Understanding the colors' effects on the health components in urban spaces

Mozhgan Hassani Kouchaki*[1], Jasmine Gohil[2]

1-Research Scholar, Adjunct Faculty, School of Architecture, Anant National University, Ahmedabad, Gujarat, India
2- Professor, Vice Principal, School of Architecture, Anant National University, Ahmedabad, Gujarat, India

*Corresponding author: *mo.hasani65@gmail.com*

Abstract
Color is one of the physical characteristics of the urban space which has a considerable impact on health. In this research, the physical, psychological, spiritual, and social health components are considered. With a qualitative correlation method, this study aims to find out the effect of the colors of the urban environment on the health components of people. Results indicated that the highest impact is on mental health which is followed by spiritual, social, and physical components respectively. Also, yellow has the greatest impact on various dimensions of health. Using the results in urban design to create healthier environments is recommended.

Keywords: *urban spaces, color, health, psychological health, social health, spiritual health, physical health*

Introduction

As the colors are associated with the emotions, thoughts, kinds of livelihood, and culture of the people in a society, they can interactively provide miscellaneous mental circumstances for them. Human beings have been influenced by colors more than can be thought. The colors have been involved in our life with the whole factors and details being a part of our life (Andrews, 2004:13). The colors affect both spirit and body of the people (Wolan, 2000). The theorists believe that colors influence anthropogenic spirits. The psychology of colors followed by sickness treatments with colors results in the appearance of the science of color therapy. Numerous studies have been done in this field leading to the recognition of the mental effects of various colors on the human spirit. Each color has different effects on various people, but from which could be derived the diversities and similarities that might be used for curing the illnesses. In urban spaces, color can be followed by natural and artificial elements. The study of color effects has become a practical science because of its importance in our life as Grandis said (Nikghadam and Raeisi, 2011:68). However, the structure of a product can be influenced by means of a controllable and predictable tool like color (Moeudi, 2001:31). Color is one of the most important visual components in terms of the emotional load, but the method of selection has been seldom considered with appropriate and accurate analysis, despite the great importance devoted to the colors (Dandis, 1997:88).

Colors can make as well as charm, a sense of freshness, energy, and sustainability, but can cause fatigue, increase stress, vision reduction, eyesight loss, increase the errors and a negative impact on the safety of the environment (Nikghadam and Raeisi, 2011:68). The understanding of the traits, characteristics and the features of the color and its influence on humans, is a way to create pleasant and agreeable areas and urban spaces (Ghalenoei and Tadaion, 2011:241). This becomes more urgent because our modern urban spaces are discombobulated and disorganized in terms of color. Therefore, this research aims at studying the effectiveness value of color in urban spaces on the various aspects/dimensions of health such as mental, spiritual, social, and physical. On this basis, the literature review on color, color in urban spaces, and also human health to illustrate the dimensions and components of health has been considered. For this purpose, data-collecting techniques like systematic investigations and study of the materials and comprehensive sources have been used. Then, it was attempted to establish a relationship between the colors and health elements/components using the qualitative correlation of the elements. Finally, it is comparatively analyzed to discover the quality and quantity of the color effectiveness regarding the dimensions and components/elements of the health.

It should be noted that the colors are interactively affected by each other. In this research, only the colors, not their interactions, have been investigated. Moreover, color is discussed in a general manner and not contextually, however, the analysis is done by the Iranian author. It seems that the results from this research and similar ones can result in the regulation set up in the field of color application in urban areas, followed by color therapy for the citizens.

Color in the city

Various heterogeneous and abnormal components along with each other cause environmental disturbances. One of the most important elements, which is seldom apparently considered, is color. Unlike the form, volume, view, or flooring, color has been placed in a hidden layer such that most of us have rarely considered the psychological effects of it while designing a space, city, or even a structure. The regulation codes and design criteria pay little attention to the color concepts. The contractors, owners, the purchase agents, or even the available goods on market and an event have been involved in selecting the color of the structures and urban space components. Recently, it includes the elements of the city particularly possessing the specific and standard identifiers; such as the red fire valves, herbs, and mailboxes with a new daily different color. On the other hand, today, all people follow arrogance and glory. The significant use of intense and different colors in door and window profiles and the reflective glasses with stunning colors is tangible and familiar to us. Each color with a specific meaning makes a person confused. The environment becomes an uncomfortable and unpleasant place while the concepts of colors have not been considered (Hoseinioun, 2002). Color is one of the most important elements which simply helps us achieve clarity, a sense of unity, and the creation of a sense of place with fewer costs than construction for space definition (Kourosh Mahmoudi, Amir Shakibamanesh, 2006:110). One of the main objectives may be achieving the determined identity, landscape, and outlook of the city. This investigation of the background of the color of the city, or in an accurate phrase, the color palette, can be defined for each city such that the constituents will be the colorful terms describing the urban spaces combined with each other.

According to Xiaomin, the urban colorscape consists of both natural and synthetic hues. Urban barren ground (including dirt roads), rocks, grass, trees, rivers, coastal places, the sky, etc., produce natural hues. Natural color consists of two aspects: dynamic and static. Dynamic color refers to all elements that exist at different times, such as seasonal hues, whilst static color refers to elements such as land (including dirt roads), rocks, flora, and water that have relatively stable colours. The color's attractiveness stems from the fact that nature enlightens humanity. The hues of nature are

always the most attractive and easiest to accept for humanity. Therefore, urban colorscape planning should seek to preserve the exceptional natural color, notably the natural color of trees, grasslands, and rivers, rather than opposing it. As a shortcut to creating a harmonious urban colorscape, we should attempt to treat the existing natural color as the urban background, constitute an urban background, and have the culture colors follow the natural colors. Artificial colors relates mostly to the hues of urban buildings, structures, roads, street furniture, advertising, transportation, etc. In the composition of artificial urban color, the color can also be subdivided into fixed colour, mobile color, permanent color, and temporary color. Numerous urban permanent buildings, structures, transportation facilities, streets, squares, and urban sculptures comprise the fixed permanent color; urban transport vehicles and pedestrian clothing comprise the mobile color; and urban advertisements, logo signs, kiosks, street lamps, neon lights, and windows comprise the temporary color. (Xiaomin, 2009)

The theory of color psychology

Each person's response to color could be explained based on the characteristics like age, sexuality, ethnicity or social/ economic class, and even the climate (Khouw, 2001). In fact, there are different opinions about the impacts of color psychology on emotions, excitement, and personality in all societies (Tekfa, 2008). Thus, it is difficult to obtain real results in the field of color. It's because of the problems which illustrate distinguishing the symbolic dimension from its psychological one (Raeisi, 2009). In most cultures, the black color represents mourning, frustration, error, silence, loss, deep relaxation and death, absolute darkness, pollution, and power and wealth (Habib, 1996, 599). The black is the symbol of destruction, and absurdity (Loucher, 1990, 97). In these cultures, white provides a sense of simplicity and cleanness, innocence and purity (Nikghadam and Raeisi, 2011:69). White also represents delicacy, freshness, light, victory, spiritual power, and happiness with paleness, futility, and meaninglessness (Habib, 1996, 955). White indicated feelings and individual potential talents have a positive impact on the emotional system of a person (Andrews, 2004, 30). the Gray, a combination of black and white, maybe consist of a variety of tunes; As Eiten said it denoted loneliness, colorlessness, lifelessness, indifference, and absorbing the adjacent forces from the surrounding colors and finally, balances them (Eiten, 2008, 68); and Luther believed that this color is neither genuine nor intellectual, neither internal nor external, neither dark nor bright. This is colorless (Lucher, 1990, 43). But, silver enhances the ingenuity, creativity, and thinking in humans (Andrews, 2004, 40). Although philosophers have not considered black and white as colors, Leonardo da Vinci listed these in the simple color group (Zelanski, 1990). In different cultures, blue

symbolizes legitimacy, sagacity, spirituality, despair, death, coldness, sadness, and mystery. In most Middle East countries, blue has been used to ward off the evil eye. In Tunisia, in order to protect the family members against the evil forces, the doors and the windows have been painted blue. If the blue is more chromatic, then the tendency to infinity has become increased, where everything is pure. Eventually, sadness will surround the human being for what is beyond his understanding and feeling (Habib, 1996, 558). Lucher believed that the dark blue showed a sense of concentration, uniqueness, assistance, dependence, distinction, tolerance, and patience and also peace, magnanimity, kindness, confidence, and the truth, love, devotion, surrender, and sacrifice. For him, the dark blue is eternal and timeless (Lucher, 1990). Turquoise blue possessed a strong protective power, repelling the devil and also the joy and happiness (Wils, 2008). Blue has a quiet and static state. The moral character of this color seems to be active, but the material one is passive and introspects (Eiten, 2008, 201). Kandinsky believed that blue is the prominent color of the sky and profoundly tends to the infinity of cleanness (Habib, 1996, 558). This color is relaxing (2008) and makes the present energy in the body balanced and increases the power of prediction (Andrews, 2004, 35). The blue alleviates the neural system reducing blood pressure, respiratory, and heart rate (Lucher, 2008, 16). In Iranian mythology, blue was the symbol of the lotus flower, sacred and the flower of life (Kamelnia, 2008, 11). The Iranians have considered blue a symbol of the moon and the sky (Riazi, 2007, 350). Indigo created the sense of infinite space and time and a symbol of introspection and pondering (Andrews, 1994, 38). However, purple is mysterious, attractive, and sometimes gloomy (Eiten, 2008, 204). This color represents self-respect, and poise, and creates a profound feeling (Wils, 2008) indicating as well as excitement and obsession with life (Lucher, 1990, 91). Iranians considered indigo as Saturn and purple as customers (Riazi, 2007, 354). In Islam, the green color symbolizes the spiritual concepts, of hope, fertility, and eternity (Kamelnia, 2008, 13). This color can create a sense of productivity, satisfaction, and comfort in a person and the symbol of a combination of faith and wisdom (Eiten, 2008, 203), and balance (Moeudi, 2001, 58). Green denotes compassion, friendship, and kindness in person and reinforces the sense of friendship, hope, faith, and peace (Andrews, 2004, 34). It is also associated with pride, reinforcing the spirit and cause to the man's ability to arrange and regulate the direction. The green-blue is a symbol of concentration, patience, independence, defense, consistency, and endurance (Lucher, 1990, 80). In literature, green has virtually represented life, vitality, activity, and creativity (Habib, 1996, 559). Iranians have considered green as Venus (Riazi, 2007, 354). Yellow indicates soothing the neural states and balancing the sympathetic and Parasympathetic nerves. Yellow with little blue stimulates that part of the brain including the intellectual mutation. The yellow color is close to the heat and is a symbol of knowledge and understanding (Eiten, 2008, 196) and causes eliminate

despair and creates optimism and self-confidence (Andrews, 2004, 33). Light yellow reminds us of the day, activity, enthusiasm, curiosity, variability, hope, and happiness (Lucher, 1990, 15). Iranians have considered the yellow and golden colors as a symbol of the sun (Riaazi, 2007: 354). The golden color alleviates the pain along with the perfect purity and public spirits (Wils, 2008). Orange is exciting and stimulating and also a symbol of love and life causing a sense of happiness and depression relief, while aggression and increasing blood pressure (Wils, 2008). Orange is a happy color and represents pride and glaring (Lucher, 1990: 16) and a symbol of energy (Moeudi, 2001:60). This color is a sign of knowledge and awareness and tends to increase socialization (Andrews, 2004, 32). Iranians have considered the orange as a symbol of Mars and red as Mercury (Riazi, 2007, 354). Red has an emotional movement and state with an active material characteristic and a passive moral one (Eiten, 2008, 198). This color is exciting and motivating, represents love and life thought is a symbol of aggression and violence (Wils, 2008, 53). This color stimulates the neural system and is a symbol of excitement, increasing the respiratory rate and blood pressure (Lucher, 1990: 18). In literature, red has been used as a symbol of agility (Habib, 1996, 559). In Iranian mythology, the red color is a symbol of fertility, blood, and holy fire (Kamelnia, 2008, 11).

Table 1. The effectiveness of colors based on the theorist's opinions, based on Nikghadam and Raeisi, 2010

ID	Color name	Type of color	Effectiveness (Feeling)
1	Black	Neutral	Power and despair, mourning, absurdity
2	White	Neutral	Cleanliness, purity and freshness, happiness, absurdity, meaninglessness
3	Gray	Neutral	Balance and indifference, lack of spirit
4	Silver	Neutral	Creativity, thinking
5	Blue	Cold	Balance, cleanliness, relaxation, tranquillity and seclusion, introversion, depression ,and spirituality
6	Cyan	Cold	Happiness and protection
7	Dark Blue	Cold	Concentration, kindness and patience and dedication and relaxation, peace , nd trust
8	Indigo	Cold	relaxation, relief ,and pondering
9	Purple	Cold/Hot	Self-esteem, dignity ,and sorrow
10	Green	Cold	Hope and satisfaction, relaxation and vitality, discipline, balance and peace, friendship, kindness
11	Green Blue	Cold	Concentration and patience, endurance
12	Yellow	Hot	Vitality, optimism, enthusiasm, hope and movement and creativity and self-confidence relaxation
13	Golden	Hot	Purity and relief
14	Orange	Hot	Happiness, excitement and sociability and aggressiveness and pride ,and mobility
15	Red	Hot	Activity, Mobility, enthusiasm and anger, aggression and excitement and materiality

Health: concept, dimensions, and components

The word health originated from the Greek word, "holth" which later "wholeness and holistic" have been also made of this word meaning perfection, complete, comprehensive, and including everything and all dimensions (Sadoughi, 2008:46). The health concept has evolved over the centuries and transformed from the individual meaning to a universal social one. In modern philosophy, has been emphasized as a central purpose in different fields related to development. The widely accepted definition has been declared by the world health organization as "health consists of the physical, mental and social welfare not the absence of disease and disability." Related to this matter, one of the fundamental rights of every human is the possession of the highest standard of health regardless of race, age, religion political opinion, and economic and social conditions (Barton and Tsourou, 2000:7)**.** In the meantime, one of the most important considerations and revisions about the theories of the health is corresponding to spirituality and the necessity of including it in definitions and patterns of the health. In this concept-making, proposed by Millerand and Toursen (1999), health contains three extensive ranges: suffering, functional capability, and tranquillity or internal integrity of mind in life. These domains in addition to the physical and cognitive aspects include the exciting and spiritual ones. These suggestions have been increasingly considered by the scientific community in growing the spiritual dimension as a part of health (Tabraei, 2011:12). According to the extensive studies investigated by the researchers in the field of health and also its dimensions and components, regarding the new ideas on spiritual health and its crucial role in human health, in this research, four aspects of health have been considered including physical, social, mental and spiritual health (Ghafarian et al. 2015)

The physical aspect of the health

Physical health or biology is the health in body functions and the optimal performance of any member or organ in perfect harmony with other organs (Clark, 1990). The physical health questionnaire of the world health organization, SF-36V2, has been implemented regarding the criteria such as physical performance, the measure of physical pains, and general health. Numerous studies indicate the positive effects of physical activities (severe and moderate) on human health such as reducing the risk of abnormal death and cardiovascular disease. The investigations have documented the beneficial impacts of physical activities on decreasing the probable stroke (Fletcher, 1994). Lack of time has been reported as a major obstacle to physical activities; under these circumstances, the citizens do not consider specific time for this action. On this basis, it is so desirable that physical activities simultaneously parallel other activities such as shopping,

transportation (daily trips), and recreation. According to the current social, cultural, and economic situation, hiking and cycling have been considered the most appropriate physical activities in urban spaces. Investments in hiking can be justified because this activity saves time (done in parallel to other activities), the low possibility of injury, and hidden enjoyment (particularly compared with other sports activities) to promote the level of physical activities of the community and reach to the public health (Khosravi, 2012: 53). Therefore, as far as possible, the environmental design and planning should be conducted in a manner to make third common activity increase.
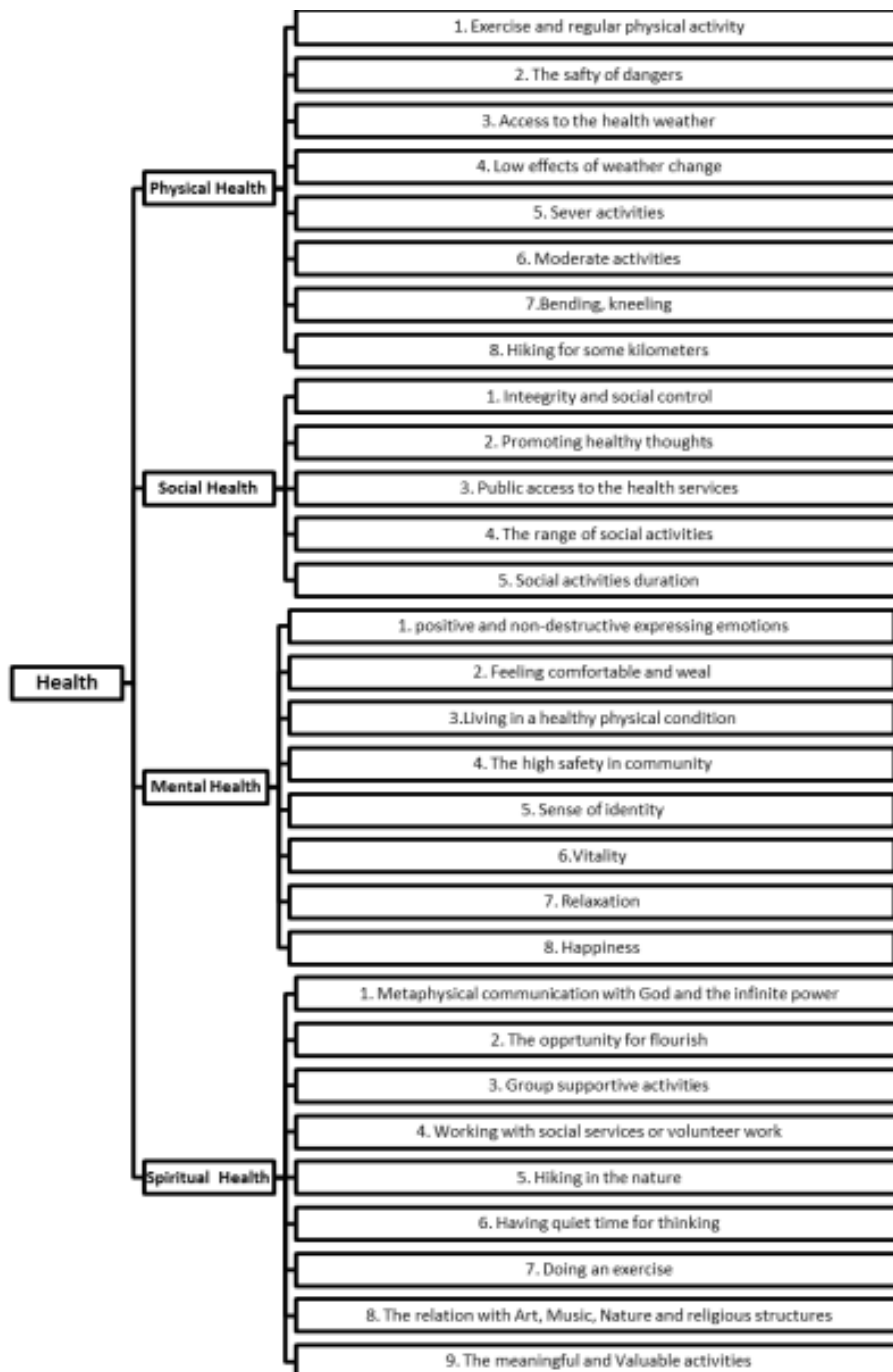

Diagram 1: Health dimensions and components, based on Ghafarian et al. (2015)

The Social aspect of the health

In recent years, the evolutional trends of health caused more attention to social issues (Marandi, 2012: 4). The health of urbanization has been considered social health more than anything because urbanization is a social phenomenon (Mehrabani, 2008: 67). If the cultural space of a community coincides the norms and creativity without any deviation from that, then, it can ensure that there will be social health. Although there is not a universal definition and index of social health, the specific indices are related to the region (Nourbala, 2011: 152). The social factors affecting health have been considered by the world health organization for many years; and even in the third Millennium development goal that has been signed by Iran, this problem has been mentioned. However, in our country, there is not sufficient attention to this issue. Indeed, the social factors are the most effective on the health of the community (Marandi, 2012: 4).

The mental aspect of the health

mental health means the health of certain features of human-like intelligence, mind, mood, and thinking with the concepts such as well-being self-confidence, the capacity for competition, intergenerational dependency, and self-efflorescence of the potential intellectual, exciting capabilities, etc. (Mehrabani, 2007: 8). from the world health organization perspective, the mental health is a human state in which, a person is aware of his abilities, has struggled with the normal stresses of life being helpful for the society and make decisions and participate contribute in social activities (World Health Organization, 2004: 10). Mental health plays an important role in ensuring the efficiency and dynamic of any society. In many countries (especially developing countries) the mental aspect of health has been less considered because of the other health priorities such as infectious Contagious diseases in the past and/or the present chronic illnesses. Nevertheless, a look at the statistical figures published in the field of the prevalence of mental disorders revealed that mental health is critical (Mehrabani, 2007: 8).

The spiritual aspect of the health

Coordinating other health aspects, spiritual health cause increases the power of mental compatibility and performance. Spiritual health can be recognized with the concepts like life stability, peace, feeling of self-relationship, God, society, and the environment, and appropriateness and coordination of the meaning and concept (Akaberi et al. 2011: 80). This term includes the aspects such as searching for the meaning, aim, the knowledge of self-enhancement, the meaningful and purposeful relationships, love and faith and the sense of the God-seeking (Suinton, 2001). Many

studies have focused on the visible elements and religious measurements like attending the church, temple, mosque, or synagogue in the field of spirituality to worship or religious ritual and ecstasy (Saed and Roshan, 2011: 101). Similarly, the nature, art, music, and even the size of buildings can considerably affect spiritual health; accordingly, in many peoples, these religious places and buildings may mysteriously create a sense of greatness, integrity, and continuity. All these factors can provide important spiritual tools for many people (Saed and Roshan, 2011: 112).

Comparative analysis

This section states how each color has a relationship with the health features and components and their effectiveness. As shown in table 2, the effect of each color on health components has been illustrated and the whole components influenced by each color have been placed in a relevant column. It should be noted that the contents of this chapter have been provided according to the analysis of the author's opinions and capability of scrutiny in future and supplementary research. Since the number of colors is unlimited and checking them all is impossible, the authors have studied more common and comprehensive colors. Table 3 indicates the mutual relationship between the urban space colors and the health components of the urban space users.

As shown in this matrix, black affects four elements of health. Out of these three are related to mental health as black creates a sense of sorrow in urban areas (Mental 1) and also makes the space blurred and dark and induces the man a feeling of space pollution (Mental3). Moreover, the black color in urban spaces can drain the spirit and create inner relaxation because of religious reasons. This also has to do with the spiritual component. As a result, it can be said that using the black color in urban spaces affects two health components including mental and spiritual, however, this effect is mostly on mental health.

On the other hand, the presence of black in urban spaces does not affect the physical and social components of health. Interestingly, exercise and regular physical activities have been influenced by the colors such as white, green, orange, and red as the major feature of physical health.

The color which affects all the health components including physical, spiritual, mental, and social is green color. This color is a symbol of mystical concepts and also hope, fertility, and eternity, using which helps spiritual health in urban space (Spiritual 8 and 9). In addition, using green as a symbol of life, and vitality causes activity and creativity in urban space (Physical 1) (Mental 6). While this color represents compassion, friendship, kindness and reinforces the sense of hope, faith, and peace, it makes the human devote more time to spend on social activities (Social 5).

In figure 1, the effect value of the colors on quadripartite aspects of health has been shown. For example, the black color has established four relationships out of thirty possible ones from which three relationships are related to the mental and the remaining related to the spiritual aspect where their proportions have been presented for better understanding in the relevant diagram. As in this study, the impact of urban space color on the users' health has been researched through the correlation approach, the precise and quantitative determination of the relationship value is meaningless and inappropriate.

Table 2. The effects of colors on components of different aspects of health

Color Name	The Impact on the health components	Effective Components
Black	- The black color in urban spaces can drain the spirit and create inner relaxation because of religious reasons (Spiritual 9) (Mental 7)**.** **-** Black creates a sense of sorrow in urban areas (Mental 1) **-** The black makes the space blurred and dark and induces the man a feeling of space pollution (Mental 3)	(Spiritual9) (Mental 7) (Mental 1) (Mental 3)
White	- Using white in urban areas, makes a sense of purity and cleanness (Spiritual 9). - White represents the potential emotions and talents in a person having positive impacts on his spiritual system (Spiritual 1). - Using too much of the white color may cause the feeling of soullessness and uniformity and numbness and illness (Physical 1) (Mental 3)	(Spiritual 9) (Mental 1) (Physical 1) (Mental 3)
Gray	-Using grey with other colors can diminish the severity and heterogeneity of them and makes them feel balanced affecting his social behaviours (Social 1) - White makes the space indifferent and soullessness for the man (Mental 3)	(Social 1) (Mental 3)
Silver	-Using silver in space encourages the human to think making intellectual creativities (Spiritual 6)	(Spiritual 6)
Blue	- The blue in urban space makes the sense of spirituality and cleanliness (Spiritual 1) - it makes the sense of safety against the negative forces (Mental 4) - It causes the balance of the existing energy in the body with increasing the predicting power (physical 2) - This color alleviates the neural system causing the blood pressure, respiratory, and heart rate to decrease (Physical 2)	(Spiritual 1) (Mental 4) (Physical 2) (Physical 2)

Cyan	- The color cyan increase the sense of spirituality of the urban space reminding us the mosques and religious places (spiritual 8) - This color makes happiness in human (mental 8) - The space with the cyan color seems to be protective (physical 2)	(Spiritual8) (Mental 8) (Physical 2)
Dark Blue	- Using this color in urban space makes the human feel relaxed and pleasant (Mental 7) - Crates a sense of dedication and peace in humans and organizes their relations (Social 1 and 2).	(Mental 7) (Social 1 and 2)
Indigo	- The indigo color in urban areas causes relaxation and mental relief (Mental 7) - Makes the human think and become aware of the features beyond the materials (Spiritual 1 and 6)	(Mental 7) (Spiritual 1 and 6)
Purple	- The purple in urban space creates excitement and vitality (Mental 6) - Using this color in pace increases self-confidence and creates self-esteem that besides the mental effect, has positive influences on relationships and the human interactions (Social 1 and 4) -It sometimes makes the feel sadness (Mental 2)	(Mental 6) (Social 1 and 4) (Mental 2)
Green	- the green color is a symbol of mystical concepts and also hope, fertility, and eternity, using which helps spiritual health in urban space (Spiritual 8 and 9) - Using green as a symbol of life, and vitality causes activity and creativity in urban space (Physical 1) (Mental 6) - While this color represents compassion, friendship, kindness and reinforces the sense of hope, faith, and peace, it makes the human devote more time to spend on social activities (Social 5).	(Spiritual 8 and 9) (Physical 1) (Mental 6) (Social 5)

Green Blue	-Since the green causes concentration, and patience, created the opportunity to flourish (Spiritual 2) - Consistency and stability result in mental health promoting the positive emotions (Mental 1)	(Spiritual 2) (Mental 1)
Yellow	- Using the yellow in urban space makes the integrity and control of the social relationships due to relaxation and nerve balancing (Social 1) (Physical 2) - Makes the elimination of despair and hopelessness and creates self-confidence and promotes healthy thoughts (Social 2) - Yellow is an active color and a symbol of enthusiasm and curiosity, changeability, and hope and happiness. Therefore, it can increase the range of social activities (Social 4) (Physical 6) and make a person happy (Mental 8).	(Social 1) (Physical 2) (Social 2) (Social 4) (Physical 6) (Mental 8)
Golden	- The golden color creates the metaphysical relation with God with perfect purity (Spiritual 1) - Is a symbol of public spirit (Spiritual 4) - heals the pain (Physical 2)	(Spiritual 1) (Spiritual 4) (Physical 2)
Orange	- As the orange is exciting and stimulating can cause severe activities in urban spaces (Physical 5) - Affect mental health by providing a sense of happiness (Mental 8) - Increasing the blood pressure, affects physical health (Physical 1) - Since a color represents pride and glaring, increases socialization (Social 4 and 5)	(Physical 5) (Mental 8) (Physical 1) (Social 4 and 5)
Red	- As the red is exciting and stimulating can cause severe activities in urban spaces (Physical 5) -Increasing the blood pressure, affects physical health (Physical 1) - Using too much of it can cause aggression and negative excitements (Social 1)	(Physical 5) (Physical 1) (Social 1)

Table 3: the Matrix of the color effect on the components of different aspects of the health

ID	color	Physical Health								Social Health					Mental Health								Spiritual Health									The number of influenced components of any color
		Exercise and regular physical activity 1	The safety of dangers 2	Access to the healthy weather 3	Low effects of weather change 4	Sever activities 5	Moderate activities 6	Bending, Kneeling 7	Hiking for some kilometers 8	Integrity and social control 1	Promoting healthy thoughts 2	Public access to the health services 3	The range of social activities 4	Social activities duration 5	Positive and non-destructive expressing emotions 1	Feeling comfortable and weal 2	Living in a healthy physical condition 3	The high safety in community 4	Sense of identity 5	Vitality 6	Relaxation 7	Happiness 8	Metaphysical communication with God and the infinite Power 1	The opportunity for flourish 2	Group supportive activities 3	Working with social services or volunteer work 4	Hiking in the nature 5	Having quiet time for thinking 6	Doing an exercise 7	The relation with art, music, nature and religious structures 8	The meaningful and valuable activities 9	
1	Black														▓		▓														▓	4
2	White	▓													▓																▓	4
3	Gray									▓																						2
4	Silver																											▓				1
5	Blue		▓														▓						▓									3
6	Cyan		▓																		▓									▓		3
7	Dark Blue									▓	▓										▓											3
8	Indigo																						▓					▓				3
9	Violet									▓			▓			▓			▓													4
10	Green	▓											▓							▓										▓	▓	5
11	Green Blue														▓									▓								2
12	Yellow		▓			▓	▓			▓	▓		▓									▓										6
13	Golden																						▓		▓							3
14	Orange				▓								▓								▓											5
15	Red	▓				▓				▓																						3
16	The number of effective colors on components	4	4	–	–	4	1	–	–	5	2	–	3	2	3	1	3	1	–	2	3	3	3	1	–	1	–	2	–	2	3	
	Sum	12								12					16								12									

Figure 1. The effectiveness value of the colors on the quadripartite aspects of the health

Conclusions

The present study has investigated urban colors and their relationships with public health. In this regard, the authors have analyzed the relationship between the colors and the quadripartite aspects of the health collecting commonly used in urban spaces and studied their impacts on humans (as shown in table 1). For this purpose, their effects on the physical, mental, spiritual, and social features have been measured by organizing the matrix of the relations between colors and health components. According to table 2 and figure 1, it was found that the colors have the most impact on the mental feature of human health, followed by spiritual, social, and physical features of health from which the yellow color has the greatest impact on the users' health in terms of mental, physical, and social, respectively. According to the results of this research, this is the green color that affects all four health components. The findings of this research have also indicated that using the silver color has the least effect on the health components. The results can motivate similar research in the field of urban design, can be used in urban projects such as health towns particularly, also to provide healthy spaces in general.

References

1. Khosravi, H., (2012), "The effect of urban form on hiking value and the resident health level and codification of an appropriate development scheme for new settlements (case study: new city Hashtgerd)", master thesis of urban design, university of Tehran, the beautiful arts campus, faculty of urbanism.

2. Andrews, T., (2004), "Treatment of disease by the colors (color therapy)", Golkarian, G., Talayeh publication, Tehran.

3. Eiten, H., "the art of color:, Sherveh, A., Yasavoli publication, Tehran.

4. Tabraei, R., (2011), "The study of spirituality place in major patterns in mental health", Psychology and Religion, 3rd. year, No. 1.

5. Hoseinioun, S., (2002), "The application of color in the city", the municipals' magazine, No. 23, Tehran.

6. Dandis, A., (1997), "The principles of visual literacy", Soroush publication, Tehran.

7. Riazi, M., (2007), "Color in Iranian beliefs", the 3rd congress of the history of architectures and urbanism, Iran, Arg-e- Bam, the cultural heritage publications, Vol. 1, Tehran.

8. Raeisi, S., Javadi M., Nikghadam, N., (2009), "Color Psychology and car selection", Iranian Psychologists, No, 17, Tehran.

9. Raeisi, S., Nikghadam, N., (2011), "the mental impact of the car colors in urban passages", The beautiful arts, No. 41, Tehran.

10. Saed, O., Roshan, R., (2011), "Spirituality and mental health", news of Psychotherapy, No. 55 & 56.

11. Sadoughi, M., (2008), "A contemplation on the religious structures and their position in health psychology", Islam studies and Psychology, No. 1.

12. Ghafarian Shoaei, M., Naghsan Mohammadi, M., Tajdar, V., (2015), "Identifying the effect of urban sidewalk elements on aspects and components of pedestrians' health", urban studies, No.7, Kurdestan.

13. Kamelnia, H., (2008), "Color and mythical expression in architecture", Abadi, No. 54, Tehran.

14. Lucher, M., (1990), "Psychology and colors", Fathi publications, Tehran.

15. Marandi, A., (2011), "The effective social factors on the health", the mental health and Prevention of addiction, No.4.

16. Merabani, P., (2007), "The study of the mental health scales of the students of Medical sciences and Engineering universities of Babol, Iran in 2005", Thesis Medicine, Babol University of Medical Sciences and Health Services, School of Medicine.

17. Mahmoudi dehbiglou, K., Shakibamanesh, A., (2006), "the principles of the colorology in architecture and urbanism, especial for the students of the architecture and urbanism", Tehran Publication: Heleh: Tahan.

18.Mehrabani, M., (2008), "urbanization, media and social health", Research and evaluation, No. 49.

19. Moeudi, M., (1991), "Application of color in Argonomy", Hesse Bartar Publications, Tehran.

20. Nourbala, A., (2011), "The socio-mental health and strategies for enhancing", Psychiatry and Clinical Psychology of Iran, No. 2.

21. Welan, B., (2000), " Companionship of colors", Vol.2, Karang Publication, Tehran.

22. Wils, P., (2010), "Colors and their remedial effects", Souratgar publication, Tehran.

23. Barton, H., Tsourou, C. (2000), Healthy urban planning, London, Spon press

24. Clarke, J., (1990), Health, Illness and Medicine in Canada, Toronto: McCelland & Stewart.

25.De Grandis, Luigina (1986), "Theory and Use of Color", John Gilbert, Prentice Hall, New Jersey.

26. Fletcher GF. (1994), Exercise in the prevention of stroke,Health Rep.

27. Khouw, N. (2001), "The Meaning of Color for Gender", Retrieved March 12, 2008 from http://tecfa. Unige, Ch/perso/.

28. Swinton, J., (2001), Spirituality and Mental Health Care: Rediscovering a forgotten dimension: London, Jessica Kinglsey Publishers.

29. Ware J. E. (2013, October 04). Retrieved from SF- 36® Health Survey Measurement Model: http:// www.sf-36.org/tools/sf36.shtml

30. World Health Organization, (2004), Women's Mental Health: An Evidence Based Review of World Geneva 31. Zelanski, Paul & Mary Pat Fisher (1990), "Color", Prentice_Hall, New Jersey.

31. Xiaomin, D. (2009), "Urban Colourscape, Planning A Colour Study Of The Architecture Of Karlskrona. Unpublished Thesis. Sweden" Blekinge Institute Of Technology.