Sense of Security from the Environmental Perspective A Case Study of Tehran's Pardisan Park

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Abstract

Since, in the same vein as public spaces, urban green spaces play a significant role in establishing social interactions in the Iranian cities, security concerns need to be taken more seriously in such places than other social environments, the insufficiency of which could diminish their functional capacity. This could in turn lead to a source of subsequent difficulties in urban spaces. Therefore, the undeniable role of environmental factors in inducing a sense of tranquility in individuals needs to be further taken into account in the field of urban design and planning.

In light of the above concern, this study aimed at explaining the contributing environmental factors to fostering a sense of security. To this end, the scope of this was limited to Pardisan Park as the case study. This was a qualitative research, in which the prepared questionnaires were analyzed using AMOS in order to examine the various environmental factors. After a preliminary test was conducted, a conceptual model comprising five perspectives of environmental legibility, visual disturbance, lighting, cleanliness, and noise pollution was developed and analyzed. Taking the significance level as well as goodness- and badness-of-fit indices into consideration, all of these perspectives had acceptable load factors. Their impact ratios were 0.51, 0.28, 0.30, 0.78, and 0.23, respectively. Finally, suggestions were made in order to enhance the sense of security in the specified space, which could be implemented by landscape designers and urban managers.

Keywords: Improving the Sense of Security, Urban Parks, Environmental Factors, Urban Design and Planning, Tehran

1. Introduction

The sense of security in urban spaces is regarded as one of the most important space quality indices. Despite the complexity of the phenomenon of security in each society and the various relevant social, economic, and cultural dimensions, the role of environmental factors should not be ignored in the realization of this necessity (Salehi, 2008:15-30; Pourjafar et al., 2008: 74-76; Sheikhi, 2012: 23-27; Bemanian et al., 2009: 42-48; Gharaei, 2010:14-22). The field of environmental psychology could particularly be employed along with other disciplines as an important factor in developing a sense of security in individuals and the eventual improvement of the quality of urban spaces. What separates environmental psychology from other branches of psychology is its emphasis on the interplay between individuals' psyche-based behaviors and their surroundings. Therefore, the concentration of urban designers on the psychological aspects of built environments has created an inextricable link between environmental psychology and their profession (Pakzad, 2012: 13-20; Motalebi, 2001: 52-67). It should be noted that, given their significance for individuals and their direct impact on the quality of urban spaces, security concerns should continue to be in the foreground. Any failure in doing so could give rise to undesirable impact on cities and citizens. For this reason, sense of security plays a particularly powerful role in the design of urban spaces, which should be realized in such a way that fosters this sense (Pourjafar, 2008:76-79; Heshmati, 2005:83).

2. Literature Review

In recent decades, most countries have been particular focusing on security issues in urban spaces. The concept of "Crime Prevention through Environmental Design" (CPTED) was first introduced in 1970 by C.R. Jeffery in his book, *Crime Prevention through Environmental Design*, which seeks to investigate the effect of psychological, physiological, biological, and design-related factors on the commitment of crime in an interdisciplinary fashion (Jeffery, 1971:184-186). Additionally, the field of psychology addresses, in a similar vein to other disciplines, the interplay between human beings and the environment, which has resulted in significant scientific findings (Mortazavi, 1988:8).

Furthermore, other studies intended mainly to investigate the manner in which real-world environments affect human behavior; including the 1947 study on the Midwest Psychological Field Station in the small town of Oskaloosa, Kansas (McAndrew, 1992:6).

The significance of taking the patterns of human behavior into account could be seen by the fact that the largest academic environmental psychology program has been instituted at the National Autonomous University of Mexico (NAUM) (Motalebi, 2001:52). Therefore, the discussion will begin with environmental security and the necessity in order to look deeper into this matter. The criteria for determining the components of environmental security will be clarified following a review of the relevant theories in order to examine the environmental aspects of fostering the sense of security. To this end, the

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scope of this research has been limited to a park as a kind of urban space.

3. The necessity of environmental security and its impact on human behavior

Sense of security is defined as a sense of inner peace and comfort brought by active environmental components, creating a feeling of safety after intellectual cognition (Heshmati, 2003: 12). Accordingly, the development of the sense of security from a psychological perspective is contingent upon the urban environment conditions, actions, and incidents, and also on different levels of perception within that specific cultural framework. These principles make the sense of security vary from city to city or nation to nation, in such a way that security needs are regarded as the most important of needs next to biological ones (Omidvar, 2000:63-81).

Understanding environmental (in)security is demonstrated through two general categories, namely, "subjective" and "objective". The objective component comprises such incidents as theft or acts of violence, while the subjective component refers to the intellectual perception of the regional security (Almasifar, 2010: 21). Studies in social sciences and sociology have shown there is a direct relationship between environmental security and legibility, i.e. the more legible a place is and the more closely an environment is designed according to the principles of environmental security, the greater security would be provided. Given the physical structure of urban spaces, new approaches in environmental design stress that security could be improved to a considerable extent by introducing specific regulations. In principle, "strengthening social motives", "promoting public oversight along with increased transparency in public spaces", and "reducing physical and landscape disturbances" are among the particular mechanisms of creating a secure urban environment. In developed countries today, new approaches are being developed in order to facilitate the efficient designing and optimal utilization of all existing components in built environments. Two Canadian researchers, Wekerle and Wietzman, have identified three contributing factors to the improvement of security in urban environments, including:

1. A sense of awareness towards the surroundings;
2. Observability by others; and
3. Ease of access to aid in case of need (Pourjafar et al., 2008:74).

As the physical manifestation of the surrounding environment, space could serve an influential and controlling function with respect to behavior, in that, it can promote or discourage certain behaviors; whereas, for actions, it can only render some of them possible or impossible. Therefore, the effect of space on behavior is far more direct and decisive. In the process of designing, then, behaviors need to be taken into account rather than actions (Pakzad, 2007:54).

4. A review of the environmental psychology literature

Environmental psychology is an interdisciplinary field that investigates the relationship between environments and human behavior. The emphasis of environmental psychology has traditionally been on how human behavior, feeling, and sense of well-being are affected and perceived by environments and individuals. Numerous theories have been proposed to explain this matter, including, Gestalt theory, Ecological Understanding, Brunswik's Probabilism, and Interaction theories, which have been illustrated in Figure 1 (McAndrew, 1992:8).

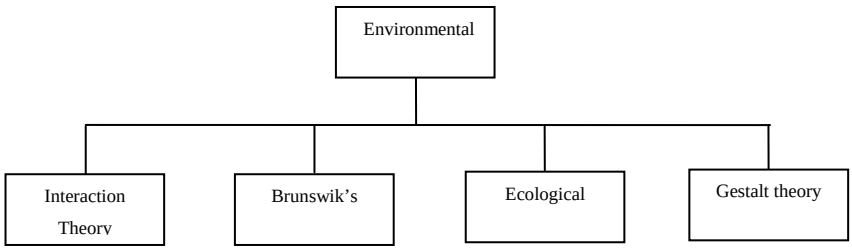

Fig. 1. Theories of environmental perception

Since interaction theory is more closely linked to the issue of design, it needs to receive the greatest attention. The interaction theory stresses the experimental function of perception and adopts the dynamic interplay between individuals and environments as the basis of analysis. Within this theory, perception is regarded as an interaction in which there is interdependency among the environment, observer, and cognition. Moreover, through the observer is affected by the understanding acquired from the environment. In other words, different feelings, such as the sense of security, are experienced by the observer through the environment. In this way, he would perceive his surroundings as a safe environment (McAndrew, 1992:23).

5. Criteria of a Safe Urban Environment

The criteria for determining a safe urban environment are its size, form, and level of comfort. The first two are relatrd to physical features, while the third could be discussed from the perspective of "environment".

Visual and environmental types of comfort are among the fundamental components of man-made environments. "Cities are like houses on a greater scale, in that, just as houses need to have specific qualities to make habitation a pleasing and comforting experience, the same is also true with respect to cities" (Lynch, 1993:17). In fact, visual and environmental comfort are found in places

which are, as a result of its relative quality, made use of in a more favorable fashion, and are subject to more formal and social monitoring, i.e. they are free of any kind of pollution (Salehi, 2008:163).

The results of exploratory studies suggest a hypothesis that there is a statistical correlation between the incidence of crime and social deviations ("behavioral pollution") and polluted environments. If anomic behavior is regarded as a kind of "behavioral pollution", it would be natural for such a pollution to have a tendency to be mixed with other kinds of pollution (Salehi, 2008:163). In other words, social ills and environmental pollution in urban spaces tend to converge at the same time and place. If some types of environmental pollution are created, the conditions are ripe for the incidence of behavioral pollution and vice versa. Accordingly, the types of environmental pollution represent the following components: symptomatic pollution, visual disturbance, light pollution, physical pollution, color pollution, and noise pollution (Salehi, 2007:22).

Overall, the issue of providing security in public spaces, for example in parks, has always been a significant point to bear in mind for urban space designers and managers, propelling them to pay more attention to the features of a safe urban environment.

In addition to adopting negative approaches, the field of environmental psychology seeks to prepare the ground for pursuing positive approaches, which is realized through studying the effective strategies of protecting the natural environment and of designing buildings and cities by taking into account the needs and behavioral responses of individuals. The theories and principles of environmental psychology, along with other factors, can prevent or facilitate the commitment of crimes. Therefore, by considering the previous studies on the environmental aspect of the sense of security, five major factors in environmental legibility could be identified as visual disturbance, light pollution, cleanliness, and noise pollution (Figure 2).

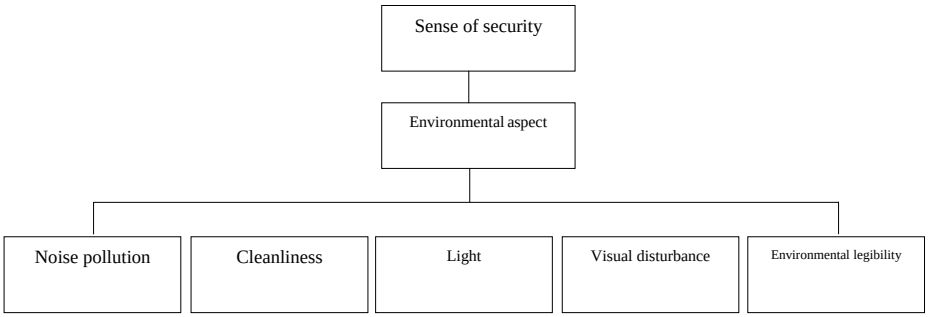

Fig. 2. The tree diagram of the environmental factors

6. Methodology

This study attempted to investigate the sense of security from the environmental perspective, with "quality" being a central topic of discussion. Therefore, the main hypothesis of this research is proposed as follows: **"the quality of the environment affects the sense of security of individuals".** To investigate this hypothesis, the contributing factors to the sense of security from the environmental perspective were separately identified and analyzed in order to determine how each component influences the sense of security of individuals.

As illustrated in Figure 2, the contributing factors to the sense of security from the environmental perspective include environmental legibility, visual disturbance, light pollution, cleanliness, and noise pollution. Therefore, the five subhypotheses of this study are formulated as follow:

1. Environmental legibility has an impact on the improvement of the sense of security.
2- Visual disturbance has an impact on the improvement of the sense of security.
3- Lighting has an impact on the improvement of the sense of security.
4- Cleanliness has an impact on the improvement of the sense of security.
5- Noise pollution legibility has an impact on the improvement of the sense of security.

Table.1
Analytical model

Concept	Dimensions	Criteria	Indices
Sense of security	Environmental	Noise pollution	The existence of a primary source of noise pollution within less than 50 meters of the main area
		Cleanliness	The quantity and quality of waste containers relative to the total area of the park; the state of the park's cleanliness
		Lighting	The brightness of the park's main path (lighting quality); the quality of light in the main path's surroundings (trees and bushes); the visibility of signs and pointers at night
		Visual disturbance	The appearance of urban furniture, fittings, and vegetation; the quality of the colors used; the quality of the structures within the park.
		Environmental legibility	The quantity and quality of signs, pointers, and information centers
			relative to the park area; the quality of main access points to the park

Since this is a quantitative study, secondary data were collected in the form of desk review. The primary data were then collected in the form of a questionnaire whose statistical population comprised the park's visitors. A total of 200 households were selected as the sample size of this study, using Cochran's formula as follows:

$$n = \frac{\frac{z^2 pq}{d^2}}{1+\frac{1}{N}\left(\frac{z^2 pq}{d^2}-1\right)}$$

In which:
n= sample size;
Z=standard normal random variable, which equals to 1.96 at a 95% confidence level;
P=estimated proportion of an attribute present in the population, which could be considered to be equal to 0.5 if not existent. In this way, the variance is maximal;
q=percentage of individuals who lack the specified attribute in the population;
d=acceptable margin of error;
N=600 households.

$$n = \frac{\frac{z^2 pq}{d^2}}{1+\frac{1}{N}\left(\frac{z^2 pq}{d^2}-1\right)} = \frac{\frac{(1.96)^2(0.5)(0.5)}{(0.05)^2}}{1+\frac{1}{600}\left(\frac{(1.96)^2(0.5)(0.5)}{(0.05)^2}-1\right)} = 200$$

In addition, a preliminary test was conducted to determine the validity of the utilized questionnaire. At the first stage, 30 preliminary questionnaires were distributed and collected from the sample, and vague or irrelevant questions were thoroughly reviewed. Then, the final version of the questionnaire was developed and distributed. Therefore, attempts were made to minimize the obscurity of the questionnaires and to clarify as much as possible the terms and concepts. Cronbach's alpha was used to assess the reliability of the questionnaire. Finally, the data were analyzed using factor analysis in AMOS

Table.2
Cronbach's alpha from the environmental perspective

Variables	Alpha coefficient
Environmental	0.797

It can be seen from the above table that the obtained Cronbach's alpha from the environmental perspective as well as the reliability coefficient are acceptable.

7. Case Study

Since any kind of scientific research begins with a question or an unknown phenomenon in the mind of the researcher (Hafeznia, 2003: 6), they sought to determine the relationship between the environmental components and their impact on individuals' sense of security. With respect to the scope of study, which is limited to urban spaces, Pardisan Park of Tehran was chosen as the case study due to its large total area, numerous reports available, and the researchers' personal observations.

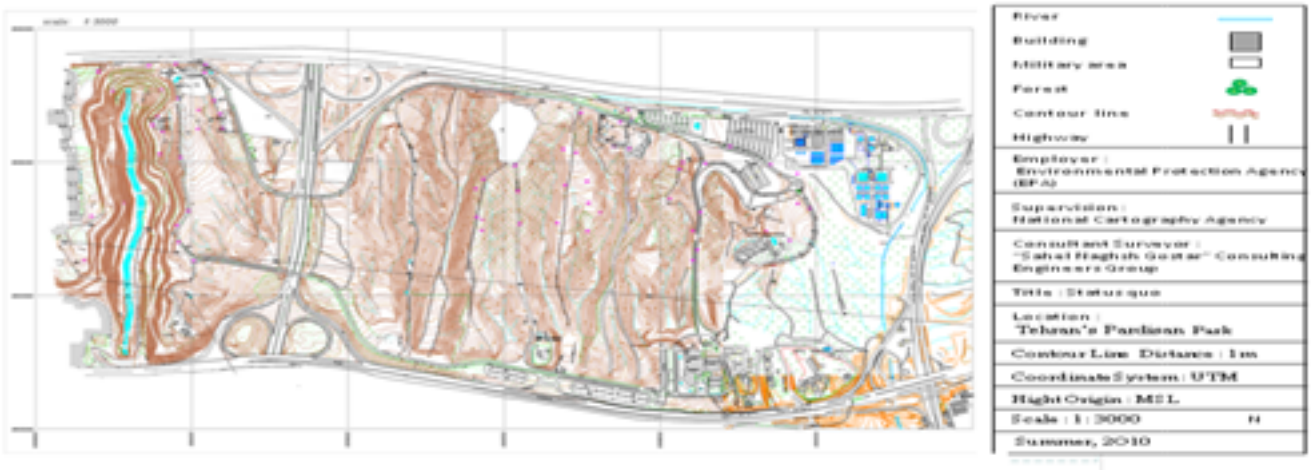

Fig.3. Pardisan Park
(Source: Sahel Naghshe Gostar Consulting Engineers: 2010)

Fig.4. Satellite image of Pardisan Park
(Source: Google Earth)

Fig.5. Picture of Pardisan Park's space

Fig.6. Picture of the condensed vegetation of the Park

Fig.7. Picture of the passage leading to the Park

Fig 8. Picture of the recreational area of the Park.

The park is located in District 2 of Tehran, and is home to many visitors during weekdays and, especially, on weekends and public holidays. With an area of 275 hectares, this park is an appropriate case study for investigating the sense of security due to its vast area, hidden places, and lack of proper oversight.

8. Statistical Analysis

AMOS was used for the purpose of data analysis, with RMSEA, and RMR being the badness-of-fit indices which should be lower than 0.08 and 0.07, respectively.
In addition, AGFI, GFI, and CFI are the goodness-of-fit indices, which are more desirable if their values are In order to perform the statistical analysis, the impact of greater than 0.09. Generally, the closer they are to 1, the better.
In order to perform the statistical analysis, the impact of each item on its respective component needs to be proved. Each item is, therefore, measured.
Given that noise pollution, cleanliness, and lighting have less than three items, statistical analysis is not required. Moreover, RMSEA and RMR are the badness-of-fit indices which should be lower than 0.08 and 0.07, respectively. In addition, AGFI, GFI, and CFI are the goodness-of-fit indices, which are more desirable if their values are greater than 0.09. Naturally, they are more desirably placed at values closer to 1.

9. Visual Disturbance

Table.3
Fitting Model Indices

RMSEA[1]	CFI[2]	AGFI[3]	GFI[4]	RMR[5]
0.039	1.000	-	1.000	0.000

Table.4
Results of the significance level and load factor of visual disturbance items

Items	Load Factor	Critical Rate	Significance Level
Item #8	0.499	-	-
Item #9	0.315	2.590	0.005
Item #10	0.392	2.522	0.006

10. Environmental Legibility

According to the above table, all three items related to visual disturbance have significant load factors in the impact they have on their respective component. They also have acceptable significance level.

Table. 5
Fitting Model Indices

RMSEA	CFI	AGFI	GFI	RMR
0.019	1.000	-	1.000	0.000

Table .6
Results of the significance level and load factor of environmental legibility items

Items	Load Factor	Critical Rate	Significance Level
Item #11	0.543	-	-
Item #12	0.783	3.361	***
Item #13	0.415	4.112	***

Now that the impact of each item on its respective component was made sure of, the significance level and impact factor of each component in the environmental dimension are measured.

10.1. Environmental Dimension Measurement Model

According to the above table, all three items related to visual disturbance have significant load factors in the impact they have on their respective component. They also have acceptable significance level.

Based on the results, it is understood that, all items have significant load factors in the impact they have on their respective component.

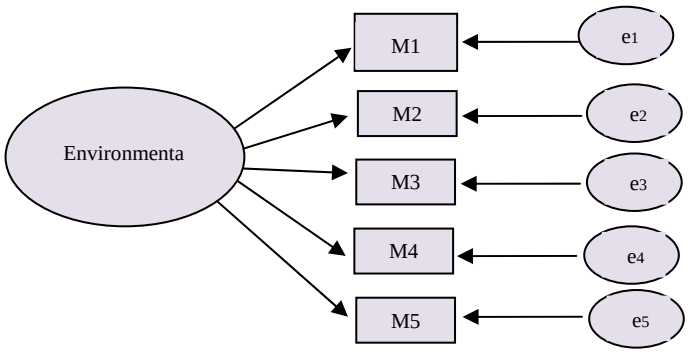

Fig.9. Environmental dimension measurement model

1- Root Mean Squared Residual

2- Goodness-of Index

3- Adjusted Goodness-of-Fit Index

4-Comparative Fit Index

5- Root Mena Squared Error of Approximation

In which:
M1: Environmental legibility;
M2: Visual disturbance;
M3: Lighting;
M4: Cleanliness;
M5: Noise pollution.

Table.7
Fitting Model Indices

RMSEA	CFI	AGFI	GFI	RMR
0.065	0.928	0.894	0.948	0.054

Table 8
Results of the significance level and load factor of environmental items

Items	Load Factor	Critical Rate	Significance Level
Item M1	0.334	-	-
Item M2	0.749	4.038	***
Item M3	0.613	3.906	***
Item M4	0.341	3.101	0.002
Item M5	0.727	4.029	***

Significance levels lower than 0.0001 are represented by ***

Having ensured the impact of each item on the environmental component, the proposed hypotheses was proved through assessing the impact level of each component on the overall sense of security of individuals.

According to the above table, all items have significant load factors in the impact they have on the environmental component. They also have acceptable significance level.

Table 9
Relationship between constructs in the model of the environmental dimension impact on creating a sense of security

Relationship between constructs	Impact Ratio	Critical Rate	Significance Level	Result
The impact of environmental legibility on the improvement of sense of security	0.511	-	-	Proved
The impact of visual disturbance on the improvement of sense of security	0.286	3.471	***	Proved
The impact of lighting on the improvement of sense of security	0.302	3.642	***	Proved
The impact of cleanliness on the improvement of sense of security	0.788	6.897	***	Proved
The impact of noise pollution on the improvement of sense of security	0.239	2.967	0.003	Proved

Significance levels lower than 0.0001 are represented by ***

The impact of lighting on the improvement of sense of security is equal to 0.302.
The impact of cleanliness on the improvement of sense of security is equal to 0.788.
The impact of noise pollution on the improvement of sense of security is equal to 0.239.
Finally, it was determined whether the hypotheses were proved or rejected.

According to the above table, the significant impact of all of the components on the environmental dimension is verified. In addition, the impact ratio of each of the components is as follows:
The impact of environmental legibility on the improvement of sense of security is equal to 0.511.
The impact of visual disturbance on the improvement of sense of security is equal to 0.286.

11. The Main Hypothesis

"The quality of the environment affects the sense of security of individuals".

This hypothesis can be verified by examining the subhypotheses as follows:
The first subhypothesis: Environmental legibility has an impact on the improvement of sense of security.
Result: according to the performed analyses and the presented tables, the significance level of environmental legibility for the impact factor on the improvement of the sense of security is lower than 0.05.
Interpretation: according to the result, it can be stated with a 95% confidence level that environmental legibility has an impact on the improvement of sense of security. The hypothesis is therefore proved and the null hypothesis is rejected.
The second subhypothesis: visual disturbance has an impact on the improvement of sense of security.
Result: according to the performed analyses and the presented tables, the significance level of visual disturbance for the impact factor on the improvement of the sense of security is lower than 0.05.
Interpretation: according to the result, it can be stated with a 95% confidence level that, visual disturbance has an impact on the improvement of sense of security. The hypothesis is therefore proved and the null hypothesis is rejected.
The third subhypothesis: lighting has an impact on the improvement of sense of security.
Result: according to the performed analyses and the presented tables, the significance level of lighting for the impact factor on the improvement of the sense of security is lower than 0.05.
Interpretation: according to the result, it can be stated with a 95% confidence level that, lighting has an impact on the improvement of sense of security. The hypothesis is therefore proved and the null hypothesis is rejected.
The fourth subhypothesis: cleanliness has an impact on the improvement of sense of security.
Result: according to the performed analyses and the presented tables, the significance level of cleanliness for the impact factor on the improvement of the sense of security is lower than 0.05.
Interpretation: according to the result, it can be stated with a 95% confidence level that, cleanliness has an impact on the improvement of sense of security. The hypothesis is therefore proved and the null hypothesis is rejected.
The fifth subhypothesis: noise pollution has an impact on the improvement of sense of security.
Result: according to the performed analyses and the presented tables, the significance level of noise pollution for the impact factor on the improvement of the sense of security is 0.03 (i.e. lower than 0.05).
Interpretation: according to the result, it can be stated with a 95% confidence level that noise pollution has an impact on the improvement of sense of security. The hypothesis is therefore proved and the null hypothesis is rejected.

12. Discussion

The significance level of each of the stated components can serve as an appropriate guideline for urban designers and managers in creating convenient urban spaces. Taking the findings of this study on the five components influencing the sense of security from the environmental perspective, the highest impact ratio belonged to"cleanliness". This could be accounted for by the popular belief that a polluted environment is the result of inadequate oversight, which in turn, is the underlying cause of insecurity.
The next three components with the highest impact ratios were "environmental legibility", "lighting", and "visual disturbance", respectively. The presented order of impact is debatable, considering that signposts and pointers for finding locations, ambient lighting for getting accustomed to the environment, and visual disturbance for associating with the surroundings are all necessary factors. Having the lowest impact on cleanliness, location finding, and environmental perception and attachment, "noise pollution" is the least influential factor in creating security from the environmental perspective.
There are two general approaches in addressing crime and insecurity:
The first is the traditional approach of punishment which, up until now, not only has yielded little satisfactory result, but has exhausted financial and human resources. A more important and practical approach is preventive. According to criminology experts, crimes are classified into two internal (individual) and external (environmental or localized) categories based on the driving factors, with the external factors being more in line with the objectives of the present study. The human-surroundings relationship is realized by the interplay between the two. Therefore, any kind of intervention made in the physical environment could prevent or facilitate the commitment of crimes and lead to an eventual feeling of insecurity. The adoption of this approach has led to highly positive results in various economic, social, cultural, and political domains due to its great efficiency in the last two decades.

13. Suggestions

Taking the interpretations of the obtained results into account, the following suggestions could be offered in order to improve the sense of security, especially in urban parks:

- Sense of security will be enhanced by designing brighter and more vivid paths with fewer dark, quite, and hidden corners.
- Sense of security will be enhanced by having a better access to information providing components (including pointer or location identifying signs, information centers, public phone booths, etc.), in a way that, individuals are made capable of forming vivid mental pictures of their surroundings.

Fig.10

Fig.11

- Sense of security will be enhanced by a better distributed lighting in parks at night, in a way that fewer dark corners could be viewed along the passages.
- To achieve this, the light bulbs should be designed properly and attention needs to be paid to their color combination in order to create an attractive environment. For instance, colored and blinking light bulbs could be installed.

Fig.12

- Low noise pollution could result in environmental comfort and a lively dynamic environment. Therefore, it is better for generally noisy activities to be separated from less noisy activities. For instance, it is better if children playgrounds are separated from adult recreation areas (such as those allocated to playing chess).
- Noise barriers could be used to protect individuals from annyoying and bothersome sounds, contributing considerably to environmental comfort and vitality.

Fig.13

- Cleanliness can promote engaging in sports and recreational activities, which contributes to the liveliness of the environment. In addition, a clean environment is itself an indicator of continuous monitoring over the complex, which enhances the sense of security. Accordingly, it is essential to install proportional urban furniture and fittings such as dustbins.

Fig.14

- Condensed vegetation leads to hidden and quite places, which in turn, gives rise to a feeling of insecurity. Therefore, trimming condensed green spaces and exercising care towards planting designs could enhance the sense of security in individuals.
- Planting shrubs around the passages and peripheral areas of parks could cover bare spaces.

Fig.15

- Removing traces of vandalistic acts and the timely replacement of urban furniture and fittings could serve as an indicator of appropriate oversight and management of the complex, leadin to a sense of security.
- Making use of graphic arts, and combining vibrant colors in parks' utilities and furniture for beautification purposes could also result in a sense of security.

Fig.16

14. Summary and Conclusions

This study attempted to investigate the effect of urban designing on the sense of security. After presenting the major theories in this regard, it sought to explore the environmental dimensions of this issue. Different components of security from the environmental perspective were introduced, and their relationships with the sense of security were examined through the environmental dimension model. The results suggested that environmental legibility, cleanliness, lighting, and noise and visual disturbance were the most important components of this model. Based on the provided suggestions, it is expected that the incorporation of such components can result in significant improvement of environmental sense of security.

While it is not conceivable to bring about changes in the culture or the behavioral patterns of a group of people in the short-term, many issues related to urban spaces, particularly public areas such as parks, could be resolved by utilizing interdisciplinary fields of study such as environmental psychology and environmental design. The relationship between different model solutions or making use of a combination of optimized models depend not only on the internal, physical conditions of parks, but also on external factors such as the severity of social ills or the location of park. Therefore, a case by case treatment of each park is called for.

Since no serious study seems to have been conducted with respect to employing the new discipline of environmental psychology in urban design and planning in Iran, more attention needs to be directed at this transdisciplinary field.

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