correction is instantaneous on the energy level. They are used to balance the energy of body organs and their functions and bring harmony into subtle energy quality of human body.¹⁸

Now, we can justify from the previous resources, in addition to published researchers in architecture, that there are lists and attributes that determine Quality of healing architectural space or an entire building. Reaching some of these attributes, can work significantly as design guidelines as well as tools of judgment and evaluation for ancient ones.

VII. STANDARDS OF JUDGMENT AND DESIGN JUSTIFICATIONS

Although the criteria established suffice to analyze and assess a building, they are not equal in priorities degree. So, if a building lacks (site study – sick building avoidance –energy balance design), it couldn't be a healing environment spaces, even it has achieved another patterns.

Based on data collected, analysis and reviews in the previous literature, we can use the following table as a checklist criterion for evaluation for architecture of healing environment spaces. Recommendations for the meaningful inclusion of the design methods defining quality degree and benefits can be listed as shown in the following Table.

it is induced to make it easier for architects to design space that protect and honor the natural environment and reflect its universal principles with the intention of healing, sustaining health, well-being, and harmony within all life forms.



VIII. CHECKLIST FOR HEALING ENVIRONMENT SPACES

Checklist for healing environment spaces.			
Design Patterns and Tools	Application In Architectural Space	Quality degree	Benefits and priority
<p>Sick Building Avoidance (Emf, Electromagnetic Waves, Material Factors And Noise)</p>	<ul style="list-style-type: none"> • Fresh air • Materials • Sunlight 	<ul style="list-style-type: none"> • Suitable distance for adjacent buildings(near domestic dwellings, factories, electricity station) • Suitable distance from electric wave sources inside places • Materials that don't emit air-born toxins. • Suitable distance from crowded and noisy places. • Natural ventilation • Natural daylight • Natural materials 	<ul style="list-style-type: none"> • Absence of it has a major effect on physical health, causes various disorders and diseases and chronic diseases. • All buildings whatever its classifications, must be designed with. • (Sick building avoidance)is very important to have a healthy building.
<p>Sky In The Design</p>	<ul style="list-style-type: none"> • Energy from stars • Sky view 	<ul style="list-style-type: none"> • Design with specific dimensioned, orientated and measured chambers to capture the energy quality of certain wavelengths that ensure the earth's sky linked. 	<ul style="list-style-type: none"> • Ability to reinforce the human health, and enhance healing process. • It isn't always available in the place. • It is preferable design method

Energy Balance Design	Earth Energy Design	<ul style="list-style-type: none"> • Schneider grid, Earth gridlines (ley lines) and Showman waves energy. • Positive power spot energy. • Geopathic zones(Hartmann , curry, Benker cubic grid) and underground water paths (black stream). 	<ul style="list-style-type: none"> • Courts. • Order the building according to positive earth lines. • Situate the building on positive power spot • Avoidance of placing beds or setting furniture above negative energy earthliness or nods. • Order axis of walls above negative energy lines. 	<ul style="list-style-type: none"> • Positive energy lines has ability to reinforce the human health, and enhance healing process. • It effects on physical body, mind and spirit • It isn't always available in the place. • It is a preferable design method
	Biogeometry Design Principles	<ul style="list-style-type: none"> • Rotation • Shifting • Transparency • Interfacing 	<ul style="list-style-type: none"> • Identification of specific distinctive nodes, point locations in the targeted space or <i>virtual centers</i>, in which bg3 is generated and intensified. -Using for arrangement of an object architectural elements (shape of the building , spaces ,sculptures, carpets, walls and decorative roof ornaments, muqarnas patterns, plants within the courtyard, windows and doors detail) 	<ul style="list-style-type: none"> • It produces BG3 energy, balancing effect within the space. • It has a positive effect on physical, mental, and spiritual levels of human being , and drive balance from bg3 energy. • It is important in design building
	Qualitative Harmonics	<ul style="list-style-type: none"> • Biogeometric series,(16, 19, 28, 34, 43, 54, 68, 72, 83, 89, & 99) • Golden ratio, fibonacci series (0, 1, 2, 3, 5, 8, 13, 21,34 ...)(1:1.618) • Qualitative scaling system • Archetypal design codes 	<ul style="list-style-type: none"> • Relations between different dimensions, proportions, ratios, angles, or objects, either in the body of space or crafting of any physical shape/object in the spaces. 	<ul style="list-style-type: none"> • It creates rhythm that its balance leads to the balance with whole universe system.it drives sacred means for building • It Has a positive effect on physical, mental, and spiritual levels of human being.²⁰ • It is important to be

					applied in design.
	Motion In Design	<ul style="list-style-type: none"> • Air • Light • Sound 	<ul style="list-style-type: none"> • A movable element is in equal distance from the space boundaries. - Applicable on any element in a motional state (a walking person, a moving vehicle, a water stream, air current, sound and even light waves) 		<ul style="list-style-type: none"> • This movement creates rhythm that its balance leads to the balance of whole universe system • It has a positive effect on physical, mental, and spiritual levels of human being , and drive balance from bg3 energy. • It is important to apply in the building.
	Dynamic Equilibrium	Polarities	Presence of Polarized <ul style="list-style-type: none"> • Points, • Shapes, • Colors • Materials • Light and dark 	<ul style="list-style-type: none"> • Presence of Orientation of the entrance with the cardinal directions (natural orientation) • Niches in the walls • Differences in the length, size, shape, wall colors and wall textures • Differences within the ceiling plane. • Polarized space between Darkness and light 	
Organized-Complexity		<ul style="list-style-type: none"> • Shapes • Surfaces • Colors • Spaces 	<ul style="list-style-type: none"> • Fractal pattern - spatial hierarchy- metaphors from nature - Using for arrangement of an objector architectural elements(Shape of the building , spaces ,Sculptures, carpets, walls and decorative roof ornaments, Muqarnas patterns, plants within the courtyard, windows and doors detail) • Transition and rhythm 		<ul style="list-style-type: none"> • It can achieve a cognitive balance which enables one to make a comparison or choice • It Has a positive effect on physical, mental, and spiritual levels of human being. • It is important to be applied in design.
	Healing Through Senses	<ul style="list-style-type: none"> • Texture and Color of materials • Shape • Smell • Sound • Light 	<ul style="list-style-type: none"> • Color of materials & their physical effect according chakras • Texture of material meets its psychological need • Machinal released plant oil or fragment 		<ul style="list-style-type: none"> • It reduces the perception of pain and strengthen the immune system, aiding in the healing process. • It supports physical , mental, and spiritual

			<ul style="list-style-type: none"> herbs and flowers in the place. • Sound from a natural environment or qualitative sound • Daylight preserving window treatment. • Fractal patterns. 		<p>levels</p> <ul style="list-style-type: none"> • It is important for healing process.
Identity And Vitality	<ul style="list-style-type: none"> • Details(Prospect-Refuge - Mystery) 	<ul style="list-style-type: none"> • Color and texture of materials • Shape 	<ul style="list-style-type: none"> • Different space for different activities • Variety of building elements material.- passages –doorway - turns for changed views-changes in floor textures, - space, light and acoustic absorbency. • inspired color by the surrounding environment. • Local building materials. 		<ul style="list-style-type: none"> • It reduces stress, fatigue and improves comfort, concentration, attention perception of safety, as induces pleasure.²¹ • It supports physical, mental, and spiritual levels. • It is important for healing process.
Harmony With Nature		<ul style="list-style-type: none"> • Materials • Life (plants, animals, ..etc.,) • Daylight • Water 	<ul style="list-style-type: none"> • Raw materials - vegetation - exposure of the biological rhythm of nature (seasons , daily cycle-water feature . 		<ul style="list-style-type: none"> • Stress reduction, quicker healing, and mitigation of Attention Deficit Disorder in children to decreasing crime and air pollution.²² • It Has a positive effect on physical, mental, and spiritual levels of human being. • It is important to be applied in design.
Precautionary Method	Biogeometry Energy Balancing Tools	<ul style="list-style-type: none"> • Biosignature with shapes 	<ul style="list-style-type: none"> • Electrical and water attachments • Corner • Nodes of negative earth lines in the space • Materials 		<ul style="list-style-type: none"> • It spreads BG3 energy in the building for protecting and creating harmony, also resonates with natural features which leads to balance with whole universe system. • It has a positive effect on physical, mental, and spiritual levels of human being. • It is important for existing building, and could be useful for new building.

IX. CONCLUSION

Healing needs to be done holistically, where in addition to healing to eliminate the disease, but also how to relieve the pollution of the technology and increase positive feelings in mind, physical and mental, therefore we need an optimal healing environment approach in treatment facilities.

Through analysis of the case studies, the paper reveals the importance of spatial experience approach in producing meaningful architecture that connects with the user. and after studying the architects' opinions and points of view to define a healing environment space, there are basic findings for this study that can be highlighted in:

- A healing environment is the one which succeeds in giving its users the quality of comfort and harmony within, which helps relief life stress and enhances occupants' health.
- healing environment spaces are those built with respect to energy balance elements and principles of design Energy balanced spaces have healing Quality.
- Energy balanced Architecture has a positive physical effect on human brain waves and performance.
- healing environment spaces have a healing effect on stressed users, as its reliefs stress affecting brain wave frequency and amplitude.
- Healing environment spaces could combine more than one feature of healing patterns.
- There is a considerable awareness of the importance of adjacency with nature in healing environments in the study area.
- The aesthetic and spiritual sense within the therapeutic buildings has a significant impact on users' comfort and satisfaction.

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