

Persian translation of this paper entitled:

ارزیابی تأثیر مؤلفه‌های کالبدی بر حس دل‌بستگی به مکان  
در فضاهای جمعی مجتمع‌های مسکونی منتخب تهران  
is also published in this issue of journal.

## Evaluation of the Effect of Physical Components on Place Attachment in Communal Spaces of Selected Residential Complexes in Tehran

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Received: 12/05/2019 ; revised: 05/08/2019 ; accepted: 28/09/2019 ; available online: 20/04/2020

### Abstract

**Problem statement:** With the extension of human societies and the promotion of human social needs, the necessity of being present in communal spaces and identifying the components that affect the sense of attachment to the place for some human activities is of great importance. The lack of attachment, the separation of individuals from one another, and the lack of social interactions, along with other urban problems, are the result of a modernist vision of space.

**Research objective:** The purpose of the study is to classify the qualitative components of communal spaces in residential complexes with moderate urban density in Tehran. To extract the values of qualitative, physical and perceptual qualities in the residential complex scale, as well as the manner and magnitude of the influence of physical components in creating a sense of place attachment, is the main purpose of this research.

**Research method:** The method of this research is the combination of quantitative and qualitative method. Using the causal-comparative strategy, the effect of physical characteristics of residential spaces was studied on the attachment of residents. In order to conduct empirical and survey studies, after field surveys, based on the scale, class and form of open and closed space, different types of residential complexes were selected. From regular daily visits through behavioral recording and completing 361 questionnaires along with analysis (Multivariate regression) through the correlation strategy and quantitative analysis of the data using SPSS 19 software, were tested on several components and personality and behavioral characteristics of users.

**Conclusion:** The results of the research show that physical components such as "privacy", "integrity", "legibility", "visual richness", "composition", "management and supervision", "natural elements" in order of priority have the greatest impact on the sense of place attachment. Therefore, the designer as the creator of space by choosing the scale and layout of the blocs together with the design of the structure of the spaces leads to a change in the sense of attachment of people living in the future.

**Keywords:** *Sense of place attachment, physical components, residential complex, communal space.*

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## Introduction

The sense of attachment of users to the living space motivates people to promote their living spaces. Elimination of the sense of attachment, separation of people, and lack of social interactions besides other urban problems are the consequences of the modernism view towards space. According to Norberg-Schulz, many people feel that their life is meaningless and they are alien to themselves (Norberg Schulz, 2002, 85). Giving meaning to life in the living space is through features that can be studied in different physical and social dimensions as well as a process that can be studied. Physical and social features of the environment can promote the life quality of residents (Moulay, Norsidah; Suhardi & Sumarni, 2018, 28).

The need to recognize the most important way of thinking and perceiving the city as an integrated whole, to believe in the innate abilities of the human mind to create a network of relationships in the world, to look at each component in connection with the whole and consequently to create a coherent whole from coherent ideas. Any intervention in the tissue (Rahimi, Mohammadi & Hasanzadeh Davoodi, 2015, 90).

Investigation of the components influencing an increased sense of attachment in the communal spaces of the residential complexes are the objectives of this study. Communal space is known as a complementary space beside the internal space of the apartments for social interaction and collective life, creating a constant relationship with nature and extending the internal space functions. Communal space can be a context for the development and formation of individual and social identities. Communal space is a space that makes the person restless and is a necessary condition for social interaction (Pakzad, 2009, 18). Communal space is used for different applied and symbolic objectives. Therefore, public spaces (communal spaces) are multi-purpose spaces and they are different from the bordered territory of

the residential units (Madanipour, 2005, 49). In residential complexes and environments, communal space is one of the identifiable common living areas. This space can be used for group uses in which collective activities and connections occur. Usually, residential building is a collective life body and socio-cultural activities in the collective space of the residential environments form its content (Mahdavinejad, Dehghani & Boroumand, 2014). With the development of human communities and the promotion of social needs for a better life and spatial limitations of the residential spaces, the necessity for presence in communal spaces for some of the activities has become very important. Human needs satisfaction and it is dependent on the establishment of a relationship with others and presence in the collective contexts that require defined communal spaces (Mohammadi & Ayatollahi, 2014, 80).

For this purpose, this study aims to explain a theory based on the identification of the role of physical factors in creating a sense of attachment to the space and assessment of this sense in communal spaces of the residential complexes with average density of Tehran. The main research question is according to understanding the physical patterns and sense of place attachment in communal spaces of the residential complexes. In this regard, the following questions are proposed: what are the effective physical components and indexes in creating a sense of place attachment? How strongly does each component influence the formation of a sense of attachment? In the process where the body influences the mind, how is the relationship between form as one of the three variables of creating place attachment and two variables of activity and understanding?

Therefore, according to the main research topic, questions, and objectives, the following hypotheses are proposed:

1. Physical components and the form of architecture have the potential to create a sense of place attachment and weaken the sense of placeless.

2. The physical form has a larger effect on the formation of a sense of attachment than activity and meaning.

The differences between this study and previous studies include extraction of the intensity of impact and prioritization of the components affecting the formation of the sense of place attachment. Especially, this study focus on communal spaces of the residential complexes with an average density of Tehran as semi-public and semi-private spaces besides other effective and intervening variables.

### Literature review

For the first time, the process of the sense of attachment was taken into consideration by child psychologists and the initial studies focused on child attachment to mother. Then, the development psychologists studied the sense of attachment in the next stages of life (Besharat, Karimi & Rahiminejad, 2007). According to the studies of Balbi, attachment has four properties of creating a safe base, a safe shelter (refer to attachment while facing risk and threats), the tendency towards the maintenance of closeness and sadness of separation (Pourjafar, Izadi & Khabiri, 2015, 44). The sense of place attachment attracted the attention of anthropologists and sociologists to study the relationship between human and sacred places. Over modern urban developments during 1950-1960 influenced by the consequences of globalization and forced relocation of people, attention to the place of residence increased (Norton & Hannon, 2002; Scannell & Gifford, 2009). The idea of place attachment is based on the bond between humans and the physical environment. This bond has different names in literature. Relph (1976) defines it as a place opposite to nowhere, Tuan (1974) calls it topophilia, Norberg-Schulz (1980) defines it as the guardian spirit, Proshansky; Fabian & Kaminoff, (1983) calls it place identity, Shamai (1991), Still (1981) and Green (1999) call it place

personality and Altman and Low (1992), Williams and Roggenbuck (1989) and Brown, Perkins, & Brown, G. (2003) call it the sense of attachment. Heshas (2004) in his doctoral dissertation at the University of North Carolina, has classified them according to the closeness of each concept to the objective or subjective natures. The objective nature is taken from the physical properties and mental nature is taken from thoughts and feelings of people toward the physical environment.

In Iran, the doctoral dissertation by Charkhchian (2009) in Iran University of Science and Technology studied the sense of attachment in urban space of Qazvin and investigated factors affecting increased attachment to the public urban spaces with an emphasis on the diversity of activities. Another example is the doctoral dissertation by Ghazizadeh (2011) in the University of Tehran that employed a quantitative method to investigate the effect of open space design in residential spaces on the creation of a sense of attachment to the place. In an urban design context, the thesis by Khabiri (2012) in Tarbiat Modares University has focused on the development of urban design framework for urban neighborhoods based on attachment creation approach for Emamzadeh Yahya neighborhood in Tehran.

According to the literature, the difference between the current study and previous studies, one the one hand, is related to the method and use of behavioral recording method combined with the quantitative method in architecture context and on the other hand, the focus on physical components in communal spaces of the residential complexes.

### The sense of place attachment

The term “attachment” refers to the effect and the term “place” refers to the behavioral base that people depend on emotionally and culturally (Altman & Low, 1992, 5). Attachment to a place confirms the method that people make meaning for themselves (Gifford, 2002, 273). Place attachment

like attachment to a person can be a result of a continuous relationship with the object of interest (Billing, 2006, 250). Cresswell (2015) by his interpretation for place believes that place is not a single aspect, but it is a way to understand the world: "... When we look at the world as the world of places, we see different things. We see connections between people and places in the worlds of meaning and experience..." (Cresswell, 2015, 18). The image of the place is the most obvious concept presented about humans and the environment. This image is like an instant representation of the occurred events in the place (Hashas, 2004) and is not a forced emotional understanding of the environment, but it is influenced by functional, conceptual, behavioral, and perceptual factors. A similar concept is considered for place identity and place personality in the literature and it can be said that both have similar meanings and are closer to the physical nature of the environment (Ibid). In environmental psychology, the emotional relationship between the self and the identified place is called spatial attachment (Ram, Björk & Weidenfeld, 2016, 111). Place attachment is the sensory bond between the actor and the place (Florek, 2011) that constitutes one of the main concepts in environmental psychology (Hataminejad, Ahmadpour, Ziari & Habibian, 2018, 67). Many researchers emphasize the individual context, an especially physical-functional attachment that occurs between the person and the geographical place. In other cases, the social context and relationships between people are emphasized and in the third dimension, the formation of spatial belongings by physical aspects (especially the natural context) is emphasized (Brown et al., 2015, 42). Many researchers treat place attachment with a multidimensional structure. However, no general agreement exists about these dimensions in practice (Anton & Lawrence, 2016, 452). Taylor (2009) introduces the sense of attachment to a place with two dimensions of physical dependence (having roots, addressing the history of the place, and acquaintance time) and social dependence

(local constraints or social attachments of people and groups). Jorgensen and Stedman introduced the sense of attachment to a place as an extensive structure including three dimensions of attachment to a place, dependence on a place, and place identity with emotional, perceptual, and behavioral components (Jorgensen & Stedman, 2006).

Components and factors influencing the formation and enhancement of the sense of place attachment are classified into three areas of functional (behavioral), body-physical (perceptual), and meaning (emotional) (Sadeghi, 2014). The functional area that emphasizes the role of social factors in the formation of the sense of attachment to a place includes various aspects of presence, social interactions, and social support in the environment, society, and local gatherings. The body-physical area focuses on how physical components influence the enhancement of the sense of attachment to a place and it is summarized in using environmental solutions to reduce crime, obtain suitable quality, suitable density, and conscious designing of the environment. Also, individual characteristics and components that point to the impact of duration of stay, marital status, gender, and income of the person in the sense of attachment to a place are classified into the perceptual-sensory area (Brown, Raymond & Corcoran, 2015; Gustafson, 2001, Lewicka, 2008). Unique characteristics of a place that make distinctions, due to helping the person to identify and understand himself or herself as a part of a social framework, enhance the sense of attachment to the place. Indeed, when people have common characteristics in a place and introduce their characteristics as a part of a spatial gathering, their sense of attachment to a place increases (Smith, 2011). Understanding, organization, classification, and remembering all new experiences are based on the imagination that the person has. The needs of the person are defined according to this "self". When the object or subject is matched with the needs of the person, the sense of attachment to

the object or subject emerges gradually. As a result, the person feels safety and peace and is motivated to maintain, preserve, and support the object or subject (Hashas, 2004). Gifford states that the components of the sense of attachment are the physical environment, users, and attachment process. Each of these components may have different levels. Attachment of users can be studied in two individual and group scales at various cultural, psychological, and biological levels. The physical environment can be considered in various geographical scales such as house, neighborhood, city, or country (Gifford, 2002).

The first component in place attachment is the object or the person that becomes dependent on the place and it addresses the personal and group characteristics affecting attachment. The second component of the psychological process is the effect of emotions, cognition, and behavior on attachment. The third component of attachment includes its characteristics and nature.

The most important component of attachment is the place. Place refers to the context in which people depend on emotionally or culturally (Altman & Low, 1992, 5). This dimension has been studied in different scales of home, neighborhood and city and at the physical environment or social level. The results of a study by Hidalgo and Hernandez indicate that the sense of attachment to the house is stronger than the city and attachment to a city is stronger than the neighborhood. Also, attachment to the social space is stronger than the physical place (Hidalgo & Hernandez, 2001). Many studies on attachment have concentrated on its social aspects. When the attachment is strongly dependent on people who live in the place, it is assigned to that social place (Scannell & Gifford, 2009). Due to the similarities between attachment to a place and collective feeling, these aspects are compared in studies in many cases. Since a part of the nature of this group is dependent on the place and its physical characteristics, the role of the designer in the formation and enhancement of the sense of

attachment is more tangible. In this group, place as the main component, has a considerable effect on the sense of attachment and the place quality and physical characteristics can enhance the place potentials against occurring social interactions and lead to a change in attachment intensity.

In this study, according to the principles of Iranian-Islamic architecture and objective observations, in addition to the mentioned variables in physical area, two variables of privacy and integrity have been taken into consideration.

### Privacy

One of the principles of Iranian architecture is the existence of arrangement and hierarchy in the establishment of spaces, activities, views, and movements. The existence of hierarchies in architecture is significantly related to the concept of privacy in Iranian culture. Privacy is a relative concept that depends on the regulations of each society, it has its specific mechanism. However, the concept of territory and privacy is changed due to modern evolutions and developments (Rahmdel, 2005). The distance between people is according to their lifestyles and cultures. Private space has been incorporated into everyday language and is perceived with various meanings. The concept of privacy, despite its cultural context in the Islamic communities, is taken into consideration in all cultures. Humans are surrounded by invisible bubbles and define their distance to other people according to these bubbles (Lawson, 2001). Accordingly, the concept that is taken from privacy in the collective space is a reference to the place in which people can use the space without interventions from others.

### Integrity

From the perspective of sustainable development, the integrity of components in every complex is one of the essential conditions for its development and sustainability and in the residence context, it guarantees variety and unity in components.

Turbulence is against the integrity and is the result of a lack of base and defined structure and dispersed components (Ode, Fry, Tveit, Sundli & Pernette, 2009). Hernandez and Garcia et al. (2004) believe that human intervention in the nature that causes visual conflict between its elements is turbulence (Hernández, García & Ayuga, 2004). Variety in space design causes changes in the scale. The macro elements will be divided into various parts and smaller scales and as a result, variety occurs. If there is no hierarchy in the scale, excessive variety eliminates unity. On the other hand, variety can be reduced that in a larger scale, it can be boring (Bell, 2006).

According to the aforementioned points, in the Fig. 1 the conceptual pattern for the creation of collective spaces with environmental physical values that induces the sense of attachment to the place in residential complexes in Tehran is presented.

According to the (Fig. 1), the extended components in all three areas had simultaneous roles in the formation of the successful collective spaces and induction of the sense of attachment to the place. Therefore, the variables and components described in this section were used in designing the questionnaires for measuring the sense of belonging of the residents of selected residential complexes in Tehran.

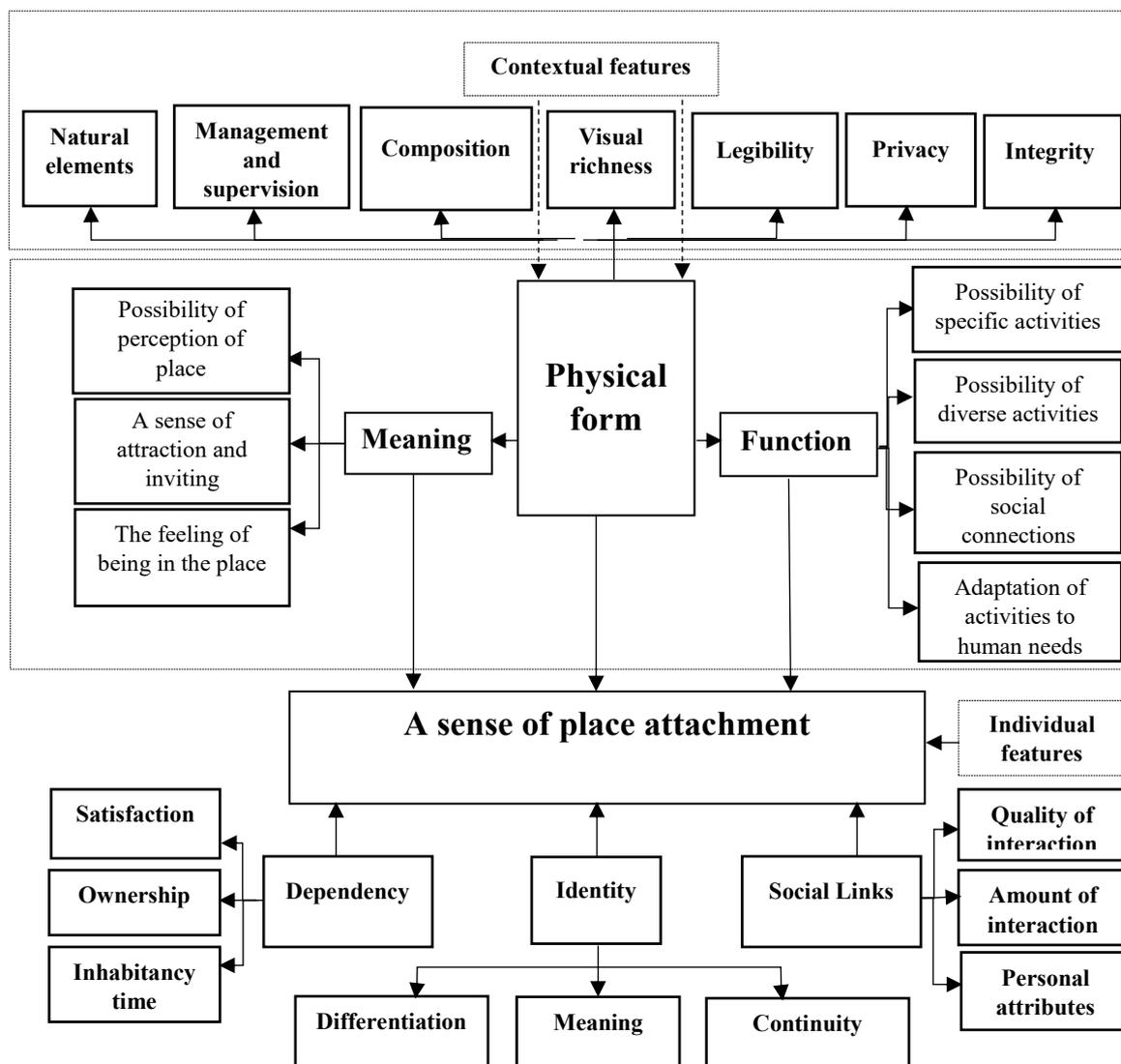


Fig. 1 . The conceptual pattern for the relationship between physical form and the sense of place attachment in communal spaces of residential complexes in Tehran. Source: Authors.

## Research Method

By studying the employed methods in the related studies and consulting experts, the selected strategy of this study to achieve the proposed objectives is the use of a combined approach. For this purpose, in order to test the hypotheses that are resulted from the theoretical foundations and the comparative view, qualitative research strategy using behavioral recording method was employed and in order to identify other intervening variables related to the sense of attachment to place, identification of the components of attachment to place in architecture, and identification of the relationships between them, and to answer the qualitative approach questions, quantitative research strategy was used. In this study, the physical characteristics of the communal spaces were the independent variable and the sense of place attachment was the dependent variable. Using the causal-comparative approach, the effect of the physical characteristics of the collective residential spaces on the sense of attachment of the residents was investigated. The case studies were included a large part of the work. In the following, to test hypotheses, data collection and data analysis was performed. For this purpose, the questionnaire was designed and after confirming validity according to the Delphi method, the opinions of experts were asked and through administering pretest for 30 subjects, reliability was examined by Cronbach's alpha and the results can be found in (Table 1). To determine the statistical sample, using Cochran's formula, from total residential complexes with 6003 people, 361 was obtained and after completing 400 questionnaires, data of 361 questionnaires

was entered the analysis process. In the next stage, statistical methods were used to analyze the data resulted from comparing mean, correlation, and regression and finally, the results were classified.

## Case study

The initial selection of the complexes was according to their collective space. For this purpose, a number of residential complexes of Tehran were derived from GIS maps, available maps, and aerial photos (Einifar & Ghazizadeh, 2010). Then, all of the residential complexes with collective spaces of 65% ground were visited and their accurate characteristics were extracted. According to the field study and comparison of data, the common factor between the complexes was extracted and the typology pattern of the residential complexes with a collective space approach was developed. In the final part, the residential areas understudy were selected from the selected samples with the highest communal space.

According to the plans, the residential complexes of the city can be divided into three main groups of row plan, scattered plan, and concentrated plan. Since in macro-scale complexes with more than 500 residential units, privacy is less observed, complexes with smaller scales with average density were selected for the field study. Finally, according to (Table 2), from each group, two complexes were selected: 1. Row (Nevisandegan, Golha), 2. Scattered (Ferdows, Pas), 3. Concentrated (Arian, Sarvestan).

## Results

As mentioned, this study aims to discover a

Table 1. Cronbach's alpha of the research variables. Source: Authors.

Research variables	Number of questions	Cronbach's alpha
Sense of place attachment	20	0.906
Physical Form	32	0.936
Function	13	0.941
Meaning	20	0.950

Table 2. Typology of residential complexes studied. Source: Authors.

Height	Outdoor pattern	Number of questionnaires	Number of units	
			<216	216 - 500
6 >	Row	43	Golha (0.78)	-
	Scattered	-	-	-
	Concentrated	-	-	-
7-12	Row	33	Nevisandegan (0.78)	-
	Scattered	54	Ferdows (0.91)	-
	Concentrated	27	Arian (0.80)	-
+13	Row	-	-	-
	Scattered	127	-	Pas (0.88)
	Concentrated	77	-	Sarvestan (0.73)

(The numbers beside the name of each complex indicate the percentage of open space).

relationship between the physical form quality of the collective space of the residential complexes and the sense of attachment to the place. The main objective of this study is to find solutions to promote the communal space of the residential complexes to enhance the sense of attachment. Field study and use of correlation strategy or qualitative method were the main approaches of similar studies. According to the approach employed in this study that is based on collective spaces or integration of scale criteria, height, and total open space and since in large complexes with over 500 residential units, privacy is rarely observed, complexes with smaller scale were selected for field studies.

First of all, using objective observations based on behavioral recording methods, behaviors of users and duration of collective space use were obtained and then, with the distribution of questionnaires, research hypotheses were tested.

### Behavioral observation

The behavioral observation method was proposed as a new method to investigate behavioral patterns in public spaces. This method is not solely based on observation, but it asks the researcher to obtain a mental representation. In other words, a sequence of observation, hearing, and thinking that is

drawn in the mind is manifested in the behavioral observation method. In this condition, it can be claimed that the balance between humans and the environment is examined (Table 3).

For this reason, behavioral interpretation was in two objectives (static activity and dynamic activity) and subjective (purpose of activity) dimensions using various methods of direct interview, observation, photography, movement draw, map, counting, tracking, and diary.

According to the studies by Gehl (1987), according to (Table 4), the relationship between the quality of collective open space and activity levels (necessary, selective, social) in residential complexes in Tehran can be assessed.

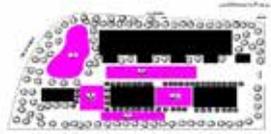
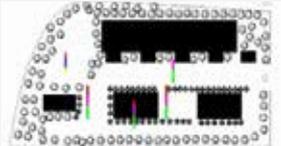
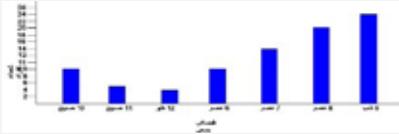
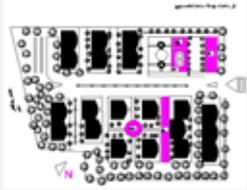
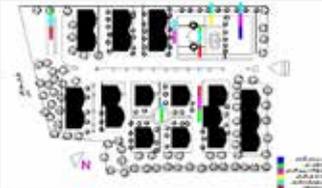
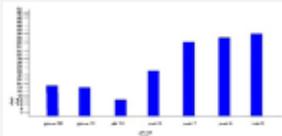
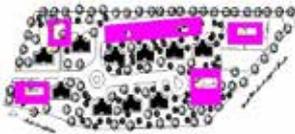
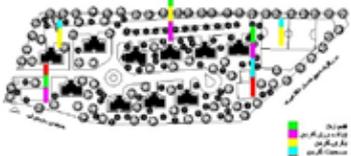
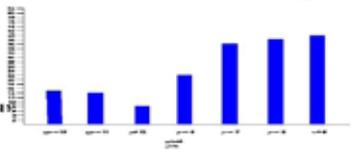
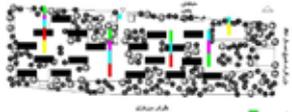
When the space quality is desirable, the selective activities increase. Moreover, as the activities increase, social activities increase as well.

According to the field observations (Table 5), the necessary activities and selective activities in the collective spaces were studied and among all complexes, the Nevisandegan row complex shows the highest activity level and attachment.

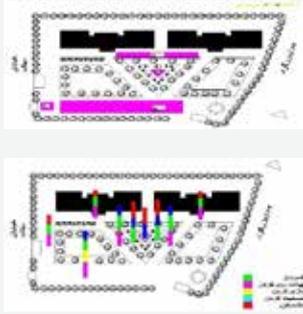
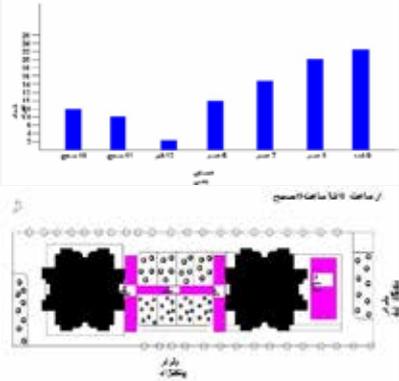
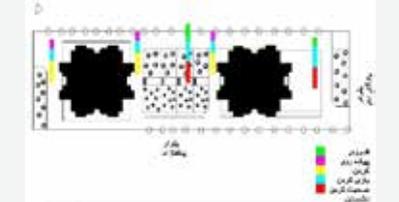
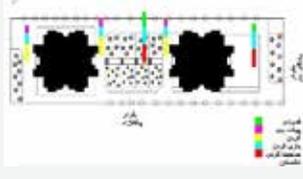
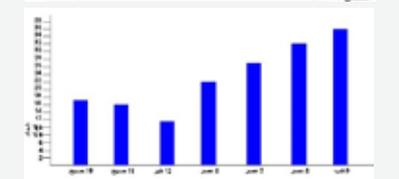
### Analysis of descriptive statistics

Of 361 participants in the study, 206 people (57.61%) were females and 155 people (42.9%) were males. Also, in this study, 276 people (76.5%)

Table 3. Behavioral recording findings in the studied complexes. Source: Authors.

Complex	Tools	
	Observation/photography/movement draw/ map Identification of activity spots (necessary, selective, social) and counting people	Counting/tracking/diary Images and maps of the communal spaces
Nevisandegan	 	 
Row		
Golha		
Ferdows	 	 
Scattered		
Pas		

Rest of table 3.

Complex	Tools	
	Observation/photography/movement draw/ map  Identification of activity spots (necessary, selective, social) and counting people	Counting/tracking/diary  Images and maps of the communal spaces
Arian		
Concentrated		
Sarvestan		

were single and 83 people (23%) were married, 1 person (0.3%) was divorced and 1 person (0.3) was a widow. Thirty-two people (8.9%) were under 18, 175 people (48.5%) were between 19 and 35, 124 people (34.3%) were between 36 and 60, and 30 people (8.3%) were above 60. The results show that 151 people (41.8%) have a diploma, 62 people (38%) have bachelor's degrees, 62 people (17.2%) have master's degrees, and 11 people (3%) have Ph.D.

It should be noted that of 361 participants in the study, 108 people (29.9%) were under 5 years residence, 154 people (42.8%) were 6 to 10 years residence, 62 people (17.2%) were 11 to 15 years

residence, and 37 people (10.2%) were more than 15 years residence in the neighborhood.

### Inferential statistics

In the following, the effect of each physical component in the sense of attachment to a place is investigated based on a questionnaire.

### Examining normality of the research variables

Kolmogorov-Smirnov test was used to examine the normality of the variables.

According to (Table 6), the obtained values (P-value<0.05) show a significant level where

Table 4. The Relationship between Quality of Outdoor communal spaces and Activity Rate (Necessary , Optional, Social). Source: Gehl, 1987, 11.

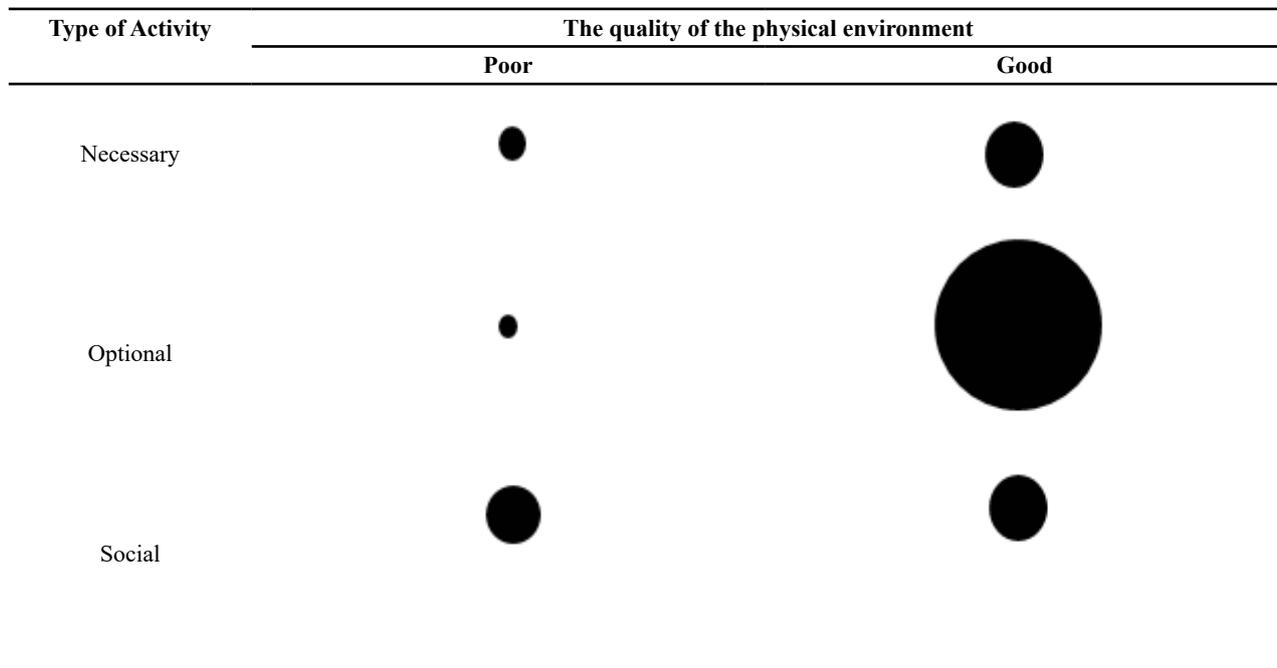


Table 5. Evaluation of the level of activity (Necessary, Optional, Social) with the behavioral recording method in the studied complexes. Source: Authors.

Activity (Necessary Optional, Social )	Row		Scattered		Concentrated		Whole	
	Nevisandegan	Golha	Ferdows	Pas	Arian	Sarvestan	Average	Sig
<b>Necessary</b>								
Commuting	5.0000	4.8837	4.7778	4.7559	4.8889	4.7922	4.8144	000.0
child’s play	2.0909	3.3953	2.2778	2.2992	3.0000	3.0260	2.6150	000.0
<b>Optional</b>								
Exercise and walking	4.0303	4.2093	3.9444	3.5669	3.9259	4.2338	3.9114	000.0
Rest - sit down	4.1212	3.7907	3.5926	3.6142	3.5185	4.0260	3.7590	000.0
<b>Social</b>								
Talk to others	3.6667	3.8605	3.5000	3.2677	3.1481	3.6883	3.4903	000.0
Connecting with neighbors	3.3636	2.7674	3.1667	2.7559	3.1481	3.3501	3.0637	208.0
<b>Place Attachment</b>								
	3.7015	3.1946	3.0631	3.2149	3.6076	3.3501	3.2925	000.0

Table 6. Kolmogorov-Smirnov test table to check for normality of variables. Source: Authors.

	Physical form	Activity	Meaning	Place attachment
Mean	3.00	2.53	2.72	3.29
Most Extreme Differences	0.52	0.67	0.62	0.47
Test Statistic	0.100	0.075	0.071	0.054
(Asymp. Sig. ) 2-tailed	0.000	0.000	0.000	0.014

all variables do not follow a normal distribution. Therefore, to analyze research hypotheses, non-parametric tests were used.

### Assessment of dependent and independent variables in communal spaces of the residential complexes

In this study, the independent variables were physical, activity, and perceptual variables and the dependent variable was attachment. To assess these components, questions were designed according to the 5-point Likert scale. The reliability of this questionnaire was confirmed by Cronbach’s alpha (0.896) and to test these variables in collective spaces, one-sample t-test was used. Since the Likert scale (from absolutely disagree to absolutely agree) can be coded and scored, in this test, 3 was considered as the test value. If the mean is larger than 3 and the significance level is smaller than alpha 0.05, it can be said that the variable level is significantly larger than the average level.

A. physical Form: Among seven components, visual and natural components show a significance level higher than 0.05; therefore, it can be said that these components are not statistically significant. Other components have significant effects and privacy and integrity have the largest mean above 3.

B. activity: in this variable, the mean level in all components is smaller than 3 and the significance level is smaller than 0.05 and it is significant.

C. meaning: the mean level in all studied components is smaller than 3 and the significance level is smaller than 0.05 and it is significant.

D. place attachment: one-sample t-test shows that attachment to a place is above the mean level and has a significant level (Table 7).

### The effect of physical form, activity, and meaning variables on the sense of place attachment

Testing the first hypothesis - To test the effect of independent variables on the sense of attachment to a place, a Spearman correlation test was used. According to (Table 8), the significance level is less than 0.5. Therefore, the relationship between independent variables and dependent variables is significant and the first hypothesis is acceptable. To test the effect of independent variables on the sense of attachment to a place, the regression test was used.

According to (Table 9), the significance level for physical Form and meaning is smaller than alpha 0.05 and for activity, the significance level is larger than 0.05. Therefore, the effect of physical form and meaning on the sense of attachment is significant but the effect of activity on the sense of place attachment is not significant. Accordingly, it can be said that activity concurrently and directly with the body and meaning does not affect the sense of place attachment. However, according to the significance level in (Table 10), the effect of physical form and meaning on the dependent variable is significant and it can be said that physical form and meaning influence the sense of place attachment. The coefficient of determination (R Square) shows that about 36% of dependent variable changes (the sense of

Table 7. Level of research variables in the communal spaces of selected residential complexes in Tehran based on a single sample T-test. Source: Authors.

Factors affecting the formation and reinforcement of a sense of place		Row		Scattered		Concentrated		Whole	
		Nevisandegan	Golha	Ferdows	Pas	Arian	Sarvestan	Mean	Sig
Physical form	Privacy	3.2955	3.2558	3.0602	3.1476	3.9012	3.4416	3.2867	0.000
	Integrity	3.7273	3.1512	3.0926	2.9016	3.3056	3.6818	3.2548	0.000
	Legibility	3.3131	2.8527	2.6296	2.4147	4.0000	3.5455	2.8606	0.000
	Visual richness	3.0379	2.8663	3.6806	2.7500	3.6543	3.2900	3.1066	0.484
	Composition	2.9780	2.8034	2.7778	2.5562	3.6389	3.2695	2.8517	0.000
	Management and supervision	3.0227	2.9099	2.7801	2.7224	3.8013	3.0307	2.9266	0.006
	Natural elements	3.2525	2.9845	2.6914	2.7900	3.6528	3.0795	3.0591	0.143
Activity	Possibility of specific activities	2.9091	2.8062	2.6049	2.3176	4.3333	3.2727	2.6519	0.000
	Possibility of diverse activities	2.6848	2.3628	2.3074	1.8346	3.2593	2.8268	2.3224	0.000
	Possibility of social connections	3.0455	2.6279	2.5370	2.0512	2.6444	2.8468	2.5942	0.000
	Adaptation of activities to human needs	3.1313	2.6357	2.6543	2.2100	3.4259	3.0260	2.7221	0.000
Meaning	Possibility of perception of place	2.8889	2.6085	2.7006	2.1640	3.8272	3.0996	2.6417	0.000
	A sense of attraction and inviting	2.9773	2.6744	2.6759	2.2854	3.7099	2.9264	2.6988	0.000
	The feeling of being in the place	2.9939	2.8140	2.7111	2.5260	3.5833	2.9805	2.8582	0.000
<b>Place attachment</b>		3.7015	3.1946	3.0631	3.2149	3.6076	3.3501	3.2925	0.000

Table 8. The effect of physical form, activity, and meaning on the sense of place attachment in communal spaces of selected residential complexes in Tehran. Source: Authors.

Variable		Physical form	Activity	Meaning	Place attachment
Physical form	Spearman Correlation	1	**0.773	**0.733	**0.350
	(Sig. 2-)tailed		0.000	0.000	0.000
Activity	Spearman Correlation	**0.773	1	**0.787	**0.201
	(Sig. 2-)tailed	0.000		0.000	0.000
Meaning	Spearman Correlation	**0.733	**0.787	1	**0.257
	(Sig. 2-)tailed	0.000	0.000		0.000
Place attachment	Spearman Correlation	**0.350	**0.201	**0.257	1
	(Sig. 2-)tailed	0.000	0.000	0.000	

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 9. Regression test table. Source: Authors.

Independent variable	sig	T	Standardized	Non-standard	B	Dependent variable; sense of place attachment
			Beta	Std. Error		
Physical form	0.003	2.973	0.200	0.060	0.180	R Square=0.373
Activity	0.060	-1.887	-0.164	0.061	-0.115	R= 0.139
Meaning	0.000	3.930	0.341	0.066	0.260	

Table 10. Regression test table. Source: Authors.

Independent variable	sig	T	Standardized	Non-standard	Dependent variable; the sense of place attachment
			Beta	Std. Error	
1 Physical form	0.000	6.301	0.316	0.045 0.283	R Square= 0.316 R= 0.100
2 Physical form	0.012	2.535	0.165	0.058 0.148	R Square= 0.361
Meaning	0.000	3.574	0.232	0.049 0.176	R= 0.131

attachment to a place) are influenced by physical form and meaning. Therefore, by promoting the physical quality of the communal space for collective activities and creating a positive perception for people, a higher level of the sense of place attachment in collective spaces of the residential complexes can be achieved.

### The effect of communal spaces of the residential complexes on the sense of place attachment

In this study, the relationship between physical characteristics of the collective space such as privacy, integrity, legibility, visual richness, composition, management and supervision, natural elements with place attachment in selected

residential complexes in Tehran was investigated. According to the results, a significant relationship exists between all parameters and place attachment. This confirms that people who live in these complexes have considered these characteristics and dependence on the place. This place attachment has created a mental image for residents. Among all the characteristics, integrity shows the largest coefficient. Therefore, this characteristic has satisfied the highest level of place attachment followed by privacy, integrity, legibility, visual richness, composition, management and supervision, natural elements (Table 11).

In this section, using the linear regression test, the effect of the independent physical variable of the communal space of the residential complex on the

Table 11. Relationship between Place Attachment and Physical Properties P = 0 <0.05. Source: Authors.

Factors affecting the formation and reinforcement of a sense of place		Spearman's coefficient	Sig	Number
Physical form	Privacy	**387.	000.	361
	Integrity	**545.	000.	361
	Legibility	**172.	001.	361
	Visual richness	**179.	001.	361
	Composition	**206.	000.	361
	Management and supervision	**377.	000.	361
	Natural elements	**212.	000.	361

Table 12. Linear Regression - The Influence of the Physical Component of Communal Spaces of Residential Complexes on the Sense of Place Attachment. Source: Authors.

		Beta	Sig	t	R	R2
Physical form	Privacy	161.	001.	3.380	.642.	.412a.
	Integrity	462.	000.	9.310		
	Legibility	032.-	566.	575.-		
	Visual richness	024.-	570.	568.-		
	Composition	084.-	221.	-1.226		
	Management and supervision	216.	001.	3.393		
	Natural elements	053.	354.	928.		

Dependent Variable: Sense of Place Attachment

Predictors: (Constant) Privacy, Integrity, Legibility, Visual richness, Composition, Management and supervision, Natural elements.

place attachment is determined. According to the significance level smaller than 0. 05 (Table 12) and beta in each independent variable of the communal space, the significant effect of the independent variables on the dependent variable is confirmed and the largest effect is related to the criterion of integration and unity with a beta coefficient of 0.462. Also, the coefficient of determination shows that about 41% of changes are explained in the effect of the communal spaces of the residential complexes in Tehran on the sense of attachment of the residents.

### Conclusion

Place attachment points to the interests and

emotional bonds of people to a special place and means the mental perception of people regarding an environment that creates an emotional relationship between people and the environment, so that understanding and emotion combine with the meaning context and will be unified. This feeling changes the space to a place with special sensory and behavioral characteristics for special people and in this study, the residents of the residential complexes of Tehran are included. According to the importance of this sense in the promotion of residential environments quality, the sense of attachment to a place and the effective factors including body, activity, and perception were taken into consideration.

This study aims to assess the relationship between the sense of place attachment and physical characteristics of the communal spaces and promote the quality of the residential complexes. The communal spaces between the residential complexes connect residents to nature and outdoor spaces. Therefore, review and special attention to the collective space design are essential in many modern residential complexes. The sense of place attachment follows various dimensions of human life and form spectrums of perceptions. According to the available studies, the criteria that create a sense of place attachment in the communal space emerge from physical form, activity, and meaning dimensions. Accordingly, the three-dimensional pattern was extracted to assess the sense of place attachment. To test the theoretical pattern, three examples: row (Nevisandegan, Golha), scattered (Ferdows, Pas), and concentrated (Arian, Sarvestan), were selected and their sense of place attachment was derived from a questionnaire. Analysis of data resulted from field studies was based on the qualitative method. The results of this study emphasize the importance of physical characteristics with the highest correlation coefficient with attachment to a place. Accordingly, integrity and privacy had the largest effect and visual richness and legibility had the smallest effect on the creation of the sense of attachment to a place. According to the results of the descriptive findings, the largest mean (3.28) is related to privacy and the smallest mean (2.32) is related to various activities. Also, the mean of 3.70 is the largest mean for attachment of the residence of the Nevisandegan complex and mean of 3.06 is the smallest mean for the attachment of the residents of the Ferdows complex. Also, this study shows that the sense of place attachment increases by enhancing the physical quality and creating an environmental perception that ultimately leads to the formation of collective activities. Certainly, physical improvement of the communal space promotes the sense of attachment of residents and their quality of life.

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**HOW TO CITE THIS ARTICLE**

Rahimi, R., Ansari, M., Bemanian, M.R. & Mahdavinejad, M.J. (2020). Evaluation of the Effect of Physical Components on Place Attachment in Communal Spaces of Selected Residential Complexes in Tehran. *Bagh-e Nazar*, 17(83), 17-34.

DOI: 10.22034/bagh.2020.185425.4107

URL: : [http://www.bagh-sj.com/article\\_105722\\_en.html](http://www.bagh-sj.com/article_105722_en.html)

