

## Effect of Environmental Psychology on Reducing Stress and Anxiety on the Pediatric Dialysis Patients

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### Article history:

Received date: 2021/06/30

Review date: 2021/09/02

Accepted date: 2021/09/07

### Keywords:

Environmental Psychology, Stress, Anxiety, Dialysis Children

### Abstract

**Purpose:** The impact of the physical surroundings on the healing process and overall well-being has become particularly important for patients in recent years. This study aimed to identify the effects of environmental psychology on reducing stress and anxiety on the pediatric dialysis.

**Methodology:** This descriptive, analytical study was conducted on 150 hemodialysis patients (50 males and 40 female) using convenience sampling at three hemodialysis centers in Ibn Sina, Saadi and Namazi hospitals. Data collection was performed during three months using questionnaire of DASS-21. Collected data were analyzed using descriptive and inferential statistics.

**Findings:** Boys accounted for 55.6 percent of pediatric dialysis patients, while girls accounted for 44.4 percent. The sample's youngest participant was 13 years old, while the eldest was 18 years old. According to the results of Table 2, the mean score of the mental state of adolescents hospitalized in three hospitals of Ibn Sina, Namazi and Saadi was  $M=42.14$ . Also, in their opinion, the mean score of medical spaces was  $M=73.54$ .

**Conclusion:** The results of this study showed that the quality of the treatment room is more effective in mitigating tension in dialysis patients aged 13-18 years admitted to the dialysis ward of Ibn Sina Hospital in Shiraz than the other two dilapidated hospitals.

**Please cite this article as:** Saghaci F, Parva M, Samani S. (2022), Effect of Environmental Psychology on reducing stress and anxiety on the Pediatric Dialysis patients, *Iranian Journal of Educational Sociology*. 4(4): 41-49.

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## 1. Introduction

Rather than merely the absence of illness or afflictions, wellbeing is characterized as a condition of full physical, mental, and social well-being. Healthcare facilities (HCF) are locations that are provided by physicians and other care providers where people with health problems go for treatment. In recent years, we've seen an increase in emphasis on the role of technology and the physical world as part of a holistic approach (Huisman et al, 2012). Environmental psychologists believe that the quality of the environment around humans affects the human mind, soul, and body. The physiological functions of the human body are influenced by his behavioral and emotional state, according to a large body of evidence. Effects on their psyche and bodies that are unwanted and unhealthy are important (Chen et al, 2020). The influence of the physical world on the recovery process and well-being of patients, as well as the well-being of their families, has been widely documented in recent years (MacAllister, et al, 2020). The maintenance of the role of the body's organs and structures in the desired state during therapy and regeneration is effective in achieving the desired therapeutic results. It is crucial to create a space for patients to reduce stress through environmental design strategies and increase hope to accelerate and encourage their recovery (Totaforti, et al, 2018).

In this report, an attempt has been made to provide solutions by following the principles, trends and also using the features of therapeutic environments to design treatment spaces, so that these spaces become spaces to alleviate anxiety and stress and increase relaxation (Bates, et al, 2020). Research shows that dense, non-natural chaotic environments can lead to heart disease and aggression, and lead to heart disease in the long run for a variety of reasons, including increased stress, decreased attention and concentration (Franco et al, 2017). Based on the study of research findings, the central role of fun, wet and versatile therapy environments emerged as a key factor in fostering both consumer health and success. The inclusion of appealing colors and images, and sufficient acoustic, thermal efficiency, ventilation, and natural lighting have all arisen as essential features those hospital designers should consider (Manca, et al, 2017).

Human beings have suffered tremendous losses as a result of urbanization and the alienation of humanity from nature today. The disappearance of natural spaces was exacerbated by the influx of people to cities and a shortage of land, which is one of the most traumatic causes for humans (Brown, et al, 2007). According to studies, the lack of human influence over the environment, as well as problems with the design-engineering structure of buildings, resulted in pollution and social segregation, which eventually lead to work and social issues; as a result, these factors threaten the mental health of people (Gifford et al, 2007). The World Health Organization (WHO) defines health as "the complete capacity to participate in social, psychological, and physical roles." The patient's environment may have a significant impact on clinical success and patient-reported outcomes (Gesler, et al, 2004).

Environmental psychology as a discipline may be helpful in explaining the dissociation of man and the environment (Levi, et al, 2001), and it demonstrates how position specification influences behavior, promotes behavioral therapy, and leads to environmental compatibility (Tavakkoli, et al, 2015). People now understand that when confronted with difficult circumstances, they use a variety of coping strategies. Individuals' physical and emotional wellbeing is affected differently as they use a combination of approaches to coping with stress. Coping skills are passive or aggressive efforts made in response to dangerous situations in order to alleviate social distress (Naderifar, et al, 2017).

As previously said, the dissertation's primary focus is on a type of healing architecture, with the overall goal of providing an environmental paradigm in which the patient's environment achieves a degree of comfort and protection that aids his physical rehabilitation. Slow down to make the recovery process go more smoothly and quickly In reality, the aim is to design a type of architecture that can offer welfare and therapeutic comfort to hospital patients, thus reducing the duration of care. Furthermore, architecture can be used to speed up regeneration, fitness, and well-being of the mind, body, and spirit. Recognize and incorporate the concepts of component-based architecture due to the increasing number of patients with

different diseases in today's industrial societies, as well as the nature of clinical centers and their function in sustaining community wellbeing and the immediate need to construct and improve them. Environmental psychology is critical for improving medical center efficiency, creating a healthy and enjoyable environment for patients and employees, and speeding up the healing process.

## 2. Methodology

The approach used in this study is a descriptive correlation based on the subject's nature. In the year 2018-201, the statistical population includes all pediatric dialysis patients (13-18 years old) in Shiraz hospitals. 100 pediatric dialyzes were chosen as the sample size based on the size of the population and the table of Karajsi and Morgan (1970).

$$\text{sample size} = Z_{1-\alpha/2} SD \sqrt{d^2}$$

$Z_{1-\alpha/2}$  = is standard normal variate

SD = Standard deviation of variable. Value of standard deviation can be taken from previously done study or through pilot study •

d = Absolute error or precision

$$\frac{1.96^2 \cdot 0.08}{0.05^2} = 123$$

The Depression Anxiety Stress Scales-21 (DASS-21) is a collection of 21 scales that measure depression, anxiety, and stress. This is a series of three self-report scales created by Lovibond and Lovibond to measure the negative mental states of fear, depression, and stress. There are seven elements in each of the subscales (Lovibond, 1995). 25 There are 21 questions on the meter, with scores ranging from 0 to 3 (Never, to some extent, medium and high), Score 0 indicates the lowest level of the problem in question, and score 3 indicates the highest level of the problem; higher scores indicate greater disease incidence. The scale has a minimum and maximum probable ranking of 21 and 83. Levy Bond (Lovibond, 1995) measured strong internal accuracy for the Depression, Anxiety, and Stress Scales in an analysis on a regular sample (0.90-0.84- 0.91, respectively). The validity of DASS in Iran was measured using factor analysis and criterion validity (Sahebi, et al, 2017).

As mentioned in the introduction, the second questionnaire was designed after the completion of field studies and observations by researchers and after extracting the architectural components affecting the quality of treatment and its adaptation to the healing elements. The reliability of the questionnaire was tested in the field. Initially, 7 variables were extracted from the studies, which were: - Dimensions and size of space 2. Furniture and layout, 3- Perspective, 4- Routing 5- Color and texture 6- Light and brightness 7- Ventilation and out of a total of 23 questions, 5 questions related to motor components and correct routing, 4 questions related to the definition and analysis of physical elements (color and texture, privacy and Privacy), 3 questions related to furniture and space layout, 3 questions related to light and lighting, 2 questions related to ventilation, 2 questions related to social interactions and 4 questions related to landscaping and suitable green space and landscape. This questionnaire has received the ethics code with the ID IR.SUMS.REC.1399.350 from the Ethics Committee of the Vice Chancellor for Research and Technology of Shiraz University of Medical Sciences. Patients were asked to express their satisfaction between the range of completely dissatisfied to complete satisfaction. In this research, confirmatory factor analysis has been performed using path analysis technique and structural equation modeling with the help of LISREL software version 8.8. All 23 questions that explain the quality of treatment spaces have a significant test value of | 96/1 | (The validity base number) is larger, which confirms the validity of the questionnaire.

The aim of this analysis is to find a connection between the therapeutic environment's consistency and its adaptation to healing components (these components are based on previous research and studies relating to the theoretical basis of research) in medical centers, as well as the calculation of these

components using independent variables derived from analytical studies. The research method is the use of mixed research quantitatively and qualitatively. Qualitative research with an interpretive (hermeneutic) approach, the purpose of selecting a participant in descriptive and hermeneutic phenomenological research is to select participants who have experience in living in an environment that is the focus of this particular study and which participants want to talk about their experience. In this study, the number of adolescent patients aged 13 to 18 years present in the project was 28 people from each of Namazi and Ibn Sina hospitals and 34 people from Saadi hospital who had more hospitalization experience. A small part of the research is a descriptive survey in which adolescent dialysis patients are asked to answer a number of specific questions. However, because there has been so much debate about the quality of care space and physical aspects that aid recovery, we first outlined the research in this area before focusing on the physiology of the atmosphere and the role of space quality in mitigating the negative effects of stress, anxiety, and depression in patients.

The next step was to determine how to sample and quantify the sample size for the target population. The sample distribution was analyzed similarly in three hospitals after the statistical population was calculated using the alpha formula. A fully worn-out case, a semi-worn case, and a recent and new case were among the hospitals. LISREL 8.8 program was used to complete this task. This article is the result of extracting from the first author's doctoral dissertation with code IR.SUMS.REC.1399.350 from the Vice Chancellor for Research of Shiraz Azad University. The age group of adolescents was between 13 and 18 years old. Frequent hospitalizations were due to dialysis and patients admitted to Ibn Sina, Saadi and Namazi hospitals. Exclusion criteria are: dissatisfaction to participate in the study and lack of accurate completion of questionnaires were considered as exclusion from the study.

To analyze the data by descriptive statistical method (tables and graphs, central indices and dispersion and correlation coefficient) and inferential statistics such as (independent t-test, analysis of variance, correlation test) to confirm or reject the hypotheses and ranking variables done. In the first stage of the research, SPSS software was used for analysis, and in the second stage, LISLER software was used for data analysis.

### 3. Findings

Patients admitted to Ibn Sina, Saadi, and Namazi hospitals aged 13 to 18 years were 55.6% of the respondents were boys and the remaining 44.4% were girls. The youngest person in the sample was 13 years old and the oldest person was 18 years old. Among the adolescent patients participating in the research project, 58.9% of the respondents lived in Shiraz. 35.6% lived in cities of Fars province and 5.6% in other cities outside the province.

**Table1.** Frequency distribution of demographic variables

demographic variables	Frequency	Percentage
Gender	Male	50
	Female	40
Age	13	13
	14	14
	15	15
	16	16
	17	17
	18	18
City of residence	Shiraz	53
	Cities of Fars province	32
	Other cities	5
Hospital	Saadi	34
	Namazi	28
	Ibn Sina	28

**Table2.** Descriptive statistics for the main research variables among adolescents admitted to three hospitals

Research structures	Standard deviation	Mean
psychic state	11. 22	42.14
Quality of treatment spaces	17. 83	73.54

According to the results of Table 2, the mean score of the mental state of adolescents hospitalized in three hospitals of Ibn Sina, Namazi and Saadi was 42.14. Also, in their opinion, the average quality score of medical spaces is 73.54.

**Table3.** Analysis of variance regression for quality of treatment spaces on mental state (treatment process) of patients less than 18 years of age

Model	DF	F	Sig.	R	R <sup>2</sup>
Regression	1	33.70	.001	-.52	.27
left over	88				

According to the results of Table 3, the quality of treatment spaces in the three hospitals and the mental states of the adolescents admitted to these hospitals indicate the effect of the principles related to the quality of treatment spaces on the treatment process ( $p < 0.05$ ). In other words, the null hypothesis of the test is rejected and the test is significant. The correlation coefficient between the two variables was  $R = -0.52$ , which indicates the inverse effect of the principles related to the quality of treatment spaces on the treatment process. In other words, the higher the adolescent's score on the hospital environment and architectural principles, the lower his or her score on the Mood Questionnaire, which indicates anxiety, stress, and depression. According to the coefficient of determination  $R^2 = 27\%$  of mood swings in adolescents aged 13 to 18 years are explained by the quality of treatment spaces.

**Table4.** Results of independent t-test in comparison of anxiety, stress, and depression between patients under 18 years of age in Ibn Sina Hospital and Saadi and Namazi hospitals

statistics	The mean in Ibn Sina Hospital	The mean in Saadi and Namazi hospitals	DF	P
Test	47.51	30.25	78.65	0.001
	-11.37			

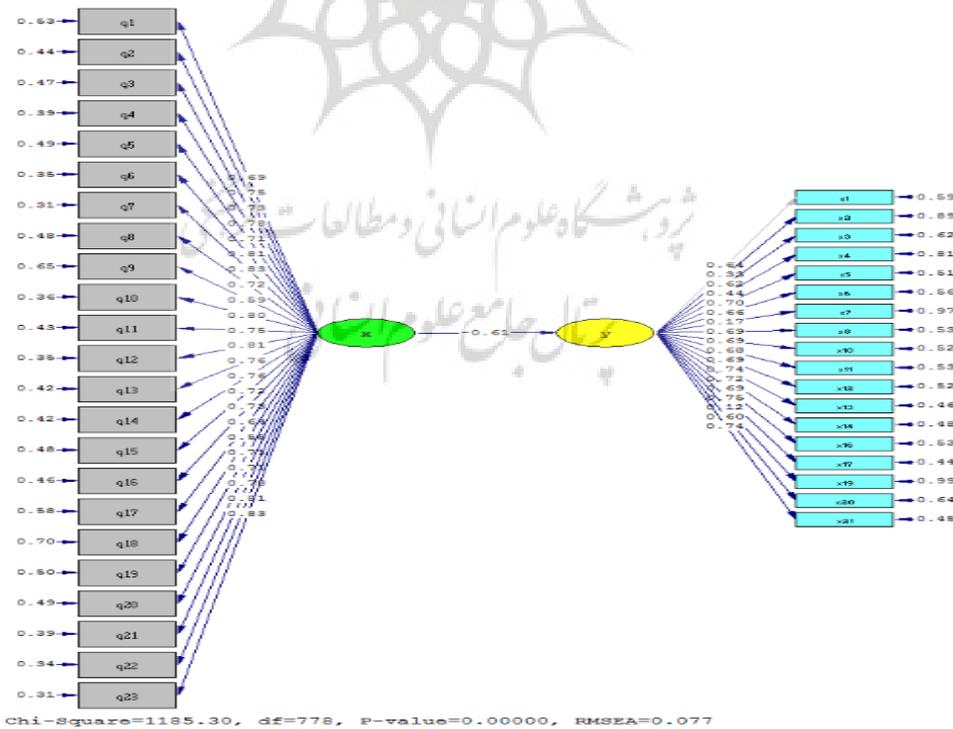
The results of Table 4 show that the mean mood of patients less than 18 years of age admitted to Ibn Sina Hospital is different from the other two hospitals. The mean of mental state among pediatric dialysis admitted to Ibn Sina Hospital is 30.25 and in the other two hospitals are 47.51. Due to the design of Ibn Sina Hospital in accordance with the principles of architecture and the low average score of mood in this hospital, it can be concluded that improving the quality of space can be useful in reducing the negative psychological effects of being in the hospital.

**Table5.** The effect of each of the components of the quality of treatment spaces in relation to this variable on the mental state of patients under 18 years and its degree of importance

Questionnaire number	Components	Standard coefficientThe	degree of importance
1	Ease of routing	0.69	10
2	Status of crosswalks and sidewalks	0.75	6
3	Ability to easily identify section input	0.73	7
4	Input section related to the amount of invitation and receptivity	0.78	4
5	Hospital facilities and equipment due to mobility restrictions	0.71	9
6	Create privacy in the room	0.81	2
7	Availability of outdoor view	0.83	1
8	Use sunlight in the room	0.72	8
9	Room temperature and humidity status	0.59	12

10	Room layout in terms of furniture	0.80	3
11	Paints and materials used	0.75	6
12	Room layout in creating privacy between patient and visitor	0.81	2
13	There is a separate space for mobile	0.76	5
14	Existence of electronic devices to communicate with social networks and	0.76	5
15	Existence of space for gathering and creating interaction between patients	0.72	8
16	Waiting space equipment	0.78	4
17	Natural and artificial light in the section	0.64	11
18	Optimal ventilation to reduce the smell of medicine	0.55	13
19	Existence of works of art inspired by the natural environment	0.71	9
20	Variety and charm of the yard	0.71	9
21	Existence of shading trees in the outside environment of the hospital	0.78	4
22	Possibility of activities such as walking	0.81	2
23	Ability to be outdoors	0.83	1

Table 5 shows the effect of each item in explaining the variance of the main factor scores. The higher the standard coefficient, the greater the impact on the quality of treatment spaces, According to these coefficients, in the opinion of adolescent patients, "the possibility of being outdoors" and "being able to watch the outside view" are two effective components of environmental psychology. These two variables respond to the adolescent's need to explore the outside world and social relationships. "Arranging the space to create privacy between the patient and the visitor," "the need to engage in tasks such as walking," and "creating privacy in the room" is all secondary considerations in the next phase. Optimal ventilation to reduce the smell of the drug is in the last rank of the effect and is the least important component for adolescent patients.



**Graph1.** Standard coefficients in relation to environmental psychology components on the mental state of patients under 18 years

#### 4. Discussion

This study aimed to identify the effects of environmental psychology on reducing stress and anxiety on the pediatric dialysis. According to the coefficient of determination, the standard of treatment spaces accounts for  $R^2=27\%$  of mood changes in pediatric dialysis. The results of Allahyar and Kazemi (2021), Ullán and Belver (2021), Graber et al. (2021), and Rollin and JuddyAnn (2009) are in line with this study.

Examining environmental factors that affect design, such as music, artwork, fragrance, colour, light, ergonomics, protection, nature, layout, comfort, and privacy, can cause a sense of stress in people, especially children, which can be accelerated by examining environmental factors that affect design, such as music, artwork, fragrance, color, light, ergonomics, safety, nature, layout, comfort, and privacy. In addition, lowering patient discomfort in medical facilities has a major impact Ullán and Belver (2021). Taken together, the works analyzed by the previous authors support the use of visual arts in hospitals as a resource to enhance the well-being of children and families and their experience in the hospital. Ullán and Belver indicate two particularly relevant aspects in this sense: the importance of the visual arts in improving the symbolic quality of hospitalization settings and the communication processes that occur in these environments.

The results showed that children's and therapists' preferences on the landscape of a children's hospital. Both respondent groups preferred warm colors. Also, among the types of topiary, design styles, and types of space design, the children preferred animal shapes and cartoon characters, combinations of flowers and turf grasses in planting beds, combinations of water fountains with flower beds instead of water fountains alone. They also preferred weeping-form trees and combined furniture forms with plants. This research showed that therapists can be good representatives for obtaining children's preferences about the landscape design factors. Also, they can be used in such children's preference studies when a direct assessment of the children's preferences is less possible. Therefore, these results could help architects and designers to provide better-suited hospital landscapes for children (Ullán, et al, 2021).

evidence-based architecture has evolved into a scientific concept about what is now known as healing environments. Healing environments should be thought of as "wise investments" because they save resources, improve personnel productivity, and reduce the length of a patient's hospital stay by making it less difficult. Based on the result of several academic kinds of research such as Therapeutic gardens as a natural method for improving the therapeutic environment of Alzheimer's and other people with dementia (Uwajeh, et al, 2019), the healthcare healing environment's mediating impact on central healthcare quality and patient satisfaction (Amankwah, et al, 2019), and Impact of the healing surrounding design on treatment outcomes (Zhang et al, 2019), all of them are agree that a healing environment is one in which the relationship between patients and workers results in better health effects in the physical environment (Huisman, et al, 2019).

According to Herweijer-van Gelder, the evidence-based design lends legitimacy to the clinical environment. In healthcare services, evidence-based architecture is used to recognize design ideas that can improve the quality and well-being of patients (Herweijer-van, et al, 2016). Brambilla et al, demonstrated that healthcare environments should be resilient to the healthcare system's ongoing evolution; in this context, the ability to actively apply new information about the effect of such architecture solutions on patient and organizational results, EBD is critical (Brambilla et al, 2016). Through visual connections with home, comfortable activities, pleasant furnishings, and space that facilitated the patients' interpersonal relationships with family and hospital personnel, the physical environment offered emotional, physical, and moral support. The theoretic concept of healing space as a physical environment that facilitates social solidarity and healing relationships and strengthens the cohesion of mind, body, and spirit will need to give way to a more pragmatic meaning.

Patients recognized calming space through the emotions it evoked, such as a sense of being cared about, a sense of belonging, and feelings of warmth and peace. The current research shows that beyond the

treatment they are providing, there are spatial enhancers and detractors of a patient's sense of recovery and that patients can associate healing spaces with healing enhancers.

One of the main limitations was dealing with Corona and obtaining certification and code of ethics from Shiraz Medical Sciences. Another drawback was the difficulty in getting into the treatment center.

A further drawback was that certain patients were unable to complete the questionnaire due to a medical condition. In comparison to the other two dilapidated hospitals, the findings of this study revealed that the efficiency of care room is more successful in reducing stress in dialysis patients aged 13-18 years admitted to the dialysis ward of Ibn Sina Hospital in Shiraz.

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