Journal of Physical Science and Environmental Studies
Vol. 8 (2), pp. 10-14, September 2023
ISSN 2467-8775
Research Paper
https://doi.org/10.36630/jpses_23011
http://pearlresearchjournals.org/journals/jpses/index.html

Impacts of Eco-Friendly Environmental Designs on Health and Well-Being of Patients in Hospitals

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Accepted 15 September 2023

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ABSTRACT

Homeopathic settings like hospital reception hall can increase a patient's nervousness level as well as mental and physical reactions to their present state. This study is aimed at evaluating the use of environmental design, precisely the design that integrates fundamentals of the natural environment, in hospitals to reduce nervousness, hypertension and heartbeat rates of waiting patients. Depictions of landscape and the natural environment are known to restore feasible bonds between man and his environment, consequently, the influences of environmental design on patient's reactions are rated and examined. In a bid to examine these assumptions about 145 persons were sampled. They were later classified into control and experiment clusters of males and females. The designed environment was subjected to experimental fields such as natural elements, green plants, sounds of waterfalls and birds. Both control and experimental fields were tested before and after the experiment. The results indicated that a designed hospital's reception hall room immensely influences the decreased rate of patient nervousness (p< 0.001), hypertension (p< 0.001) and heartbeat rate (0.001). We propose that using an environmental design for homeopathic treatment centers can decrease the level of nervousness in patients and can lead to a patient's recovery.

Keywords: Architectural Design, Environmental Design, Nervousness, Hypertension, Heartbeat Rate, Stress.

INTRODUCTION

Man, over time, has transformed the natural environment and has changed to a primarily non-natural (urban) setting. A common challenge associated with an urban habitat is an ever-growing level of environmental contamination and the subsequent pressure that has posed a serious environmental issue for urban health and environmental comfort (Bunny et al.,2019; Ramp, 2020; Elide and Vent, 2017).

In line with the advancement of sound well-being, the term 'environment' refers to its physical, mental and group physiognomies (Chancre et al., 2022). World Health Organization (WHO) in 2014, proposed solutions to human difficulties in environmental terms, based on the environmental impacts on human health and environmental mindset. Results from scholarly research conducted in 2019 reveal that humans need the natural environment for good health and a closer relationship between humans and their environment results in a more developed sense of well-being and promotes better ability in humans to adapt to their settings (Crooks and Atwal, 2019 and Mortenson and Kim, 2021).

Nature as postulated by the Biophilia concept identifies as the gratifier of human beings' biological needs. Environmental mindset leads to a protectoral mindset by an evolutionary process whereby the relationship between humans and environmental sustainability is considered essential for humans to promote a sustainable future (Dore and Kaplan, 2021).

Stress on its own, results to ill health, which might delay the recovery course to well-being. Elide and Vent (2017) suggested that stress in conditions of homeopathic treatment centers could be alleviated by exposure to an environment with natural physiognomies (therapeutic landscape). The therapeutic impact of the natural landscape in an environment facilitates an individual's ability to recover and cope with stress, which in turn results in improved health (Gaul and Tendril, 2018; Han, 2019).

Environmental design as stated by the Attention Restoration Theory, includes important perceptions like being away, extent, fascination, and compatibility, which are necessary for restoring attention (Geyser et al., 2023). These concepts include making various places, the presence of green materials, decreasing hard places and surfaces, encouraging environment design, decreasing

factors that cause confusion and removing ambiguity about the principles of environmental design. Exposure to the natural environment increases adaptation, a sense of security, and positive emotion and reduces feelings of indignation while increasing a sense of patience and tolerance.

Harte, inspired by the ideas of Sigmund Freud (an eminent psychologist), influenced studies in humanities and social sciences on the relationship between landscaping and human health, especially, the aspect of spaces within hospital reception (waiting hall) (Harte and Stoats, 2017).

Curative centers known for treating body ailments with a minimum amount of remedies are nerve-racking places for patients. They have been recognized with feelings of nervousness as patients wait to be attended to by a physician, this complicates the problems associated with pain and illness (Lanner, 2022; Marko and John, 2019). Engaging images of the natural environment in curative centers and hospital reception halls stimulates both patients and doctors by directing and redirecting their consideration to nature and art.

The extant facts linked with a curative waiting environment are seldom that of nervousness, aggression and contradiction caused by the gravity of discomfort associated with such illness. Therefore, it is likely to change this aspect of man's mental picture by using the reception hall environment as a tonic (Newman et al., 2022 and Mortenson and Kim, 2021). Likewise, it is possible to activate these feelings by considering images surrounding the natural environment of the reception hall. Contemporarily, it has been proven that natural scenes have positive responses on patients (Prosper and Sooner, 2023).

The incidence of paintings, sculpture, drawings and general artwork-based designs on natural hospital environments may benefit healthcare providers immensely, including patients who scans through the natural hospital environment with their eyes. This observation brings to bear careful retrospection on who profits from nature scenes, especially when they are viewed from the reception hall or waiting room of a hospital setting.

By employing the ethics of an ecological mindset, it is possible, to maintain a constant environment scenario using architectural skills and drawings. More importantly, it is worthy to state that architectural designs targeted at interior decoration to reflect natural order seriously impact the mental status of patients' attitudes and behaviour (Ramp, 2020).

This study aims to investigate the influence of architectural design on the health and well-being of patients in Living Word Hospital (LWH), Aba Nigeria, West Africa.

MATERIALS AND METHOD

This study adopted a semi-experimental approach in analyzing data, using a pre-test group, post-test group and control. The sample of patients was chosen from patients of Living Word Missions Hospital, Aba. The study included 145 foci, 69 males - a control group of 34 and a group of 35 for the experiment, and 76 females - a control group of 37 and a group of 39 for the experiment. The foci were between 30 to 55 years of age; 34.5, on average. The foci were chosen from the patients admitted to the hospital by related sampling which was voluntarily determined at intervals. The variation analysis method was used to evaluate heartbeat rates. The difference in both groups is shown in the heartbeat rate index.

The foci were pre-tested and then post-tested by exposure to the designed environment for about 20 to 45 minutes. In this short period, the impacts of the environment and factors on waiting nervousness and hypertension were verified. The planned environment was stocked with vegetation (green plants), there were views of forests and bamboo fields with a short waterfall with the natural and gentle sounds of falling water in the pond, producing a staccato full of quiet sounds, and a grove made from natural materials, with a wooden bamboo chair for relaxation.

The method of the study was the foci' responses to the observer's waiting nervousness test questionnaire whose reliability had been tested on 97 patients from homeopathic health centres. The validity of the test was measured at 0.83 by Cranach's α (alpha) numeric. This item test examined 3 nervous conditions, namely: mental, physical and behavioral. It was based on the Spielberger Test Nervousness Inventory (STNI). The nervousness was weighted on the range of the scale from high to low. The questionnaire used was apt to evaluate nervousness. Moreover, foci' nervousness was measured with two scales - STAI and Waiting Nervousness Scale.

The tool used to measure hypertension and heartbeat rate (including measurements of the two levels systolic, diastolic) was a digital manometer BMG 5309 model that is padlocked on the wrist of the right hand and after a round of patient rest; the readings were recorded, while the person is unmoving. To be more precise, the readings were taken again using a mercuric manometer and the two readings were compared to gain more accuracy (Randy, 2022). To examine the differences in the two groups, variation analysis was used.

Then, using a parametric statistical method of multiple regressions of the demographic data and nervousness a Shpylberger Scale mode criterion, the subject of anxious waiting was compared between the two groups in the position of having or not having a nervous history. To find a meaningful relationship between the variables as already mentioned, the ANOVA method was used.

RESULTS AND DISCUSSION

The findings have shown the results of exposure to the aforementioned environment on waiting nervousness, systolic and diastolic hypertension and heartbeat rate indexes in both males and females of both the control and experimental groups. The averages for the experimental group were lower than that of the control group, as shown in Table 2.

Table 2 shows the differences between waiting

Table 1: Impacts of Previous Nervous History on a Person's Waiting Nervousness Index.

Waiting nervousness	Mean	s. d.	Mean Error	t	d.f.	Sig.	N
With background	23.8077	8.65457	0.81188	2.942	145	0.001	73
Without background	15.0769	6.58906	1.48834				72

Table 2: Variant Indices of the Nervousness of the Subject Group

Indexes	group	mean	s.d.	group	mean	s.d.
Waiting nervousness	control	23.80	6.52	Experiment	16.80	5.90
Systolic (heart rhythm) hypertension	control	129.11	11.98	Experiment	117.25	11.46
Diastolic hypertension	control	77.21	8.2	Experiment	74.10	6.51
Heartbeat rate	control	86.11	9.78	Experiment	77.20	7.99

Table 3: Outcomes of Disparity Analysis in Waiting Nervousness.

Indexes	Recourse	Square addition	Degree of free	Square average	F	Significant
Waiting	Corrected model	850.1250	3	325.12	8.202	0.001
Nervousness	Within group	31455.205	1	31455.205	894.051	0.001
	Group	698.210	1	698.210	18.139	0.001

Table 4: Outcomes of Variation Analysis in Hypertension.

Indexes	Recourse	Square addition	d. f.	Square average	F	Sig.
Systolic blood Pressure	Corrected model	5875.9830	3	1485.328	8.625	0.001
	Within group	1579884.433	1	1579884.433	7282.922	0.001
	Group	3145.083	1	3145.083	19.146	0.001
	Gender	1306.151	1	1306.151	7.075	0.007
Diastolic blood Pressure	Corrected model	177.9930	3	60.508	1.558	0.290
	Within group	435553.216	1	435553.216	7005.404	0.001
	Group	82.108	1	82.108	1.566	0.123

nervousness and systolic and diastolic hypertension catalogs for both male and female patients of the control and experimental groups.

Sequel to the variation analysis results shown in Table 3, F = 18.139 between the control and experimental groups. Consequently, with a 99% confidence level, being subjected to the designed environment, therefore, affected a subject's heartbeat index and, as indicated by a decrease; better than found in the control group (f =18.139, $d.f.$=1,144, p< 0.01).

The results also show that the F in waiting nervousness index of both genders is not significant. Therefore, the difference between genders was not significant for the heartbeat index since group and gender relation F was not significant. Our findings also demonstrated that the design of health centre and hospital waiting environments by natural elements could decrease the patient's waiting nervousness according to the principles of the environmental mindset that is in step with the findings of Spinout et al (2022), Struve and Herzog (2020) and Ramp (2020). A study on 35 females and 56 males (Park, 2009) under surgery showed that exposure to the inside of a hospital with a designed environment decreased nervousness levels in comparison to the control group.

Since the waiting nervousness index displays advanced records for patients with a nervousness history, it can thus be presumed that earlier nervousness has an impact on the waiting nervousness index by aggregate rating, in other words, there is a rising propensity that nervous people with type-A behaviors will be more concerned in a waiting state than other behavioral types. This study, therefore, has demonstrated that the waiting nervousness variable, with a 99 % confidence level, changed and had noticeable declines by contact with the designed environment, when as compared with the control group that did not experience the sampled environment.

On the other hand, the findings of the study demonstrated that there was no significant difference in waiting nervousness between male and female patients in an environment based on natural elements. This finding is,

Table 5: Results of Disparity Analysis in Heartbeat Rate.

Indexes	recourse	Square addition	d. f.	Square average	F	Sig.
Heartbeat rate	Corrected model	1499.89	3	501.99	5.012	0.001
	Within group	578522.22	1	578522.22	4999.97	0.001
	group	1478.5433	1	1478.54	14.990	0.001
	gender	4.012	1	4.012	0.031	0.543

however, contrary to the results of a previous study conducted by Han (2019) which revealed that a designed environment had greater impacts on female patients than on male patients.

The differences between male and female patients of both control and experimental groups exposed to the designed environment are shown in the systolic hypertension index. Thus, variation analysis method was used to study the differences between the two groups in this index. As the information in Table 4 shows, the results of variation analysis (F), 19.146 between the control and experimental groups in systolic hypertension index, is very significant. Hence, having contact with the designed environment, at a 99% confidence level, had impacts on the subject's hypertension index, validated by lower hypertension levels than those in the control groups (f =19.146, $d.f.$=1,145, p< 0.01).

The results of Table 4, subsequently, illustrate that F was equal to 7.076 between two groups of males and females as exemplified by the systolic hypertension index, which appears substantial. So, exposure to the designed environment, at a 99% confidence level, had different impacts in the various groups: between males and females on the subject's systolic hypertension (f =7.076, $d.f.$=1,145, p< 0.01). From the outcomes of the systolic hypertension index, therefore, it can be presumed that the impacts of the designed environment increase for female patients than for male patients. Furthermore, the findings from the experiment show that the impacts of the designed environment were significant to health and well-being.

Consequently, alternative hypothesis is refuted while the null hypothesis is confirmed. Based on these outcomes, the designed environment did not distort a patient's diastolic hypertension index, thus, there was no significant difference between the groups - control and experimental or between males and females. At that point, the difference in systolic hypertension index was investigated for male and female patients in both the control and experimental groups.

Table 5 revealed, the outcomes of variation analysis showing that F equals approximately, 15.00 in both control and experimental groups in heartbeat rate index seems significant. So, exposure to the designed environment at a 99% confidence level, affects a subject's heartbeat rate index, indicating a reduced heartbeat rate in the experimented group compared to the control group (f =15.00, $d.f.$=1,145, p< 0.01).

The results of this study show that the design of the Living Word Mission hospital waiting environment using representations of nature reduced the patient's systolic hypertension and heartbeat rate. Findings from other studies serve as a surrogate for the result of this study (Crooks and Atwal, 2019; Marko and John, 2019; Randy, 2022). The findings of this study show that the natural environment design in the waiting room had no influence on patients' diastolic hypertension.

Results from the findings demonstrated that the coincidence in patients of waiting nervousness and a history of anxiety was 0.857. The result obtained from the use of ANOVA established that there was a correlation between indicators of nervousness prompted by waiting and general nervousness, gender and education.

However, there was no correlation found between waiting with nervousness index family, job and disease. Table 1 shows the findings of the impact on patients with a history of nervousness measured by STNI. Table 1 also shows that previous nervousness levels affected the waiting nervousness indices, at a 99% confidence level. Therefore, the null hypothesis is refuted and the researcher's hypothesis, confirmed (p< 0.01).

CONCLUSION

The built environment was constructed on the principles of environmental design that specifically used representations of nature in natural ecological design, thus enabling patients to distance themselves from nervousness that can stem from being in challenging places like hospitals and health centres. The waiting room in a hospital or health centre or is an environment that prompts stress and nervousness. There is a correlation between the natural environment and hospital design; a connection between beauty, landscape and skill. Using principles of environmental mindset in these settings led to a waiting period where a subliminal sagacity of harmony and tranquility was proficient.

Prosper and Sooner (2023) and Randy (2022) accordingly expressed the waiting room as a complex 'space of public display' that through its design exposes some of our deepest assumptions, or perhaps more accurately our deepest illusions, about ourselves and our bodies. It is the therapeutic landscape of small-scale of gardens in reception halls in hospitals located in Aba urban, like that used in Living Word Missions hospital, which is viewed by care providers and administrators as a space in which to appeal through visual and other stimulation to the desires of people in those places.

Therefore, placing nature on display in the reception room dissuades patients' anxiety from reality, while gradually,

healing patients' nervousness. Sighting the natural environment within the hospital's reception space ameliorates burning sensations of worry, stress and anxiety, to produce calmness, relaxation, and even pleasure in a manner that diverts attention away from the hospital's sickness-infested environment.

Lastly, it is highly recommended that the Hospital Management Board and other health unions saddled with the responsibility of monitoring hospital and health-related activities, should ensure that the natural environment is integrated into the hospital environment, especially, within the reception halls or waiting rooms. Insisting on the inclusion of natural scenes in architectural designs of hospitals assists in facilitating the healing and recovery process in patients.

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