

## Identifying influential environmental factors in designing dentistry clinic with the approach to promote mental health in cure process

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### ABSTRACT

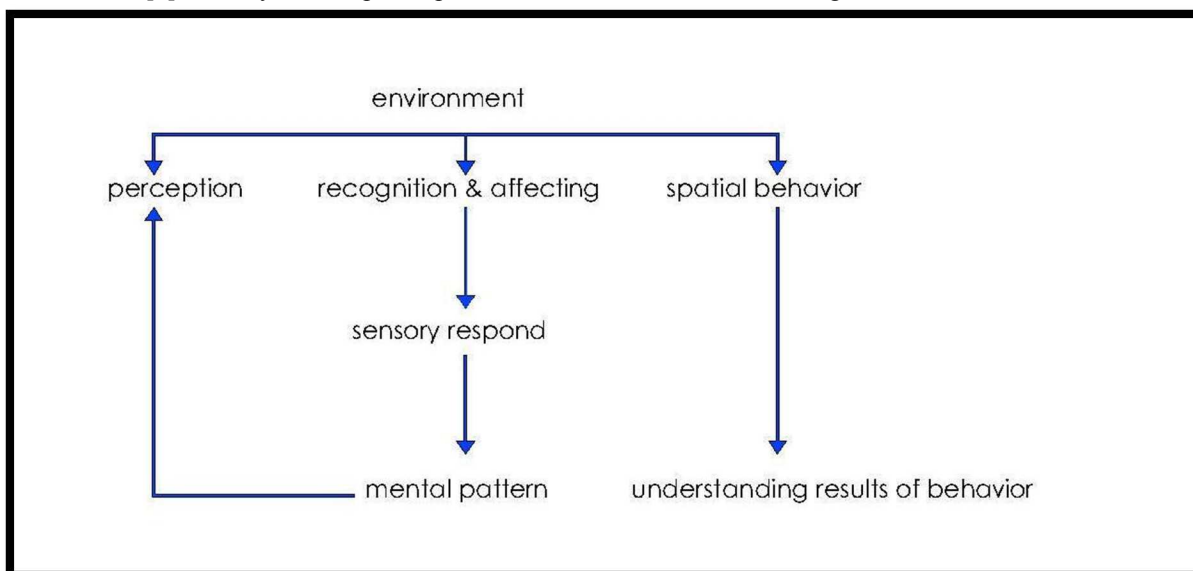
Dentistry clinic is a place where all people will attend once. A dentistry clinic is dominantly imagined as a frightening and stressful environment, this vision is resulted from existing clinics with no respect for architectural design and spaces merely for cure regardless designing factors. In current conditions, dentistry clinics are places lacking architectural identity and they do not meet patient's mental, sensory, emotional and curing needs perfectly. In this paper, role of architectural science and art in mental health promotion and healing process improvement and role of pleasant environment's constituent elements (compatible with human nature) are investigated. The objective of this research is to revision impact of architectural space on mental health and behavior and optimized design of interior architectural spaces and outdoor spaces in regard with lowering stress, increasing confidence, mental health promotion and improving patients' behavior. To achieve these objectives, data have been collected via library and documentaries research method and spatial solutions providing an appropriate environment in cure process have been proposed in order to design dentistry clinic. According to the results, it seems that architecture of environment, landscape and space's furniture (color, light, texture) can affect cure process promotion directly.

**KEYWORDS:** architecture and mental process, environmental psychology, dentistry clinic, patients' needs

### INTRODUCTION AND LITERATURE REVIEW

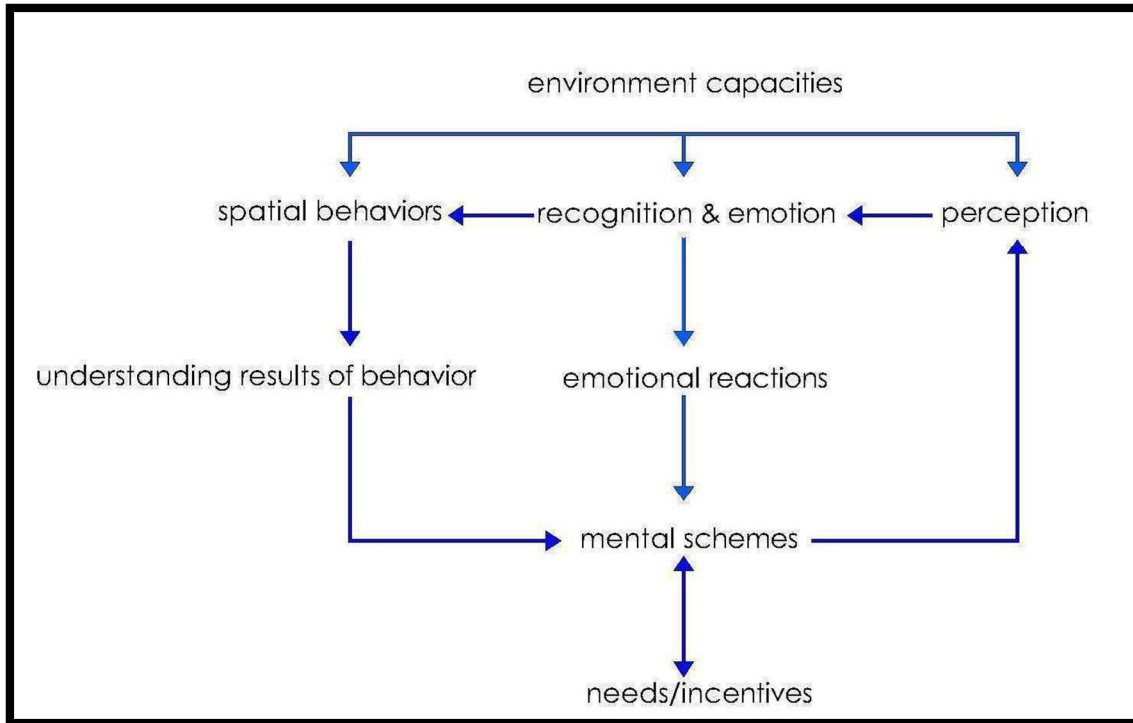
"Not only the spirit is alive in essence of space, but also space is manifestation of human's need to presence".  
Louis Kahn

Manner of doing an activity is called behavior; human behavior is result of person's incentives and needs, environment capacity, and person's mental image of outside world resulted from his perceptions and what this image means for him. Resultant behaviors of a constant activity are different in regard with change in time and place circumstances [1]. Bentley et al. depicted process of human behavior in the diagram below:



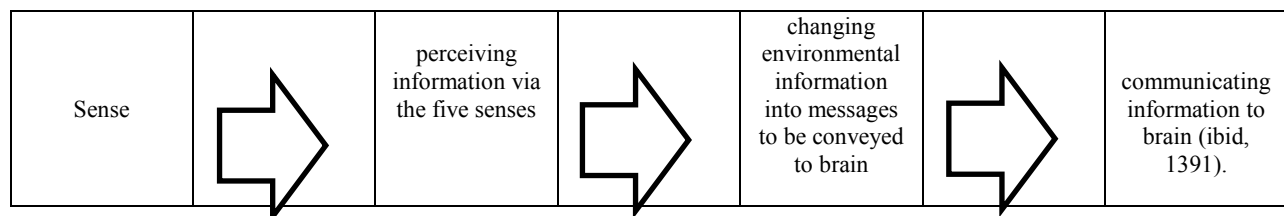
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Today, anthropological, sociological and psychological researchers have revealed some secrets of human behavior. Many of these secrets have been remained undiscovered, too. There is a broad knowledge and perception of the link between human behavior and environment and environmental design now. Environment has a potential capacity to supply human experiences and behaviors [2]. Crucial process of interaction between human and environment is shown in the figure below:



Behavior follows both person and situation: different people behave in various ways in the same situation. A person's behavior reflects an individual order of characteristics brought to situation by person [3].

People form their behaviors according to environment and also environment affects behavior. Environmental features have a great influence on our judgments on that environment in this regard. Environment impacts on person by providing information [4]. Pakzad and Bozorg represent processes of sense of environment as following:



Human perception of environment is of the most important notions in environmental psychology. Environmental perception is a procedure through which human selects necessary data on environment based on his requirement. So perception is a targeted procedure and relies on dominant culture, attitude and value within perceiver's thought [5]. Discussion of sense and perception in today's psychology known as sensory perception is a procedure that begins under influence of environmental motivations and ends with quality of human reaction and mental analysis and interpretation. It means that human receives information about surrounding environment by its receptors and shows a compatible behavior by reacting against them. Due to environmental motivations being on sensory threshold, human feels and reacts, feeling pain is accounted as the most significant sensory quality in human and it informs human of damaging agitations and causes him to go to the doctor and so, conditions of various feelings and perceptions and reaction and behavior will be also different [6]. Therefore, lack of correct and realistic recognition of mutual relationship of human environment can cause to environmental determinism on one hand, and

oppression, on the other hand. Environment determinism which means assuming environment dominant in person and no influence on environment by him results in exploitative use of environment, assuming designers' decisions determined and paying no attention to the observers and their mental meanings. People should be known in encountering environment, their mental expectations and meanings should be investigated and therefore, environment should be organized so that it creates a desirable relationship between person and environment[4].

People react not only to objective characteristics of a reality, but also respond to their own mental interpretations and explanations of that reality, that is a reason for which different people behave variously in a determined objective situation [7]. People react in different ways in various spiritual and mental conditions and difference in attitude and consequently, positive behavior can be constituted through providing circumstances synchronized with principles of balancing their spiritual moods. In addition, Sotudeh explains: "Change in people's opinion also impacts on their behavior because types of opinions are known as indicators or factors of behavior prediction. Intense or strong opinions or those of human favorites are much more related to weak or irrelevant attitudes. Recognizing components are able to predict some people better than emotional components, so importance and benefits of attitudes can be realized when the link between attitudes and behavior becomes clear, because change in attitudes not only can be a meaningful start of behavior adjustment in psychological researches, but also can be beneficial in everyday life. So change in people's opinion can affect their behavior, thus positive opinion results in a positive behavior" [7].

### **Investigating role of environment in defining kind of behavior**

Bently et al. highlights sensory enrichment as one of pivots of environment quality improvement. Furthermore, Lynch in his book "Managing sense of region" investigates perceived quality of environment via the five senses and influence of scale of space on quality of feeling the space. Our sensory system is the main channel to contact with our surrounding world. Each of our sensory organs has a part called sensory receptor that is sensitive to environmental motivators. Moreover, there is an intensity spectrum of environmental information in our sensory domain. In general, we will be annoyed in ranges near top or bottom thresholds, for instance, existence of unpleasant sound motivators with high intensity, various or highly intensive lights, abundant details and variety of colors, unreasonable change in substance, surface coating and smell intensity irritate citizens. In that case, tendency to exist and stay in space, doing various activities and social interaction increases and quality of space declines [4]. A good feeling in user about attending the space can be made by considering suitable and desirable circumstances for patient.

Filin divides built visual environment into three categories of homogeneous, aggressive and reliever in studies on environment's impact on visual system. In spite of great number of varied elements, Filin describes a reliever environment as a pleasant space with features like curved lines in thickness, color diversity, variety of surfaces and volumes, shapes and colors resembling natural environment. Relieving environments are generally picturesque. Odor is one of the most primary and important elements of urban space quality. Presence of pleasant odors in urban spaces increases user's satisfactory who experience space and it helps us connect to environment in other steps. Space can be strengthened by varied and nice smells. For example, space would be seem pleasant to person when he smells fragrant of flower or coffee in that space and it enriches person's experience of space [8].

In today's modern life, human beings spend most of their time in built environments made by mankind. These physical environments affect human's behavior and a well-designed place can empower abilities and help reduce stress. Today, architects, doctors, nurses and psychologists consider constructed buildings as a component of cure process. Meanwhile, studies particularly indicate impact of curing environments on people's well-being, healing process and patients' recovery [9].

Applying environmental psychology in designing spaces by architects and designers make design process targeted and it provides a design based on human needs and appropriate for him in architectural design process by means of considering human with all aspects and principles in physical environment [10]. One of innovative designer's duties is to identify people's intentions or to form tendencies and create spaces which respond to consequent behaviors of these intentions. Designer influences human experiences through controlling capacities of built environment [2].

Spatial desirability is acquired by accurate recognition of space. Architectural space being able to perceive objectively is a space which is felt directly and identified by its defining elements. All elements are connected to each other in a perceptive space [11]. Temperature thresholds have key role in desirability of space experience; in spite of visual beauty we are not comfortable in spaces in which we feel excessive heat or cold and we are not interested in staying there. Therefore, we are required to provide climatic comfort. Factor of congestion is also influential on feeling hot and being annoyed in space. Public spaces (lobbie) ought to be in a way that prevents people from probable congestion and unnecessary physical interferences among users so that there would be no dissatisfaction with feeling cold or hot. Moreover, temperature has broad impacts on human behavior. High

temperature affects health and social behaviors such as aggression and being attracted to others [4].

### Examining impact of nature on reducing stress

Stress or mental pressure is a notion and phenomenon creating passive changes and stress generally reveals when a person is exposed to social and psychological and physical motivators and finally, it disturbs person's comfort [12].

In late 1800s, Florence Nightingale was of first people who investigated influential environmental elements on accelerating recovery and reducing mental pressure on patients in hospitals and he proposed patient rooms with much light, larger windows, ventilation and perfect natural light in this regard [13]. After bringing his opinion up, researchers started debating and studying on such buildings since middle 1970s and remarked that windowless hallways, labyrinthine corridors, foul-smelling sterilized interior enclosures raise an unfavorable feeling of space and results in increasing mental pressure and stress in patients [14]. Accordingly, Dr. Roger Ulrich is a researcher who have studied impact of interior design on people's health academically since 1980 and remarked this issue particularly about patients and in healing environments in several researches [15].

Physical environment of clinic can create levels of stress by conveying negative concepts. Stressful motivators experienced by patient in clinic may be classified in two broad groups: 1. motivators related to illness and sort of cure, 2. motivators related to experiences of attendance in an unfamiliar environment and being cured by unknown people [9].

Connection and integration with nature is the only way to reach stability and calm and security [16]. Because human beings are raised from nature, they are intrinsically interrelated to nature and they try to explore and reach natural environments or spaces imitating natural universe [17]. The fact is that people automatically respond well to green environment. Being drawn to environment in this way is called "smooth attraction" [18].

Aminzadeh utilizes healing characteristic of nature to investigate a solution for promotion of citizen's health in urban context and introduces three key principles in designing healing gardens including: 1. to make contact with nature or looking at nature landscape, 2. meeting individual and social demands, 3. environmental comfort conditions [19]. Healing gardens do not have merely aesthetic function, but also they cause to cure physical and especially mental diseases due to the connection with user and sublimely prevent from getting ill [20]. Some components are mentioned to design healing gardens in Nikbakht's studies which generally emphasizes on the link between landscape and human senses [21].



**Image1.**Connection with Nature and Visual Comfort, Reference:Www.Archdaily.Com

Garden and green open space are required to be full of flowers and plants in order to be more useful in cure, they must have plants able to adapt when season changes... Plants may be subliminally symbol of a specific concept... Green space should have view to the sky and changes in clouds, it should have pools reflecting picture of the sky and trees and remind patients that life goes on [22]. Trees and shrubs affect humans' spirits and minds by their different shapes and colors and textures and decreases patients' mental pressures and physical diseases. Today, it has been proved that some trees create sort of a calm mood and ecstasy by secreting a substance named "Phytoncide", so green space has a vital role in providing human's neural balance and it influences process of patient's recovery [23].





**Image2.** Connection with Nature and Visual Comfort, Reference:(Choi, Kim, & Min Hye, 2010)

Patients feel of no control of matters while entering a hospital. Resultant stress of having no control over matters has a negative effect on body's immune system and patient's physical equilibrium... Garden ought to be accessible in order to decline stress in patient by providing feeling of control and patient must be able to use it as he desires. Above all, design of garden should give people a choice: to choose between a place for loneliness or being together, sitting in the sunshine or shadow, broad or closed view, fixed or movable benches and various walking paths, whole of these invigorate sense of independence [24].

People prefer to be in familiar and soothing places while feeling worried and nervous. A depress patient may have no interest to leave his bed; or a worried patient may prefer acquainted of home. Furthermore, people who become stressed because of hard work, illness or anxiety in curing environment need a pacifying green space due to its familiar environment [25]. According to disturbance in perception process, person becomes stressed in spaces in which he is encountered lack of input data or excessive increase in information entering neural system... So a clear and peaceful space must be made in garden design[22]. Humans often tend to transmit some part of their anxiety and worry to things and people around them when they get stressed. While a person encounters some external motivators, the one with more compatibility with his emotional status would be focused... Conceptual art may seem frightening or threatening to a stressed person while it may be amazing and challenging in ordinary person's view... Accordingly, garden must convey a positive and obvious message to patients in a cure environment with the purpose of reducing stress signs [24].

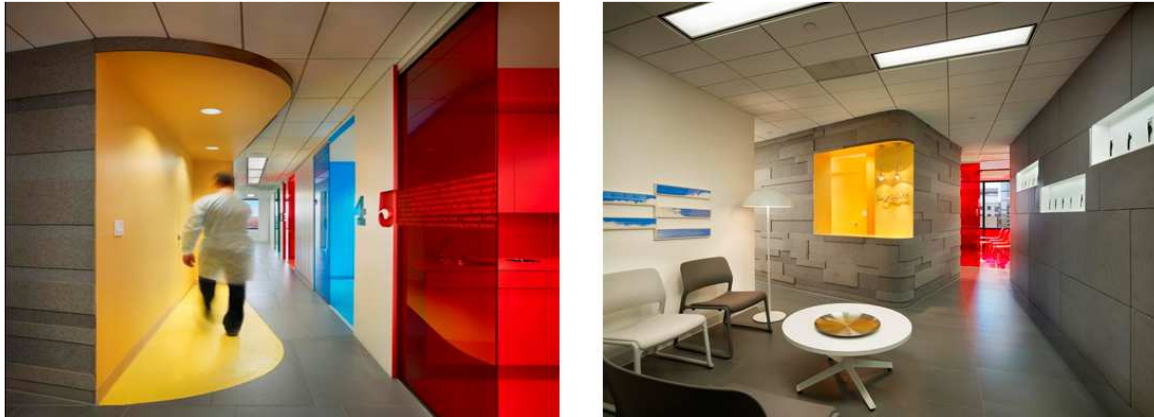
### **Investigating impact on color and light on reducing stress**

Quality of a space is defined by forms inside it. All phenomena emerging architectural forms together include space, shape, light, color and material. Islamic architecture has significant emphasis on light especially in Iran, light is a spiritual; presence that penetrates in material's mass and turns it to a new form valuable of human spirit's settlement, a spirit whose essence originates from world of light is nothing but spiritual universe [26]. Color is obtained from polarization of light; colors are symbols of numerous aspects of existence polarization. Light has been dominant on all arts of Iran as it always has been so important in Iranian architecture, sense of color and its harmony which indeed has a direct relation to awareness of role and importance of light [27].



**Image3.** Using Natural Light to Enhance the Energy, Reference:Www.Archdaily.Com

Color flows in entire dimensions of life and so, its concept is as wide as concept of life or as Itten argues, color is life itself [28]. Color is one of elements affecting people's visual perception of environment beside light, texture, form and shape, but it may be addressed randomly in design more than other notions. Color is a crucial tool to conduct or induce specific spiritual moods to people and communities. Color helps decrease tiredness and motivates eyes. Color emerge a various background of contrasts in different hours a day and creates new shades in each hour and makes space varied and vivid. By the way, color can give space integrity and unity or make it different and distinguishable. Reality and spiritual-mental impact of color is called color effect. Color factor and color effect are compatible just in case of coordinated diversity. In all other cases, color factor turns into a new effect [29].



**Image4.** An Attractive Place with Colors, Reference:Www.Archdaily.Com

Human lives are under influence of connections to surrounding environment. Colors are one of important elements to make connection [30]. Colors are energies transmitting through waves and light receivers in retina of the eye turn these energies to sense of color by brain [31].

Color transforms architectural shape and can cause expansion, shrinkage, widening or extension and create an incorrect understanding of ceiling height (being high or low). Color is able to change appearance of environment so that leads to change in a person's temper [32].

Proportion (geometric order of light) and color (of material features of light) that are two of three distinctive items having the most significant ability to demonstrate visual beauty, as Ibn-Heisam declares, are seriously relied on third item, light. Light is origin of visual beauty endings (ultimate source of visual beauty) (Noqrekar, 1389)[16].

One of great progresses in interior design is provision of natural light inside hospital and particularly in middle spaces of wards. Central courtyards can be employed in areas with good weather to provide whole floors with natural light as well as landscape design. If central courtyard is located in one side of main corridor or in main halls (that is common in many hospitals) it can be useful in navigation of visitors and staff [33].

Color and light can have complicated and extensive influences on people's emotions and reactions to environment (Birren, 1987)[34] and in addition, it is effective to enhance rate of patients' recovery and to increase spatial quality generally perceptible for patients, staff and visitors [35].

#### Results of research have been listed in table below:

subject	solution
<b>Sense of belonging to a place</b>	Access to nature and interaction with it and using comfortable and inflexible and suitable furniture. Spaces designed according to aesthetic criteria, using types of plants with complementary colors adaptable to seasonal changes leading to confidence and sense of possession.
<b>Improving patient's satisfaction</b>	View of nature from inside cure room and locating dentistry units across windows with proper height that makes it possible for patient to see outside.
<b>Increasing fear and stress</b>	Using suitable color to reduce tiredness and decrease fear and utilizing color regarding environment use.
<b>Creating sense of privacy in space</b>	Using proper partitions between dentistry units, locating dentistry units with appropriate space between them.
<b>Increasing patience</b>	Options like providing the internet access to get updated information or creating playing rooms in children's spaces.
<b>Enhancing staff's job satisfaction</b>	Using appropriate colors in surfaces and furniture and noticing rules of ergonomics.
<b>Improving sense of place</b>	Using peaceful art works and familiar pictures, prevention of complicated patterns, motivating colors, and monochrome patterns in choosing physical furniture, equipment and devices.
<b>Promoting energy</b>	Maximum use of natural daylight.
<b>Environment clearance</b>	Minimizing ambiguity in space by creating order in environment that causes attraction in environment and also organizes mental space of patient.
<b>Interfering connection</b>	Appropriate use of artificial lights evoking daylight. Using live wall in interior architecture.

## CONCLUSION

Qualitative criteria for reducing patients' stress in clinics were proposed and investigated in this paper. Final achievement of the research has proved these items that considering these patterns (view and landscape and nature, light, color) beside each other is essential to improve sense of place and make a pleasant environment for patients generally with the aim to decrease stress and promote patients' health. We try to find quality in our lives and it should be fulfilled by considering specific patterns playing role in providing identity. Patterns have a deep and major impact so that they have power of making an infinite change. Some patterns are able to emerge endless and effective results and an effective building is really created by some of these patterns, and the created building acquires its identity from these patterns, and it will provide a place full of positive features giving calm to users of space. A deep connection between nature and human is realized through investigated items. Demonstrating landscape through frame of window and respond to human's instinctive demand that being windowless makes him stressed, window will be no more a hole in wall from his point of view, and these nice patterns help people to be constantly delighted and cheerful and fresh if they are recognized properly. And about light that is a source of life and color... Vital patterns that each makes the building more beautiful and evolved. And particles of a building which is vivid and beautiful show that people feel calm inside it. These are the patterns adaptable to inner force, and whole of patterns inject a tremendous resource of tranquility into mankind and provide happiness and cheer inside them because patterns interact with each other.

According to considered items, we try to take people to the excellent moments of sense and perception and peace visually.

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