HEALTH AND NATURE

A study investigating types of exposure to nature that benefits people's health

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ABSTRACT

Exposure to nature benefits people's health and well-being. Yet, many studies till today depict only a general idea about these advantages. Research scientists, theorists and design practitioners have been able to define aspects of nature which help in the healing process. But it is also important to understand what kind of environment delivers these benefits. This paper tries to understand the ways in which humans interact with nature through a scoping review which aims to map key concepts, describes the types of evidence, and identifies gaps in research. Databases like Google scholar, PubMed and ScienceDirect were used to search for literatures using specific keywords related to the topic and the case studies supports the idea. Furthermore, it investigates what type of exposure to nature is more beneficial to the users. The finding of these studies requires certain strategies to be executed. Taken together, these results strongly recommend increasing the daylighting, biodiversity and use of natural materials and brighter colors like blue or green. Moreover, elements that stimulate the other senses of the human body like auditory, olfactory, and haptic, should also be considered while designing as it complements the benefits to the human body provided by visual connections. At the same time, it is also important to understand various aspects that generate fear in humans while experiencing nature and provide spaces accordingly.

Additionally, this paper helps to find evidence which could be used to make informed design decisions for our final study projects, Cancer care center and Recreation center.

1.0. INTRODUCTION

Urbanization is progressing at a rapid rate around the globe. According to the UN's Department of Economic and Social Affairs, by 2050, this proportion is expected to exceed 68 percent (UN, 2018). This unprecedented shift from rural to urban living is resulting in a significant decrease in exposure to natural environments. Coincident with urbanization, there is also evidence of an increase in the worldwide prevalence of mental disorder (Srivastava, 2009). Growing evidence suggests that these two trends may be linked, with decreased exposure to nature causing changes in psychological functioning (Pearson & Craig, 2014).

As the world urbanizes and people are less exposed to natural environments, urban planners and other public policy decision-makers are turning to research in environmental psychology to help inform them of the relationship between exposure to nature and mental health. This study aims to contribute to the literature concerned with the examination of this relationship. It represents design strategies that reflect the nature and health connections within the built environment.

Research till date mostly focuses only on the visual connections with nature as perception is a dominant sense. However, humans are multisensory and even though limited, studies have shown the benefits are also delivered through non-visual connections with nature, especially for visually impaired groups. Inclusion of sounds, smell and texture can be beneficial to enhance this interaction not only in terms of experience, but also wayfinding. Furthermore, people experience nature at different levels. Two ways in which an individual can interact with nature are Active Interaction and Passive Interaction. These different levels offer different potential outcomes.

Moreover, every individual experience nature differently. As architects, we need to be aware of the positive as well as the negative impacts a design could have on an individual. While some people enjoy nature, there are others who reflect fear within this natural environment.

In this paper, we will study these visual and non-visual connections, different levels of interaction and elements of fear that people experience in the presence of nature, by reviewing selected literatures and analyzing supporting case studies and interpreting these understandings within the design of a Cancer care center and a Recreation Center. The patients, when experiencing a hospital environment, are in a vulnerable state. Going through cancer treatment processes like Chemotherapy and radiation is not only painful but also induces psychological stress within the patients and their family members. Hence, it is important to provide environments which support health, well-being, and positive mindsets of these users. On the other hand, a Recreation Center is a public facility hence does not have a defined user. Today, the cities are growing at a very fast pace and need to meet the recreational needs of its residents. Living the busy, fast-paced American lifestyle, it is hard to imagine taking a few hours to relax and socialize. This has resulted in low quality of life and increased stress in people. Hence, the Recreation center focuses on creating a healing environment which can be identified by evidence from measurements and results.

2.0. METHODOLOGY

This scoping review follows few steps: First we conducted keyword searches to identify potential studies which could be relevant and are published in English. Google scholar, PubMed, ScienceDirect databases were mainly used. These searches included keywords from the intended hypothesis and the potential title of the paper. Multiple studies were found including results of human-nature relationship, human-animal relationships, and human-built environment relationships. Some search terms such as “built environment”, “sensory”, “olfactory”, ”auditory”, “visual-impairment”, “wellbeing”, “health”, “nature”, “restoration”, “nature views”, “nature fear”, “Biophobia” were used to collect articles. When relevant articles were found, a snowballing method was utilized to search for references and other relevant articles. In some instances, this process led us to extremely detailed biological studies which were not required for this study. For those cases, this study reflects a summary of the results, excluding the complete method. The paper also has used the term “senses” in a broader way rather than differentiating between active searching and passive reception.

3.0. TYPES OF EXPOSURE TO NATURE

3.1. VISUAL CONNECTION

View of nature has been found to provide various benefits for health and immune systems in humans. Several researches have indicated that looking at certain types of nature scenes have helped in considerably reducing stress. Further, research has found that viewing nature for longer periods can have major impacts even in clinical outcomes resulting in shorter hospital stays.

Natural surroundings can better aid the psychological restoration of people living in cities than an urban environment relatively devoid of nature (Van den Berg, Hartig, & Staats, 2007). Results suggest that visual impressions of nature compared with urban environments facilitate recovery after psychological stress (Alvarsson, Wiens, & Nilsson, 2010). Post-surgical patients whose hospital windows overlooked trees, rather than a brick wall, recover more rapidly and require less pain relief (Ulrich, 1984). It is known that high blood pressure may cause headaches, shortness of breath and nose bleeds and more (Weiss, 1972). View of nature has helped in lowering the blood pressure and the heart rate compared to recovery in the built environment (Figure 1) (Brown, Barton, & Gladwell, 2013). Results in another study showed that sitting in a room with tree views promoted more rapid decline in diastolic blood pressure than sitting in a viewless room.

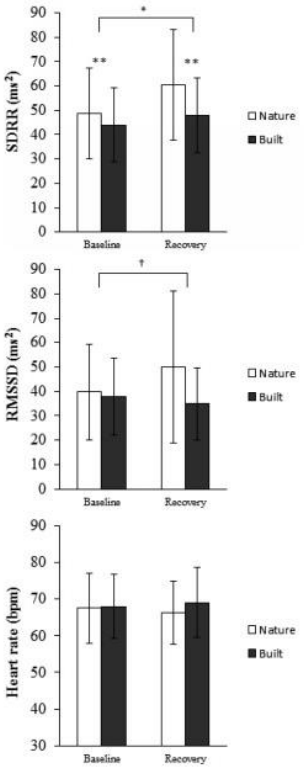

Figure 1. Mean (SD) Heart rate and heart rate variability recovery.

A study showed the psychological benefits gained by greenspace users increase with levels of biodiversity (Fuller, Irvine, Devine-Wright, Warren, & Gaston, 2007). Biodiversity can be described as interconnection between people and place and the interrelation of social and biological dimensions. This relationship links all biodiversity, including various species, seascapes, and landscapes to the places where we live. Some types of species like butterflies or birds enhance the experience and result in better outcomes. Not only green environments but also the presence of water generated better effects on self-esteem and mood (Barton & Pretty, 2010).

3.1.1. Natural Connections

Materials and Colors:

Except for creating a connection with the natural environment, a major role in the physical and psychological benefits is played by the material that surrounds us. Evidence shows that materials can enhance the experience of the user while providing a relaxed and comfortable environment. The impact of natural material and color palette have shown effects on cognitive performance.

To determine the effects of materials, a study compared the results of the same room with different wood ratios, 0%, 45% and 90%. This study demonstrated that a difference in wood ratio in the interior caused different physiological responses, especially in the autonomic nervous activity. A room with a moderate ratio of wood (i.e., 45% coverage), with a more subjective "comfortable" feeling, exhibited significant decreases in diastolic blood pressure and significant increases in pulse rate, whereas a decrease in brain activity was observed (i.e., 90% coverage), which could be either highly restorative in a spa or doctor's office, or counterproductive where high cognitive functionality is expected (Tsunetsugu, Miyazaki, & Sato, 2007).

Moreover, colors also play an important role in affecting the cognitive functionality in a person. In a series of four experiments, where four different colors were compared, the results showed that the color green facilitates creativity. Participants who viewed the color green prior to engaging in a creativity task exhibited more creativity than did those who viewed blue or gray (Lichtenfeld, Elliot, Maier, & Pekrun, 2012). Another study done in 1994, gets into conclusion that color has an effect on the emotions. The study took into consideration the brightness and saturation, while measuring the levels of anxiety of people experiencing. Short-wavelength hues (e.g., blue, green) are more pleasant than long-wavelength hues (e.g., yellow, orange). Pleasure is a positive correlate of brightness and saturation. Nevertheless, it is noteworthy that higher state-anxiety scores were associated with red and yellow than with blue and green (Valdez & Mehrabian, 1994).

Daylighting:

When we speak about natural elements, something inevitable to take into consideration is the daylighting conditions. Architects have always been interested in creating powerful atmospheres by combining the effect of light and shadow. It conveys expressions of time and movement and creates a feeling of drama with a sense of calm. There are a lot of studies which show daylighting affects human performance, increases visibility, and enhances mood.

A study compared three different schools with different daylit qualities. The results showed that the classes with more daylight reflected a better health of students with higher attendance per year (Nicklas & Bailey, 1996). Also, higher level of daylighting resulted in increased test scores compared to the students with average daylighting (Heschong, Wright, & Okura, 2002). Other positive outcomes were also seen in comparison to moods and child's growth in average lighting conditions (Nicklas & Bailey, 1996).

3.1.2. Artificial connection

Although experience of nature is good for health and well-being, sometimes we do not have the opportunity to provide such exposure. During these instances, researchers have tried to imitate the experience of real nature in forms of images. Evidence has been found for stress reduction related to seeing images of nature. An even better way to create this artificial contact between humans and the natural environment is through digital screens. A 2006 study presents a new system using a head-coupled display and image-based rendering to simulate a photorealistic artificial window view of nature with motion parallax. This mode allows the screen to have the best simulation of nature. With this device, people can also choose the look that best suits them and the environment, offering views such as:

mountains, fields, sea, or forest. The results showed much higher ratings for realism and preference than a static image (Radikovic, Leggett, Keyser, & Ulrich, 2005).

3.2. NON-VISUAL CONNECTION

While the pattern of visual connection with nature focuses on capturing attention of the user, promotes health, and provides calm, non-visual connection emphasizes on experiences that need not be seen but can be felt. Humans are multi-sensory, and research shows many benefits are achieved through the non-visual senses and through potential avenues in which psychological mechanisms can occur. These multi-sensory patterns connect to all other senses except sight i.e. touch, taste, smell, and sound. Hence, non-visual connection with nature is characterized by auditory, haptic, olfactory or gustatory stimuli that engender a positive reference to nature (Ryan, Browning, Clancy, Andrews, & Kallianpurkar, 2014).

3.2.1. Multi-sensory Aspects of Nature

Handling the multisensory aspect of nature can be crucial as monotony of stimulation can result in stress while multiple sensory inputs can drive positive mental state. But the ultimate goal is to reduce stress and bring a state of tranquility in the user group. A space with good non-visual connection with nature feels well-balanced. Even though at beginning the environment might seem complex, it becomes comfortable soon while the sounds, texture and aromas help in feeling relaxed.

Auditory or Sound

A number of literatures suggest that hearing appears to be the second-most studied of all the human senses. It is the understanding of acoustic waves that provides us information about the surrounding environment. Nature sounds are usually considered most complex and informational sound types, as they can provide information on species, seasons and humans are attuned to such hints and cues (Franco, Shanahan, Fuller, & health, 2017). Sounds may comprise of birds chirping, ocean waves, rustling of the leaves or even simulated digital nature sounds.

A research done in 2010, suggests that nature sounds, when compared to urban noise, allow for physiological and psychological restoration to occur upto 37% faster after exposure to a psychological stressor. Further supported by another research saying moderate ambient noise has greater positive impact on creative performance than exposure to low or high ambient noise (Ryan et al., 2014). Moreover, one of the key components of Attention Restoration Theory (ART) is that restorative environments attract attention and hence provide information. Directed attention helps in stepping back from a situation one is facing and getting a larger picture of what is happening. Sometimes, directed attention leads to fascination, which is a central component of restorative experience (Kaplan, 1995). Hence, it seems plausible that rich information content from nature sounds can help in a restorative effect for the user. Another researcher investigated brain mechanisms for the generation of subjective experience from objective sensory inputs. The findings suggested that subjective experience is more closely linked to the connectivity state of the auditory cortex than to its basic sensory inputs (Hunter et al., 2010). Ocean waves and traffic

signals have very similar sound patterns. Participants considered the sound to be pleasurable when viewing the video of waves but not when viewing traffic, suggesting strong connection between our visual and auditory sensory systems and psychological well-being.

Soundscapes provide complex auditory experiences with emotional content. Application of soundscape in community noise evaluation is attempting to provide data that can be used by architects and urban designers to create an acoustically pleasing environment. As part of Positive Soundscapes (UK) Project, the effects of individual soundscape elements, on the subjective assessment of pleasantness and arousal were compared with associated physiological responses – Heart Rate (HR), Respiratory Rate (RR) and forehead electromyography (EMG) levels. Eight subjects listened to 18x8 sound clips from soundscapes, HR, RR, EMG were recorded, and pleasantness and arousal were assessed on a point of 9.

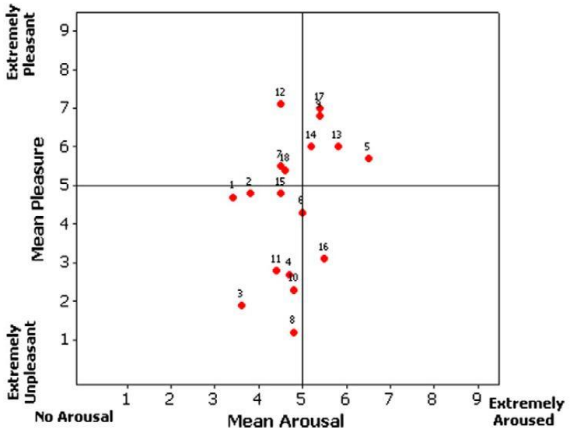

Figure 2. Scatter plot demonstrating the emotional content.

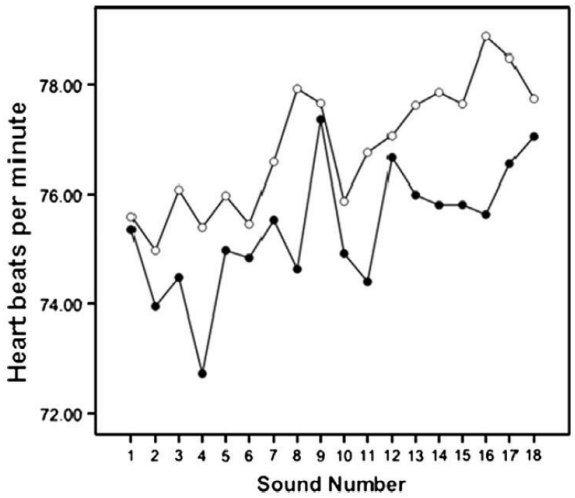

Figure 3. Graph showing the mean HR before and during sound clips.

The low arousal and high pleasantness indicate sounds of waves, evening birdsong and church bells. The most pleasant sound was an evening bird song. More pleasant sound-clips caused larger falls in HR and raised RR significantly. The more than pleasant sound-clip is just, the greater the RR (Hume & Ahtamad, 2013).

Sound of nature such as wind, water is preferred over anthropogenic sounds such as traffic, industrial noise, recreational noise. At low-levels, nature sounds were found to decrease perceived crowding and increase inter-personal encounter tolerances, while fountain and bird sounds were found to decrease perceived loudness of traffic and enhanced pleasantness and eventfulness. Quiet and natural sounds increase the quality of visitor's experience in the park (Franco et al., 2017).

Aroma or the Smell

Some odors can have direct or indirect physiological, psychological, and social benefits. Smell is one of our weakest senses, yet everything around us emits various kinds of smell. This is true for both urban and natural environments. There is an abundance of anthropogenic or urban smell but a lack of natural ones. These include smells from grass, flowers, trees, and shrubs, rotting matter and insects and more. Though how these smells affect our health is less researched.

Smell can affect our moods and behavior significantly depending on the time exposed to it. We have all observed how our facial expression and behavior changes if we pass through a dumpster or get a rotting odor, while we feel relaxed with the smell of grass and flowers. Hence, one could say that odors are associated with information and our likes and dislikes. Traditional practices have long used plant oils to calm and energize people. Studies have shown that olfactory exposure to phytoncides have had a positive effect on the healing process and human immune function, respectively. It decreases stress hormone levels and partially contributes to production of cells (Natural Killer cells) that mediate antitumor and antiviral responses in our body (Li et al., 2012). Some other benefits of natural odors include state of pleasantness as well as the warnings about potential toxicity or threat. The odor of summer air (leaf alcohol) and bees-wax have shown experimentally, to be associated with emotion of happiness in the participants while burnt smell and vomit were associated with disgust (Glass, Lingg, & Heuberger, 2014).

Another investigation compared Peripheral Blood Cell counts including red blood cells (RBCs), white blood cells (WBCs), neutrophils, peripheral blood lymphocytes (PBLs) and many more. Psychological measures included the State–Trait Anxiety Inventory (STAI) questionnaire and the Self-rating Depression Scale (SDS) between eleven recipients (n = 11) of carrier oil massage and aromatherapy massage. The STAI and SDS showed significant reduction after treatment with Aromatherapy and carrier massage. Aromatherapy also showed a significant increase in PBLs post treatment. This suggests that aromatherapy could be beneficial for healing (Kuriyama et al., 2005).

Haptic or Touch

Touch affects people's willingness to create bonds with each other, strengthen relationships and reduce stress. There are many benefits of tactile stimulation. In nature, one of the everyday experiences one could relate to is animal petting. This has been found to provide positive benefits like reduced blood pressure, improved social responses in asocial and autistic individuals, increased relaxation, and comfort (Katcher & Wilkins, 1993). Moreover, taking a *hands-on* approach to nature, as practiced in schools where children are taken for plantation activities or to play outdoors, is believed one way to get benefitted from nature. Forest school kids are believed to develop confidence, social skills, language and communication, motivation and concentration, physical skills and knowledge and understanding, improved by playing in the forest than in a playground area (Franco et al., 2017).

Gustatory or Taste

Another way of experiencing nature is through taste. Edible plants and herbs have proven to be beneficial for the immune system. One thing that can contribute to the benefits and help lift up moods is enjoyment of flavors in natural foods. Infants were found to respond positively to sugar solutions and negatively to sour and salty flavors, showing emotional response to flavors being present from birth (Franco et al., 2017). Researchers have found links between our emotions and neuronal responses to the taste and smell of food. It regulates our nutrition intake and benefits from the natural property of food. Taste is unique among sensory systems and helps humans make choices of their likes and dislikes (Yamamoto, 2008).

There are also indications that growing your own food, whether in the farm or in your backyard, have beneficial effects and positive influences on an individual and on the community. Flavors of food have an effect on emotions; organic being perceived as tasting better and makes one feel healthier. Natural diets are better for our mental and physical health (Franco et al., 2017).

Temperature and Air flow

These can be characterized as subtle changes in thermal and air temperature, humidity, and flow across our skin surface. A space with good thermal and airflow variability feels refreshing, active and comfortable. Sick building syndrome is a term given to symptoms that affect workers in modern mechanically ventilated office buildings. A new ventilation system with variable temperature and higher airflow velocities have reported fewer systems over time with worker comfort and improved productivity by 11% (Menzies, Pasztor, Nunes, Leduc, & Chan, 1997).

3.2.2. Visual Impairment

Another important finding from the readings was that most of the research done to find out the benefits of nature, primarily focused on people without Visual Impairments, not inclusive of partially sighted or blind individuals. It is important to address this gap.

Sensory experiences in natural environments assist in sense making and relaxing experiences for the visually impaired participants of a study. The tactile and auditory changes in the walking surface, the sound of flowing water, touch of the breeze and sunshine on the skin helped them in understanding the changes in the environment and in orienting themselves within this environment. Participants reported this experience as relaxing and provided them relief from the busy urban environment. Sounds of walking on the leaves and grass, flowing water and birds chirping above the trees were highlighted experiences. *"You hear birds and there are no car noises, it was beautiful".* They also associated being in nature as restoring and rejuvenating (Bandukda, Singh, Berthouze, & Holloway, 2019).

There are many different ways to be able to experience and get benefitted from nature. But there are also many gaps and avenues, which could be looked into, in the research in understanding and the amount of focus put on the benefits by visual and non-visual connections with nature.

3.3. LEVELS OF INTERACTION

An individual can experience nature at different levels. Two ways in which an individual can interact with nature are Active and Passive interaction.

Active interaction means to consciously decide to come in contact of nature while doing something. Performing activities like gardening, farming, petting, feeding birds and animals, which involve physical connection of users with the natural environment, are said to come under active interaction. Gardens have shown to be an important resource for psychological restoration for urban dwellers. It restores positive moods and promotes relief from acute stress (Van Den Berg & Custers, 2011).

Figure 4. Butaro Hospital, Rwanda showing interaction of patients with nature.

Passive interaction, on the other hand, means to view nature or be in the presence of nature. This may include viewing actual or images of natural landscape, posters, incidental or unintentional engaging through activities such as walking, biking, or playing in a park.

Active interaction mode had significantly greater self-reported stress restoration than the passive interaction mode (Han & Environment, 2018). Active ways also reported higher quality of life, better overall mood and lower stress (Holt et al., 2019).

3.4. FEAR OF NATURE

As read earlier in the paper, nature and the natural environment are important restorative sources which have positive impacts in reducing stresses of urban living and promoting physical health. This is what Biophilia Hypothesis suggests that humans possess an natural tendency to seek connections with nature and other forms of life. However, some urban populations have found to not be engaged with these spaces and reflect some kind of fear which hinders them to look at the benefits of such environments (Patuano, 2020). This fear of nature is called Biophobia.

Specific phobias are common and emerging prevalent substance use disorders. Torgerson, in a study of male female same-sex twins, performed factor analysis of their fears. He found that fears of animals and of nature formed two of five coherent types, although the nature category included both man-made and natural environments (Skre, Onstad, Torgersen, Lygren, & Kringlen, 2000). Some other common aspects of fear within people would include allergies, undesirable flora and fauna, darkness, cultural evolution, poisoning, vector-borne diseases, crime/injuries etc. Urbanization has caused an overlap between the natural and urban habitats. Presence of these natural habitats, unpredictable and dangerous, can push people away from using these spaces. The fear of getting hurt or being in pain hinders some people from building connections with nature and getting benefitted from it. It is important to focus on creating mixed environments where nature is present but not threatening and balanced with the presence of restorative built elements (Patuano, 2020).

4.0. CASE STUDIES

The case studies identified here helps in generating new ideas and illustrates theories showcasing different aspects of nature and built environment are related to each other. These cases look into different variety of building types (Health Facility and Public Gallery), locations (Sweden and USA), scales and uses. They are helpful in analyzing how the different aspects of nature connection, as described above, are successfully implemented by designers and clients for beneficial health outcomes.

4.1. Case Study 1 : Östra Hospital

Location: Göteborg, Sweden | Function: Psychiatric Facility
Occupant: Patients, Staff, Guests | Area: 193,750 sqft
Year of Completion: 2006 | Design Team: White Architects

Figure 5. Ostra Hospital Exterior View

Figure 6. View of the Courtyard.

The design was aimed towards answering the questions, “Can good architecture alleviate the suffering and speed recovery of psychiatry patients?”. One of the key design elements was the exposure to nature. All the patient rooms have views to the central gardens planted with low vegetation. The users can experience sounds and smells from the courtyards through the operable windows. The occupants can feel breezes, see cloud movements, and hear bird and insect sounds and see the seasonal changes. Special attention was given to the materials, by using natural ones like stone floors, oak hardwood floors, birch handrails, and unpainted wood furniture.

All these strategies aimed to improve the health and wellbeing of patients. The visual exposure to nature helped in lowering blood pressure and heart rate, improved mental attentiveness, positively impacted attitude, and overall happiness. The abundant daylighting positively impacted circadian system functioning and increased visual comfort. After pre- and post-move study, the results were as follows:

- The number of compulsory medications and restraints of patients had fallen greatly.
- The atmosphere in the department became calmer and patients have had fewer outbreaks of aggression.
- Sick listing of staff was decreased from 9% in 2005 to 6% in 2007.

Figure 7. Plan of Ostra Hospital, Goteborg, Sweden.

Figure 8. Visual Connections to nature; Dynamic and Diffused Lighting.

4.2. Case Study 2 : Windhover Contemplative Center

Location: Stanford University, California | Function: Public Gallery
Occupant: Faculty, Students, Staff | Area: 4,000 sqft
Year of Completion: 2014 | Design Team: Aidlin Darling Design

Figure 9. View of the Reflective Pool.

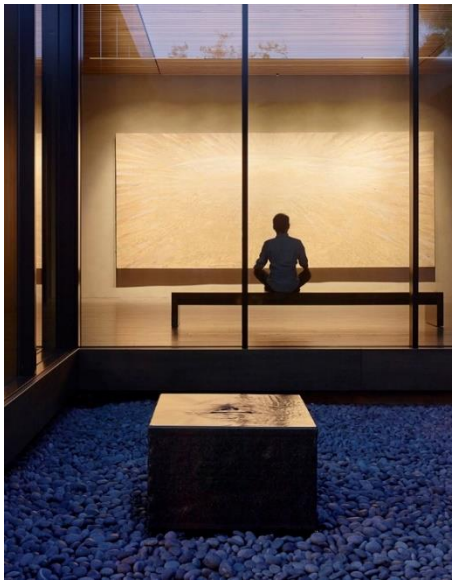

Figure 10. Interior View of the Gallery space.

This center is designed to be a spiritual refuge for the Stanford Community. The Stanford Wellbeing Task Force stated that the prevalence and complexity of student mental health issues have grown in recent years. The college is also seeing students struggle with mental health concerns ranging from self-esteem issues to depression, anxiety, and other behavioral disorders. Based on the needs of students, the design offers multiple spaces and pathways for contemplation and reflection regardless of the time.

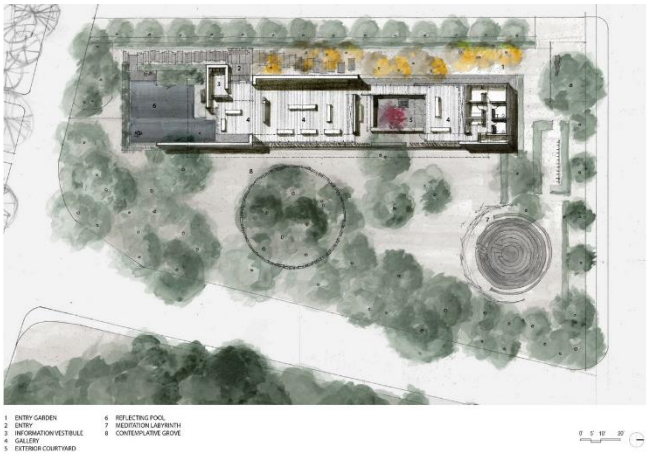

Figure 11. Plan of WCC.

The design offers experience of nature through visually connecting the inside spaces with outdoors by providing courtyards and permeable screens. Some nesting locations were created to view the artwork giving the user flexibility to interact with nature in the way they want. Skylights and diffused light create a dramatic effect backed up by the natural materials like rammed earth, wood, and glass. The material palette is carefully chosen to reinforce a calming atmosphere in and around the structure.

This connection with nature helped in lowering the blood pressure and heart rate, improved mental attentiveness, increased creative performance, and positively impacted overall happiness of the users while providing a sense of safety.

5.0. CONCLUSION

With this pace of urbanization and increasing health related issues, as designers, we need to think of ways to enhance the relationships between the built and natural environment. Experience of nature is important in our everyday lives. Providing natural elements, visual and non-visual, in urban contexts can offer many physical, psychological, and physiological benefits.

Although, it is also important to maintain the balance between visual and non-visual aspects of connections. Inclusion of sensory elements along with nature views has been proven beneficial. Moreover, micro-variables such as birds, plants, water, and native species (plant) create a bond between people and natural places. In cases with limited access to nature, provision of imagery and VR alternatives also helps.

However, it is essential to keep in mind the variation in the user groups. While some people may like being surrounded by nature, there are a few who have associated fear like being in dark, fear of undesirable flora or fauna, sometimes allergies and more.

Summarizing these findings, one can suggest the role of exposure to nature in promoting health and wellbeing. Even though this study focuses on a variety of user groups, these outcomes may also be applied for patients in a cancer care center as well as for the user group of a recreational center.

The Cancer care center should be designed to provide spaces that look out into the surrounding natural environment. Looking at the windows, the patients will be able to view a variety of wildlife such as birds, trees, water, and plants. Operable windows would allow us to bring in the sounds and smell of nature within the indoor environment enhancing the sensory experience for the patients. A combination of natural materials like wood and stone would help the users to connect better with nature. A thoughtful landscape design which includes seasonal trees, water elements and colorful and aromatic flowers will help in this experience. Recognizing the fear of nature, the design would ensure safety measures through incorporation of a plaza and artificial lighting within dark areas that allows visibility between built and the forest. Likewise, activity in natural surroundings is better than in any other places. Opportunities (ramps, steps, and staircase) to encourage movements would be helpful.

The Recreation Center would incorporate the same concepts as Cancer care center except for the material use. Even though natural materials like stone and wood would be used, the quantity may vary. Wood will be used in higher quantities in massage and spa rooms, making people feel more relaxed. Hence, applying these strategies can be helpful to benefit from a closer relationship with nature to reduce anxiety and enhance their quality of life.

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