

Research Article

The Role of Spatial Organization in Social Interaction of Residents of Residential Complexes (Case Study: Two Residential Complexes in Shiraz, Iran)

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Abstract: This study addresses the relationship between spatial organization of residential complexes and social interaction in these complexes. Environmental organization studies revealed certain sub-branches of this problem including readability, accessibility, permeability, flexibility, visual elements and domain. For the purpose of this study, two residential complexes with different organizations were selected in Shiraz. The survey method was used to analytically test the research hypotheses regarding the effective factors in environmental and interaction organization. The final results were obtained in the form of a case study through a combined approach basically relying on the correlation and regression analysis methods. The index assessment questionnaire was analyzed via the SPSS for investigating the studied residential complexes. The results showed that there was a 0.84 correlation between environmental organization and social interaction. Since the correlation level of significance was below 0.01, there is a strong correlation between these factors. The difference between interactions in these two organizational systems was assessed through the t-test which indicated a significant difference between these social interactions. Regarding the indexes used for environmental organization, the regression analysis showed that the Visual Elements Index with an effectivity coefficient of 0.29 was the strongest and the Readability Index with an effectivity coefficient of 0.21 was the least effective index in predicting this factor. The regression analysis also showed that of the six effective indexes on organization, only three (that is, availability, permeability and domain (territory)) with respective effectivity coefficients of 0.43, 0.28 and 0.26, respectively played a role in creating social interaction in the studied complexes. Due to the suitable fitting of the model, these results can be generalized to the whole society.

Keywords: Environmental psychology, social interaction, spatial organization, SPSS residential complex

INTRODUCTION

Interactive views in psychological schools believe that humans interact with and manipulate the environment. Humans are also affected by the environment. On the other hand, the human need to house is far beyond the basic need for shelter. The living environment has less quality when less attention is paid to other needs of humans with an emphasis on economic and demographic perspectives. Residents of residential places suffer from anonymity when they no longer commit to social interactions. Moreover, no one can escape from predesigned and aggregated complexes due to problems in metropolises. As a result, design of complexes is important with regard to human aspects (Bahraini and Tajbakhsh, 1999). However, we are witnessing a decline in human communication with each other in the modern society. As size, area, speed and density of cities increase, civility and citizenship increase and social relations as the basic urban principles decline. The researchers have addressed

numerous important cases with an emphasis on human special needs in the living environment among which social interaction, space security, legibility, privacy, human dignity and identity can be noted.

Literature relevant to human and environment indicated that studying physical space requires considering physical activities in that space. Barker (1969) has emphasized collective-behavioral nature of activity in spaces. He has also focused on social interactions in spaces as a spatial feature (Barker, 1969). Although more research addressed social interaction in collective environment, collective interaction in all spheres of man-made environment including private, semi-public and public spaces is emphasized. Particularly, establishing collective relationships at users' level of in a private environment such as housing is emphasized due to the impact of these interactions on quality of life.

In fact, the importance of spatial socialization is to the extent that many theorists emphasized the effectiveness of this quality on social interaction and

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attachment to the living place. According to these ideas, quality of social interactions in the place of residency is effective in attachment to the place (Pol, 2002).

The success of public space lies in using the space and human presence in that space. In fact, architecture and urban planning should increase social interaction and human solidarity (Daneshpor and Charkhchian, 2007).

Establishing an appropriate level of social interactions in living environments as one effective component in quality of life is affected by characteristics of man-made environment. Most human and environmental investigations in connection with collective interactions have studied social interaction in public areas. This research attempted to analyze the effect of environmental design and spatial organization in the living areas on how social interactions are established.

LITERATURE REVIEW

The idea of returning to the past normal life and the necessity to human social life was developed globally around the world since 1970s. Constructing residential complexes titled as cohousing was regarded as the measures to enhance this idea. Cohousing idea aimed to encourage the humans to have a social life. Cohousing is combination of two words of house and society (McCamant and Durrett, 1989).

These complexes aim to promote human social life, provide a harmonious collective and shared living experience based on democratic ways for the residents and achieve a high level of stability. The people are encouraged to live together and conduct collective activities in such complexes. However, the residents control their individual lives and personal thoughts in the best manner. Thus, an equilibrium is established between the private and social life of human beings (Scotthanson and Scotthanson, 2005). Since development of this idea, many studies were conducted on revival and enhancement of human social relationships in various fields. In the following, several studies are addressed. However, social life was transformed and the main goal to construct these complexes was modified after decades passed since construction of these complexes under the influence of economic and political issues that challenged the balance between the complexes.

Alexandr and Chermayeff showed that solitude and social interaction are closely related concepts (Chermayeff and Alexandr, 1963).

Nasr also referred to environmental features and addressed the impact of users' collective-emotional on their living environment. In addition, temporary emotional aspects of the users' experience in the environment are known as an integral component of the environment-human interactions. This issue shows the

necessity to pay attention to living space of the users as well as continuity and integrity of their perceptions on the environment and their living space (Bonaiuto and Bonnes, 2000).

Hung examined the relationship between design of a residential area and the residents' social interactions in Taiwan in 2006. For this purpose, the questionnaires were distributed among residents of three residential complexes. The results showed that design of different outdoor spaces such as scenic green spaces, playgrounds, greenery spaces and sites suitable for sitting could have a great impact on increasing the residents' social interaction (Huang, 2006).

In addition, Wood *et al.* (2010) investigated the effective factors in increasing the residents' social interactions in Australia. In this regard, they sought to explore the relationship between three elements of neighborhood design, walking and the residents' social interactions. The results showed that socialization of residents has a direct relationship with their leisurely walk around the neighborhood, watching the neighbors during walking and scenic landscape (Wood *et al.*, 2010).

Due to population growth and density in South Korean apartments in 2010, Lee *et al.* (2010) used several approaches in design of apartment plans to increase social health of the residents. The results indicated that residents did not incline to amend the plans and design of public spaces in each floor corridor and lobbies to increase the rate of interactions (Lee *et al.*, 2010).

A review of literature: Altman (2003) stated that if members of society were able to achieve the desired level of interaction, the social system is in equilibrium or a balance state. Social interaction refers to establishing a relationship between two or more people, which leads to a reaction among them. This type of reaction is known to both sides (Daneshpor and Charkhchian, 2007).

Most people become familiar, understand and experience interactive relations in the residential environments. Thus, they are allowed to make values in these places. Personal and social relationships are more highlighted in composition and structure of residential complexes with the desired spatial data (Shafie, 2001).

Social interaction and communication inevitably take place in public spaces. The urban space is not only a physical concept, but also covers "interactions" and "activities". In other words, a physical frame is visualized in urban space where social activities can be done or interactions can be established (Habib *et al.*, 2012) (Table 1).

Development of social or communal activities addressed in this research is dependent on presence of people in public space. According to triple Ian Gol

Table 1: Social objectives in design of public spaces

Social objectives in the design of public spaces
Enhancing visual, verbal and personal communication in the context of social interaction
Sense of belonging to public and communal spaces with inner peace and outer peace
Facilitator rather than a deterrent in social activities and guidance on the appropriate path
Respond to all social groups, especially vulnerable groups, social-spatial equality
Creating memorable and valuable experiences and exploring the motivation and sense of belonging in the public space
Nurturing and fostering social and cultural values

Habib *et al.* (2012); With slight changes

classification of outdoor activities, presence of people at these places is arbitrary and optional and depends on quality of the built environment.

Therefore, the tendency to collective activities in a living space at different familial and collective levels is associated with physical space organization. Then, studying the places, which are the centers of activity in specific regions of physical space and making values and distinction in several parts of a space are dependent on spatial features (Danshgar Moqhadam *et al.*, 2011).

Various approaches are introduced on creating a successful public space that is open to various individuals and groups. In this regard, the approaches presented by Jane Jacobs, Ian Gehl, Alan Jacobs, Cooper Marcus, Donald Appleyard and PPS, 2010 can be noted. In general, such factors as user mixing, vitality, visual beauty and specific care for the environment, physical comfort, ability to sit and stand, proper access and safety, suitability and legibility, diversity and universality of the site are addressed as the most important factors affecting presence acceptance and social interactions.

In this context, recent research highlighted characteristics of the physical space and social interactions. This research was based on the fact that the physical environment acts as a spatial system in any environment. Moreover, characteristics of this spatial system are effective in users' social interactions (Pasalar, 2003).

In this study, the relationship between social organization and environmental structure of the environment is studied. Accordingly, Moleski and Lang (1986) stated that an ideal physical location supports behaviors and behavioral events in space in three manners. First, the physical location offers the physical elements and attributes necessary for continuity and stability of individual comfort in the environment. For example, lightness is an important feature in the physical environment, which is specified by the physical location. Second, the physical environment provides spatial facilities and organizations, which enhances special systems and patterns for the activities in the location. Other activities are less highlighted. In other words, the physical environment facilitates development of social relations, provides a desirable level of privacy in active environment. Operational

variables at this level are dimensions, geometry of space and spatial relations and communication in active space. Finally, the man-made environment create and ensure symbolic and aesthetic emotions, experiences and perceptions, which affect the users' perceptions qualitatively in the environment. These three levels consistently, interactively and diversely control the relationship between social interactions and behavioral systems in the space (Danshgar Moqhadam *et al.*, 2011).

Research in the field of environmental psychology indicated that a spatial system could strengthen desirable social interactions. On the other hand, the spatial system can directly affect creation of an appropriate atmosphere of privacy. In fact, an appropriate level of collective relations and a desired privacy suitable to activities in the desired space can be achieved through appropriate organization of the spaces and spatial arrangement (Lang, 1987; Archea, 1999). Therefore, these investigations focus on how behavioral patterns and events within the space and environment are associated with the spatial structure of buildings and monuments and how this spatial structure affects the events.

Hiller and Hanson (1984) showed the relationship between the physical space and the social interactions. According to this study, collective patterns in the environment have spatial systems in the man-made environment. On the other hand, spatial content of the environment has collective patterns (Hiller and Hanson, 1984).

Social situations are judged by environmental circumstances. Size, location, furniture, clothing and other characteristics develop a text and define a position in identity-position interaction. The subject reads the position and text. Then, the subject acts according to both factors (Rappaport, 2012).

Accordingly, "socialization" is the most important factor in estimating utility of public spaces. This term refers to the fact that a favorable environment is certainly used by a social user. It should be noted that space is the only arena of social interaction socially demanded and desired in discussions relevant to social spaces and interactive area of "mass communication". Designing any space regardless of "social demand" or the "collective behavior" does not ensure certain optimal use of urban spaces. In addition, paying attention to socially vulnerable groups such as the disabled and the elderly is also at stake (Habib *et al.*, 2012).

MATERIALS AND METHODS

This was an applied research. Applied research attempts to find answers to solve a scientific problem in the real world. In this study, the results of basic research are used to improve and master behaviors, methods, tools, equipment, products, structures and patterns used by humans (Tabibi *et al.*, 2013). This was

a descriptive study considering the objectives. Survey method was used to conduct the study. The responses to the questions that have been developed in time were used to investigate the nature of personal characteristics and perceptions (attitudes, beliefs, interests) (Tabibi *et al.*, 2013).

In this study, the main hypothesis was refined based on pre-test study, according to literature on environmental psychology and behavioral science in the basic framework in human-environment context. The factors affecting the interaction between humans in the physical environment were examined. Then, the role of environmental design and organization was analyzed and evaluated according to social interaction.

In this study, the hypothesis claimed that environmental organization and relative constructive factors have a significant effect on social interaction. The questions discussed in this regard are as follows:

- Is social interaction among residents of residential complexes associated with the designed space?
- What factors are effective in complex organization?
- Which factors are effective in social interaction?

The present study aimed to understand the effect of environmental organization in social interaction and finding the factors that are more efficient.

In the present study, the basic framework was developed with reference to literature. The hypotheses were proposed. The case study was used to clarify and confirm the hypotheses in the context of research framework, which led to completion of the investigation. The questionnaire was designed and distributed among residents of two housing complexes with different physical properties. Then, the results were analyzed.

Data analysis was carried out using SPSS 20.

RESULTS

Survey method was used in this study. SPSS 20 was used to analyze the collected data.

The statistical population consisted of Shiraz residential complexes among which residents of two Amirkabir and Jannat housing complexes were selected. Random sampling method was used. In this study, a questionnaire with various components was used in relation to social interaction of the residents and features of environmental organization. Every question was about the living place of the residents. The subjects should write their responses in the format of five-point Likert scale. In this study, 100 questionnaires were distributed in each complex among which 72 questionnaires were collected from Amirkabir complex while 76 questionnaires were collected from Janat complex.



Fig. 1: Janat complex (right) and Amirkabir complex (left) (Google earth and authors)

Introducing the samples under study: The samples under study included two housing complexes with different organizational pattern in Shiraz. It was attempted to select the complexes, which had no significant differences in terms of social status and urban situation because the researchers believed that these components might affect the dependent variable and change the results. As a result, both Janat and Amirkabir Complexes were located in proximity to one another, but were designed with different patterns.

Amirkabir Residential Complex had a strip organization while Janat Residential Complex had a complex organization with a central courtyard approach (Fig. 1). Due to the proximity of the two complexes, residents had almost a common culture and belonged to middle social class. Outdoor percentage was 62% in Amirkabir Complex while 56% in Janat Complex.

The main hypothesis of the research claimed that the desire for social interaction between residents in the residential complexes is associated with the environmental organization.

In this study, the researcher should be aware of several factors on the questionnaire to provide assurance to analyze and make conclusion. The first factor is the normality of data. Here, Kolmogorov Test was used to examine normality of data. The result was 0.92, which indicated normality of data at 0.2 significance level (<0.05).

Cronbach's alpha was used to determine reliability of the questionnaire (Cronbach = 0.85), which confirmed high degree of reliability. Views of professors and experts were used to determine validity of the questionnaire.

Based on the data obtained: 33.8% of the subjects were males (50) while 66.2% were females (98). 85.8% of the subjects were married (127) while 11.5% were single (17) and 2.7% did not specify their marital status (4).

In terms of age groups, most subjects were between 19 and 35 years old (56.8%) while less subjects were under 18 years old (5.4%).

Table 2: Descriptive statistics on the social interaction variable

Name	Number	Mean	Mode	S.D.	Variance	Min.	Max.
Amir Kabir	72	2.37	1.77	0.70	0.50	1	3.77
Jannat	76	4.10	5.00	0.54	0.30	3	5.00

S.D.: Standard deviation; Min.: Minimum; Max.: Maximum; Based on SPSS data

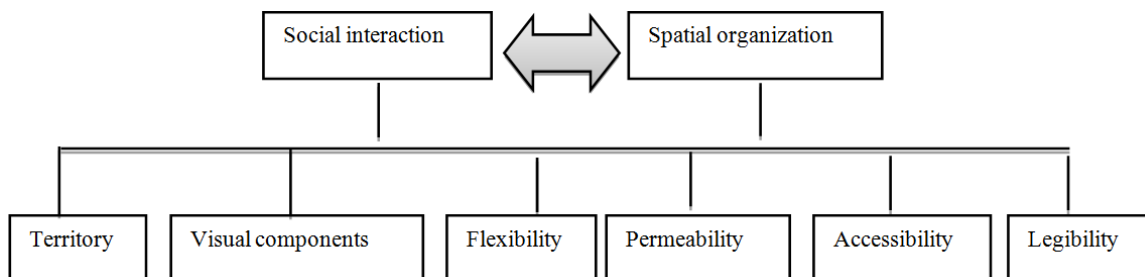


Fig. 2: The relationship between social interaction and spatial organization and relevant components (authors)

Table 3: t independent test, comparison of Janat and Amirkabir complexes in terms of interaction

	Levene's test for equality of variances		t-test for equality of means		
	F	Sig.	t	df	Sig.
Social interaction	3.87	0.05	-13.55	90.54	0.000

(Based on SPSS)

Table 4: The correlation between two variables of social interaction and spatial organization

	Sig.	R (pearson)
Interaction and organization	0.00	0.841

Significance level <0.05 refers to statistically significant correlation; Significance level <0.01 refers to a strong significant correlation; Based on SPSS data

Table 5: Independent t test to compare the organizations of Amirkabir and Janat complexes

	Levene's test for equality of variances		t-test for equality of means		
	F	Sig.	t	df	Sig.
Spatial organization	6.22	0.01	39.78	84.79	0.00

Among the subjects, 64.2% were owners of the housing complex while 35.8% were tenant. In terms of education, 13.5% of the subjects had lower than diploma degree while 45.9% had a diploma, 14.2% were undergraduate, 19.6% had master degree and 4.7% had higher education.

The subjects' length of stay in the complexes ranged from 1 month to 12 years. Level of social interaction in the complex was asked from the residents based on a group of thirteen questions, which showed the mean social interactions in Janat Complex as 4.1% and as 2.37% in Amirkabir complex (Table 2).

Based on the above table, the level of social interaction in Janat Complex was more than Amirkabir Complex.

The null hypothesis: The difference between interactions in two Janat and Amirkabir complexes was not statistically significant.

The first hypothesis: The difference between interactions in two Janat and Amirkabir complexes was statistically significant.

This difference was statistically evaluated using the Leven test, which was significant with $F = 3.87$ at 0.05 level. The t statistic was -13.55 with a confidence level lower than 0.01. Thus, the first hypothesis was confirmed and the null hypothesis was rejected (Table 3).

The null hypothesis: The correlation between social interaction and organization is not significant.

The first hypothesis: The correlation social interaction and organization is significant.

The relationship between these two factors was calculated using the Pearson correlation coefficient. Accordingly, R was reported as 0.84, which was significant under 0.01 level. This shows a high correlation between the two factors of social interaction and environmental organization. Therefore, the null hypothesis was rejected and the first hypothesis was confirmed (Table 4).

Given the strong correlation between social interaction and environmental organization and the difference between social interactions in the two complexes, the subsequent hypothesis claimed that organizations of two Janat and Amirkabir complexes are statistically and significantly difference.

According to the independent t-test, the results showed that environmental organizations of two Janat and Amirkabir complexes are statistically and significantly difference. Leven Test showed that F-value was 6.27, which is significant below 0.05 level. t statistic was -39.87, which was significant below 0.01 level (with confidence level = 99.9%) (Table 5).

The authors reviewed the literature and drew the Fig. 2, which shows the relationship between environmental organization and social interaction.

In the next phase, the effectiveness of qualitative constructive components was examined on the environmental organization. For this purpose, stepwise regression method was used. In this method, the value of a dependent variable is predicted based on value of the independent variable. Science is obliged to predict and explain the phenomena. Therefore, regression analysis plays an important role in research on prediction or explanation (Habibpour and Safari, 2012). In stepwise method, all variables are entered to the system simultaneously. The software selects the dependent variable, which is maximally correlated with the independent variable at first. Then, it predicts value of the dependent variable. In the next steps, the dependent variables are entered into the model with respect to the correlation coefficient value.

The correlation coefficient (R) shows the correlation between dependent and independent variables.

The adjusted determination coefficient indicates how much the environmental organization will be explained by the independent variables.

Judgment on the role and contribution of every six variables in explaining the dependent variable should be done according to beta values. These values compare and determine the relative contribution of each variable.

According to calculations, the strongest factor in environmental organization is the visual components

in the complex with determination coefficient (R^2) = 0.612. In other words, this variable alone can predict 0.612% of the dependent variable. Other variables in order of preference are as follows: flexibility, accessibility, mastery, territory and legibility.

F-value was reported as 253.91, which is significant under 0.01 level. Thus, the model had a proper fit. Moreover, the model can be generalized to the population.

Effective coefficient (β) of each variable is as follows: visual components (0.29), flexibility (0.37), accessibility (0.25), mastery (0.24), territory (0.23) and legibility (0.21). Effective coefficient indicates that how much the variance of dependent variable will change under the influence of one unit change in the variance of each independent variable (Table 6).

Stepwise regression method was reused to determine the effectiveness of each environmental organization factors on social interaction in Janat Complex in order to determine the effect each organization factor on prediction and explanation of social interaction in the complex.

According to calculations, how to define the accessibility was the most effective environmental organization factor in residents' social interactions in the complex. Since the correlation between these factors was 0.53 and the determination coefficient was 0.29, other factors in order of preference are as follows:

Table 6: Major indexes in multivariate regression analysis to predict the environmental organization variable

	1 model		2 model		3 model		4 model		5 model		6 model	
	β	B	β	B	β	B	β	B	β	B	β	B
Constant	-	1.56	-	0.75	-	0.75	-	0.57	-	0.24	-	3.95
Visual components	0.78	0.44	0.65	0.37	0.53	0.30	0.42	0.24	0.30	0.17	0.29	0.16
Flexibility			0.39	0.17	0.42	0.18	0.37	0.16	0.37	0.16	0.37	0.16
Accessibility					0.38	0.25	0.35	0.23	0.35	0.23	0.25	0.16
Permeability							0.26	0.17	0.27	0.18	0.24	0.16
Territory									0.21	0.15	0.23	0.16
Legibility											0.21	0.16
R	0.78		0.86		0.94		0.96		0.98		1.00	
R square	0.61		0.75		0.88		0.93		0.96		1.00	
Adjusted R square	0.60		0.73		0.88		0.92		0.96		1.00	
F	75.66		70.41		120.43		156.59		253.91		...	
F (sig.)	0.00		0.00		0.00		0.00		0.00		...	

Authors, based on SPSS output

Table 7: Major indexes of multivariate regression analysis to predict social interaction

	1 model		2 model		3 model	
	β	B	β	B	β	B
Constant	-	1.07	-	0.55	-	0.05
Accessibility	0.53	0.41	0.45	0.35	0.43	0.33
Permeability			0.33	0.27	0.28	0.22
Territory					0.26	0.23
R	0.53		0.62		0.67	
R square	0.29		0.39		0.46	
Adjusted R square	0.27		0.36		0.42	
F	19.65		15.28		13.12	
F (sig.)	0.00		0.00		0.00	

Authors, based on SPSS output

Table 8: Correlation between individual elements and social interaction

	R	Sig.
Age and interaction	0.109	0.000
sex and interaction	-0.360	0.000
Education and interaction	-1.560	0.000
Inhabitancy and interaction	0.049	0.058
Interaction and ownership	0.023	0.220

Level of significance below 0.05 indicated significant correlation and level of significance higher than 0.05 indicated non-significant correlation; Authors, based on SPSS data

mastery and how to define territories. It should be noted that flexibility and visual components had not a significant effect on the level of interaction in this complex in prediction of eligibility.

F value was equal to 13.12, which was significant at 0.01 level of significance. This represents fitness of the model and capability of generalization to the population. The effective factor in this analysis was equal to 0.43 for accessibility variable, 0.28 for mastery variable and 0.26 for territory variable (Table 7).

DISCUSSION

Based on the above material, residents of Amirkabir complex had less interactions compared to residents of Janat complex. Since the interaction was correlated with the organization, reducing interaction in this complex was directly related to poor environmental organization. Therefore, the researcher sought to discover other effective variables in interaction in the complex by investigating the interaction between personality variables. The results indicated that the interaction was correlated with age, education and gender. The dependent variable had not a significant relationship with variables of length of stay and marital status and ownership (Table 8).

CONCLUSION

People often act based on environmental signs. This is based on the observations representing the people behaving quite differently in different environments. As a result, the language used in the environmental implications should be fully understood and the codes should be read carefully. If the environmental information defined contents of the codes, the people can clearly understand the codes later. If the codes were not understood, one cannot communicate with the environment (Rappaport, 2012).

In this study, two different housing complexes were selected. One had the central courtyard organization while the other one had strip organization. Based on the analysis presented in this study, social interactions among residents of Janat Complex was more than Amirkabir Complex. A statistical relationship was observed between environmental organization and social interaction of the residents. It

can be concluded that high levels of interaction in Janat Complex was due to proper placement of architectural elements together to create spaces that provide the possibility of more interaction among people. This factor was weaker in Amirkabir Complex.

Based on regression analysis, the factors influencing social interaction in order of preference are as follows: accessibility, mastery and territory. In other words, the access of people living in different blocks to other blocks and open space and access of riders and pedestrians to these places have an important role in social interaction. Janat complex is designed as two separate central courtyard. The path of the roadway and parking cars is designed apart from the main courtyard used by the pedestrians for comfort. Then, the pedestrians can easily interact with each other in this area without being disturbed by the riders.

Mastery factor refers to the separation of public and semi-public spaces and the sight of the public and semi-public spaces, etc. and presence of diverse spaces in the complex. In this study, these factors were strengthened in Janat complex while weakened in Amirkabir Complex.

Territory factor referred to how different territories were created in the complex. The results showed that Janat Complex was rich in this factor due to specific spatial organization, presence of a yard that has somewhat protected their privacy, the possibility to make friends and interact with other people, presence of greenery areas and presence of an open visible space for play or rest without bothering others and easily doing the desired activity.

These three factors were weakened in Amirkabir Complex. Then, the most important factor reducing interactions was absence of a space designed for the yard. Most open spaces were dedicated to car parking.

In the meantime, it is necessary to consider the role of individual factors in the development of social interaction because these factors have a direct connection with interactions. Each individual selects a specific type of interaction with the surrounding environment and people fit with social, cultural and economic circumstances. The results showed that gender, age and education were strongly correlated with interactions.

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