

The Impact of Earthquakes on Survivors' Perceptual and Cognitive alterations in Residential Environment; Case Study: Bam Earthquake, 2003*

Saeedeh Asadi^a- Ali Sharghi^{b**} - Zoheir Mottaki^c

^a Ph.D. Candidate of Architecture, Faculty of Architecture and Urban Design, Shahid Rajaei Teacher Training University, Tehran, Iran.

^b Associate Professor of Architecture, Department of Architecture, Faculty of Architecture and Urban Design, Shahid Rajaei Teacher Training University, Tehran, Iran (Corresponding Author).

^c Assistant Professor of Reconstruction after Disaster, Department of Reconstruction after Disaster, Faculty of Architecture and Urban Planning, Shahid Beheshti University, Tehran, Iran.

Received 09 February 2020; Revised 19 May 2020; Accepted 26 May 2020; Available Online 22 September 2021

ABSTRACT

The sudden occurrence of an earthquake exposes the survivors with some inconsistencies in the post-disaster world, hence severely undermining the perceptual-cognitive structures and the assessment of the desired living environment. As such, the current study has sought to evaluate the views and attitudes of the earthquake-affected communities of Bam and Fahraj regarding the significance of different dimensions of housing and the reconstructed environment and compare them with control group, with similar social, cultural, economic, and environmental features. The authors employed a mixed method approach, and data were collected through interviews, ethnography, survey through questionnaires and hand sketches. The research participants were from Bam and Fahraj, while the Bazaar neighborhood of Kerman as the control group. Simple random sampling was used for the control group, while purposive sampling was used for target group. Based on the findings, the individual-interpersonal dimensions of housing and the reconstructed environment were deemed more important than the collective function of these units from the perspective of earthquake-affected communities. Furthermore, risk perception increased the importance of home safety and strength, while experiences of homelessness, living in emergency and temporary shelters, and reconstruction programs and policies lead people to cognitions in response to self-confident, self-concept protection, improving others perception of self (i.e., social dignity), and expression the distinction between self and others (i.e., personalization). Parameters such as taste-based housing design, privacy and territoriality, meanings, desired housing facade, and gratefulness towards housing have gained further significance. In contrast, in the perception of the surrounded world and the collective functioning of the residential environment, cognitive schemas were exposed to contradictions, leading to an imbalance between cognition of pre-earthquake and post-earthquake schemas, pointing to parameters such as neighborhood units, semi-public residential areas, landscapes, and maintenance were deemed less significant compared with the control group. In conclusion, in addition to the recovery of the individual-interpersonal scale, the improvement of the worldview is also of utmost importance in the housing and living environment reconstruction with the aim of collective recovery.

Keywords: The 2003 Bam Earthquake, Survivors Perceptual-Cognitive Structures, Reconstruction of Bam and Fahraj, Post-Disaster Housing and Living Environment.

* The present paper is taken from the PhD dissertation of the first author entitled "Principles of planning and environmental-physical designing based on the survivors socio-psychological recovery and healing in post-earthquake reconstruction" which is being conducted at Shahid Rajaei Teacher Training University under the supervision and consultation with second and third authors.

** E_mail: sharghi@sru.ac.ir

1. INTRODUCTION

Humans are confined and hence in constant interaction with their surrounded environment and house (Clapham, 2005, p. 38), and with time, and an increased sense of safety and comfort is shaped thereby. The occurrence of disasters such as earthquakes, often accompanied by far-reaching destructions, disrupts the usual routines of lives, exposing the survivors to vulnerabilities of the real world. These experiences upset the interpersonal relationships of survivors (Waldrep & Benight, 2015, p. 206), disturb their perceptions and assumptions about the world (O'Connor, 2002, p. 64), and change their cognitive schemas (Horowitz, 1990, p. 29). The destruction of houses and disturbances to the environment may change the home meanings (Carroll, Morbey, Araoz, & Balogh, 2009, p. 545), often arisen from the destruction of acquaintances, leading to changes in mental structures and evaluations. Experiences of settlement changes over time (Parva & Pour Rahimian, 2014, p. 432) confirm this claim. The contradictions that occurred in the perceptual-cognitive structure seem to be at the forefront of the related issues, for which less academic interest has been garnered. Although the effect of place on the experiential and physical aspects, life experiences, emotional and semantic associations, and recovery interventions (Macintyre, Ellaway, & Cummins, 2002, p. 129) has been extensively studied to extract its role in the housing provision (Sampson & Gifford, 2009; Lyon, 2014), owing to the existing complexities, post-disaster reconstruction has not witnessed practical success in creating place-based capacities and socio-psychological recovery (Ade Bilau, Witt, & Lill, 2018, p. 315). Thus, the need to change attitudes from physical reconstruction in response to emergency needs to long-term community recovery (Sadiqi, Coffey, & Trigunaryah, 2012, p. 294) in policies, strategies, and principles is of utmost significance in this realm. In recent decades, various aspects of post-disaster housing have been extensively regarding by researchers, and various scholars and policy-makers have expressed their growing concerns regarding its

effectiveness on community recovery (Johnson & Lizarralde, 2012; Barenstein, 2012; Wardak, Coffey, & Trigunaryah, 2013). On the other hand, complexity and uncertainties in the case of natural disasters lead research in this field to be of exploratory nature (Donner & Diaz, 2018), as there is no specific method and tool for alleviating such ambiguities. In this regard, Tapsell & Tunstall (2008) has sought to address the perceptual changes of habitants after floods in qualitative and phenomenological research. In another study, Carroll et al. (2009) employed a qualitative approach to examine the psychological and semantic effects of housing destruction after floods. Kamani-Fard et al. (2013) used a mixed quantitative and qualitative approach to the sense of place in the housing reconstruction (Kamani-Fard, Hamdan, Mohd, & Ossen, 2013). In line with the aforementioned research, the current study aims to explore the effect of earthquakes on the perceptual-cognitive process of individuals regarding housing as a collective and individual unit, the roots of changes, the effect of housing on recovery, and behavioral-mental health of survivors. To test the research hypotheses, a deductive-inductive process using a mixed-method has been chosen to achieve a more comprehensive level of insight, combining width and depth, exploration and validation in the process (Palinkas, 2003; Teddlie & Tashakkori, 2003). This study seeks to address the mental characteristics of traumatized communities regarding the perception of the living environment as one that exposes them risk perception, cognitive restructuring, and, ultimately, perceptions on the reconstructed houses. The studied communities were the residents of the Bazaar neighborhood of Bam city following the 2003 earthquake and Fahraj city after the 2003 and 2010 earthquakes. As such, the authors sought to respond to the following research questions:

1. Following the earthquake, which categories and indicators related to housing and the reconstructed environment have changed in significance in the views of the communities of Bam and Fahraj?
2. What areas of perceptual-cognitive structures do changes in the perspective of societies refer to?

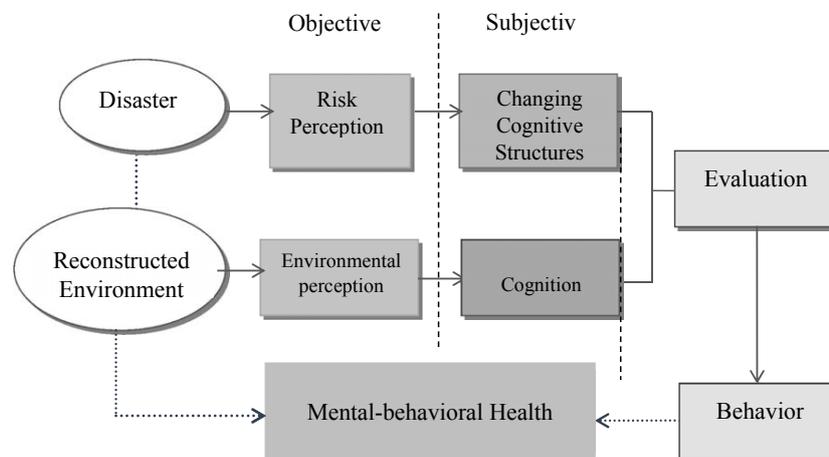


Fig. 1. Conceptual Framework of Research

2. RESEARCH METHOD

To quantify the desirability of the residential environment in the framework of the perceptual-cognitive system, a qualitative-quantitative mixed approach was selected based on the environmental experiences of the survivors. After literature content analysis, owing to the wide domain of indicators, the aforementioned study population was deemed to be the most applicable. Using ethnography and participatory observation five families in Bam were interviewed for one month. Unorganized data was collected in the form of notes and, where possible, audio recordings. Moreover, hand-drawn sketches were prepared from housing and natural-physical characteristics of the environment. Findings were analyzed and abstracted by content analysis, and a checklist of effective factors and components was revised and reduced. Other effective factors such as the number of floors (compliance with pre-disaster skyline) and housing design based on taste and needs were also considered. As such, from a total of 67 variables extracted from the texts, 35 indicators were selected in three factors and six categories. A Likert-scale questionnaire was devised to extract perceptual-cognitive perspectives in the study. The content validity of the items was examined by the inductive approach and the Delphi method. The number of panel members for the Delphi method was determined to be four people based on the Lawshe index (Faraji Khiavi, Gholipour, Dashtinejad and Mir, 2017, 492). Also, the pilot questionnaire was employed with 30 people, the adjusted of which was administered in the research population during two trips to Bam and Fahraj and one trip to Kerman. A control group was employed to compare the variances in the attitudes of the communities. The research communities include the traumatized community of Bam (Bazaar neighborhood) and Fahraj, while the control group was the residents of the Bazaar neighborhood of Kerman. The inclusion criteria for the control sample were (1) spatial and contextual affinity of Kerman, Bam, and Fahraj, and (2) The similarities of the cultural, economic, social, functional, and physical structure of the studied areas. The number of samples was determined to be 96 to 384 people using Cochran's formula for unknown confidence interval and width of the statistical population and with an acceptable error level between 0.1 to 50.0%, who were randomly selected in the control group, while purposive sampling was used for the target group. The target parameter for the purposive sampling was the history of earthquakes experiencing. Out of a total of 300 questionnaires distributed in each community, 117 questionnaires were returned from Kerman, 109 from Bam, and 114 from Fahraj, amassing a total return of 340 questionnaires out of 900. For data analysis, SPSS software, one-way analysis of variance, Friedman test, and mean were used.

3. RESEARCH

Natural disasters and the subsequent widespread destruction of houses and property, followed by the need for swift reconstruction, expose survivors to risk perception of such occurrences, and hence changes in the perceptual-cognitive mindset of individuals. Dialectical discussion of corresponding parameters is described in detail in the following section.

3.1. The Perception of Risk

This type of perception is related to attitudes and judgments of people regarding risk occurrence (Slovic, 2000), which is highly based on personal beliefs and assessments (Slovic & Weber, 2002, p. 3). Risk perception is rarely logic-based and rather a combination of cognitive skills, evaluation of evidence, and use of reasoning to draw and appraise risk (Harvard Mental Health Letter, 2011). Therefore, it is often discussed in the realm of cognitive psychology, and its development is strictly based on mental strategies for overcoming unfamiliar and unpleasant situations (Slovic, Peters, L. Finucane, & MacGregor, 2005, p. 37). Risk perception is a key component in many behavioral health doctrines and the goal of most interventions (Ferrer & Klein, 2015, p. 2). Thus, by influencing the attitudes and evaluations of the disaster-affected communities, it shapes human knowledge of the environment and housing and leading to the emergence of different attitudes.

One of the consequences of risk perception is the perception of vulnerability that leads to feelings of incapacitation in facing danger, loss of control, inability to prevent the outcomes or to protect oneself, and feeling incapable of controlling one's fate, in turn causing a long-standing fear of uncontrollable consequences and reduced levels of motivation (Navarro, 2017; Lacey, 1979). Such rather subjective assessment of one's ability to control the stressors emerges as lack of cognitive control (that is, risk perception) or lack of decision-making control (perception of the power of choice) in the environment (Bechtel & Churchman 2003; Gatersleben & Griffin, 2017). As a result, the perception of risk and vulnerability leads to the helplessness of the subjects, itself resulting in a decrease in the level of community-oriented participation and involvement in determining fate and place making.

3.2. Reconstruction of Housing and Environment

Approaches to the perception of place and home are extensively discussed in a wide range of literature (Moore, 2000; Manzo, 2003). This concept is mostly addressed under two categories, namely (1) place as a community, that people finds the sense of place in semantic associations, identity, and belonging, and place as a shelter, where people can attain sense of security and safety (Massey & Jess, 1995, p. 74). However, the concepts of shelter and post-housing

have complex connotations, as most definitions only refer to frameworks for getting back to accommodation for a permanent life (Chang, 2012, p. 16) or to everyday responsibilities and circumstances (Felix, Branco, & Feio, 2013, p.142). Notably, permanent post-disaster housing is often deemed beyond basic performance under normal circumstances and is hence rightfully assumed as a significant factor in the rehabilitation and mental and physical well-being of survivors (Da Silva, 2007, p. 56). This aspect of the reconstruction requires an unremitting process followed by several decades of efforts meticulously devised to return to normal conditions (Sadiqi, Coffey, & Trigunarsyah, 2012, p. 291). Nevertheless, the perceptual-cognitive changes of the survivors in the post-traumatic environment have been neglected in academic examinations of the corresponding processes.

3.3. Post-disaster Perceptual-cognitive Changes

Natural disasters alter the sense of place in the home (Tapsell & Tunstall, 2008; Carroll, Morbey, Araoz, Balogh, 2009; Sims, Medd, Mort, Twigger-Ross, 2009). As a result of these, rather swift, alterations, a sense of confusion and disorientation is shaped within the victims, leading to the destruction of the people-place relationship and a change in the notion of home, in turn causing negative health consequences (Harries, 2008). These changes lead to inconsistencies in collective cognition and normal behavior (Ache, 2018, p. 316). For this reason, recognizing the perceptions, environmental behavior, expectations and different assessments of the survivors of the living environment becomes of paramount importance.

3.4. Theoretical Framework

The solutions housing provides for many needs and expectations have been studied from a variety of perspectives and theoretical frameworks. Place assessment is a comprehensive, complex, and multidimensional task that combines cognitive, emotional, behavioral, and a variety of subjective and objective variables (Amerigo & Aragonés, 1990, p. 319). Therefore, the evaluation of the objective aspect

of the housing quality, one that is based on the physical-environmental features, often proves to be inefficient in evaluating and explaining the psychological aspects of perception and satisfaction, and hence there is a certain need to pay more attention to the mental dimension of perception, aspiration, and satisfaction (Mohit & Azim, 2012, p. 21). Residential housing should be able to address the concept of "quality" (Sinha Rajan, Sarkar, Ranjan, & Mandal, 2017, p. 339), commonly defined as a set of general and local characteristics of the environment that affect human beings, and of utmost significance in measuring the state of the environment concerning its needs and requirement (Johnson et al., 1997, pp. 581-589). This concept conveys the well-being and satisfaction of residents of physical, social, or symbolic characteristics (Marans, 2003, p. 75), hence widely based on differing views of people (Kurian & Thampuran, 2011, p. 76). Owing to the complexity of this topic, Adeleye et al. proposed a threefold framework for research, including:

- Perception of housing quality, as a process of gaining awareness regarding the environment through the organization and interpretation of the sensory information;
- Habitability, that is, the physical condition of housing in terms of structure, internal and external design, and the existence of basic utilities and conditions of the surrounding environment; and
- Desirability, the perception of residents regarding the houses and the immediate environment (Adeleye, Azeez, & Yusuff, 2014, p. 37).

The perceptions of residents provide important information about people's reactions to environmental issues, while environmental satisfaction is perceived to be impacted by preference and experience and is influenced by cognition (Ogu, 2002, p. 39). Therefore, to discover the latent relationships between dimensions/variables and factors/variables, a three-dimensional theoretical framework including habitually, perception of quality, and satisfaction, along with socio-cultural, economic, semantic, environmental, physical-spatial, and functional dimensions of the living environment was developed in this research (Table 1).

Table 1. Theoretical Framework of the Research

Categories	Variables	Dimensions	Researchers
Habitability	- Social relations and communication with neighborhood units	Sociocultural	(Dadashpour & Roshani, 2013; Barati & Kakavand, 2014; Akbarianfar, Hadiyani, & Heidari, 2016; Abedi & Karimi, 2015; PourDehghan et al., 2019; Dehghanpour & Miri, 2012; Kabiri, Fallahi, & Miri, 2011)
	- Happiness and vitality of neighborhoods	Sociocultural	
	- Social Security	Sociocultural	
	- Lack of aristocracy of neighbors	Sociocultural	
	- Collective living spaces such as living room	Physical-spatial	
	- Flexibility	Functional	
	- Facilities and infrastructures	Functional	
	- Proportion and design of private and public territories (privacy)	Functional	

Categories	Variables	Dimensions	Researchers
Satisfaction	- Size of plots	Physical-spatial	(New Zealand, 2015; Kurian & Thampuran, 2011; Sinha et al., 2017; Ramirez, Sanchez, & Vegas, 2018; Parva, Dola, & Pour Rahimian, 2014; TaG, TaG, & AydJn, 2014; Tas & Tas, 2014)
	- Housing infrastructure	Physical-spatial	
	- number of rooms	Physical-spatial	
	- Yard or terrace	Physical-spatial	
	- The appropriate area of spaces	Physical-spatial	
	- Housing materials and structures	Physical-spatial	
	- Proper collection of sewage and waste	Environmental	
	- Convenient service in the neighborhood	Environmental	
	- Health and hygiene of the living environment	Environmental	
	- Safety and strength against accidents and hazards	Functional	
	- housing design according to the survivors tastes	Semantic	
	- Maintaining the dignity and social status of the reconstructed housing through housing and housing location	Sociocultural	
	- Loving the living environment	Semantic	
	- desirable housing facade	Physical-spatial	
	- Using appropriate cultural forms and symbols	Sociocultural	
	- Number of floors of the house (skyline)	Physical-spatial	
	Perception of Quality	- Easy access to different parts of the city	
- House maintenance and repair costs		Economical	
- Willingness to live in a neighborhood with the economic level of neighborhood units (unwillingness to relocation)		Economical	
- Preventing noise		Environmental	
- Privacy at home		Physical-spatial	
- View from home to outdoor/green spaces		Functional	
- Thermal comfort in the living space		Functional	
- Optimal home lighting		Physical-spatial	
- The desire to repair and renovate the house		Economical	
- The meaning of home		Semantic	
- Sense of calm	Semantic		

3.5. Findings

Regarding the first research question, various tests and statistical analysis methods were employed to increase the accuracy of the findings. First, significant differences between physical-spatial, functional, social-cultural, environmental, economic, and semantic dimensions were compared with those of the control group, and significant differences were extracted using various statistical tests. Then, the average of dimensions was determined in comparison with the control group, after which they were ranked according

to the perspective of the research and control group. In the second stage, significant differences between the studied indicators in the three domains of perception of quality, satisfaction, and habitability of the housing and the reconstructed environment, and the control group were examined and significant differences between the factors were extracted based on the mean classification. To this end, one-way analysis of variance, Friedman test and mean rank were used to identify significant differences between the importance of housing and living environment, and those of the control group, the results of which are presented in Tables 2 to 4.

Table 2. One-Way Analysis of Variance in the Control and the Research Groups

		Sum of Squares	DF	Mean of Square	F	Sig.
Physical-spatial	Intergroup	528.118	2	528.118	7.519	.007
	Intragroup	9762.989	337	70.237		
	Total	10291.106	339			

		Sum of Squares	DF	Mean of Square	F	Sig.
Functional	Intergroup	61.036	2	61.036	4.867	.029
	Intragroup	1743.276	337	12.542		
	Total	1804.312	339			
Economical	Intergroup	25.285	2	25.285	6.131	.014
	Intragroup	573.268	337	4.124		
	Total	598.553	339			

According to Table 2, the physical-spatial, functional and economic dimensions of housing and living environment have an error level of less than 0.05. Therefore, it can be concluded that there is a significant difference between the research and control groups in physical-spatial, functional, and economic dimensions. The mentioned dimensions in Bam and Fahraj groups have a higher average than those of the control group. Experiences of natural disasters, damages, and loss of tangible and intangible resources, drastic changes

in the individual and collective environment, and damages have led to the increased significance of these dimensions of housing and living environment in assessing the factors of habitability, satisfaction, and perception of the quality of reconstructed housing. Friedman's test was used to evaluate the research indicators. First, the ranking of variables in each group was examined and then their average ranking was discussed (Table 3).

Table 3. Friedman Test for Ranking Research Variables

	Target Group	Control Group
Frequency	223	117
Chi-square	116.078	84.350
DF	5	5
Significance Level	0.000	0.00

According to Table 3, there is a significant difference between the ranking of variables in the two groups of research and control group at a significance level of

less than 0.05. Table 4 presents the average ranking of groups.

Table 4. Average Rank of Dimensions

	Average Rank	Average Rank
Sociocultural	3.15	4.47
Functional	4.67	4.41
Physical-Spatial	4.59	4.01
Environmental	3.48	3.63
Economic	2.60	2.64
Semantic	2.51	1.83
Groups	Research	Control

According to the aforementioned table, in the target group, functional, physical-spatial, sociocultural, environmental, economic, and semantic dimensions are respectively ranked in importance, while in the control group, socio-cultural, functional, physical-spatial, environmental, economic, and semantic dimensions are respectively ranked in importance. It can be concluded that in disaster-affected communities, the importance of the individual and family aspects of housing and the living environment is greater than that of the collective aspect, hence confirming the claim that "survivors prioritize the use of resources for themselves and physical reconstruction, and this often

delays the reconstruction and recovery of 'social life'". (Kaniasty & Norris, 1993, pp. 403-405; Norris, K Baker, Murphy, & Kaniasty, 2005, pp. 23-25), as owing to the ensuing destructions and socio-psychological damages, the residents of the neighborhoods suffer from a decline in place attachments and as a result, the perceptual boundaries of the neighborhood units are diminished (Nejat, 2017, p. 233). Another finding is the significance of the semantic aspect of the living environment according to the traumatized community, which has a higher average than the control group. The experience of seeing one's house demolished as a result of the disaster and its ensuing reconstruction

has increased the significance of the semantic aspect of housing and the concept of living and comfort in the home.

In the second stage, the indicators were studied under three categories of perception of quality, habitability, and satisfaction of the reconstructed housing, and significant differences were compared with those of

the control group. Friedman test (Table 5) was used for statistical analysis, and then the mean of each item was calculated (Figs. 2, 3, & 4). According to the analysis, there is a significant difference between the ranking of items in the target group and the control group at a significance level of less than 0.05.

Table 5. Friedman Test to Rank the Items of the Research and Control Group

	Target Group	Control Group
Frequency	223	117
Chi-square	778.618	378.456
DF	35	35
Significance Level	0.000	0.000

To describe the significant aspects, the mean classification of each variable in the research and control groups were calculated and plotted using comparative diagrams.

A) Perception of quality: According to the comparative diagram, the importance of desirable living environment indicators related to the perception of quality exhibit significant differences in some places that have made the slope and movement of paths rather inconsistent (Fig. 2). The experience of homelessness and temporary shelter has further highlighted the concept of privacy, that is, the need for private spaces in housing. On the other hand, the tendency to repair and renovate housing has decreased in the disaster-affected group. According to qualitative findings, fear of the

demolition of the house is one of the most powerful mindsets in these communities. Moreover, findings indicate that creating a mindset of reliance on others and not trying to empower after the policies adopted in the reconstruction of housing after the earthquake has caused the learned helplessness. Furthermore, there is a difference in the internal dimensions of the perception of quality versus the external dimensions. According to the means, the importance of internal to external communication factors and living environment has decreased in earthquake-stricken communities. That is, the dialectic of the interior and exterior of the house suffers from a disruption, namely, the reduction of the importance of light entering the house, and the view of the semi-public or public spaces related to housing.

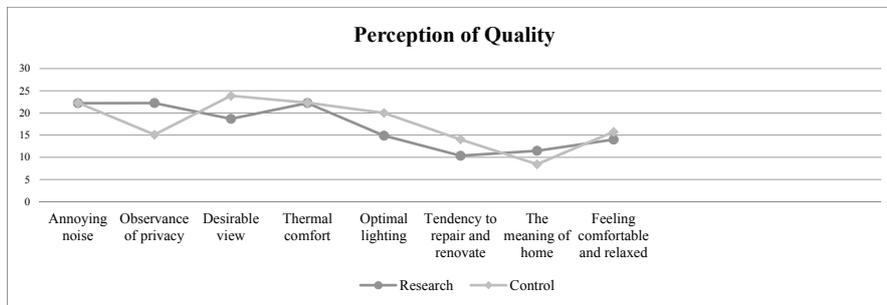


Fig. 2. Average Ranking of Indicators of Perception of Housing Quality

B) Habitability: According to the average scores presented in Figure 3, compared to the perception of quality, in the indicators related to habitability, there is more consistency and similarity between the research and control groups, indicating the relative return of these communities to normal living conditions and the fulfillment of basic living needs in reconstructed housing. The most significant difference in these indicators is the decrease in the desire for relationships with neighbors, which is perceived to be in contrast to the need or importance of happiness and vitality of the neighborhood. This contradiction implies the lack of

optimal recovery and reconstruction of neighborhood units, increased density of neighborhood units in reconstruction programs, and altered physical-social perspective of neighborhoods. On the other hand, the importance of distinguishing privacy and public and private realms of housing has increased, while the need for a having yard has decreased. In contrast, the experience of extensive damage after the earthquake has made the need for safety and resilience of housing in the face of disasters extremely important.

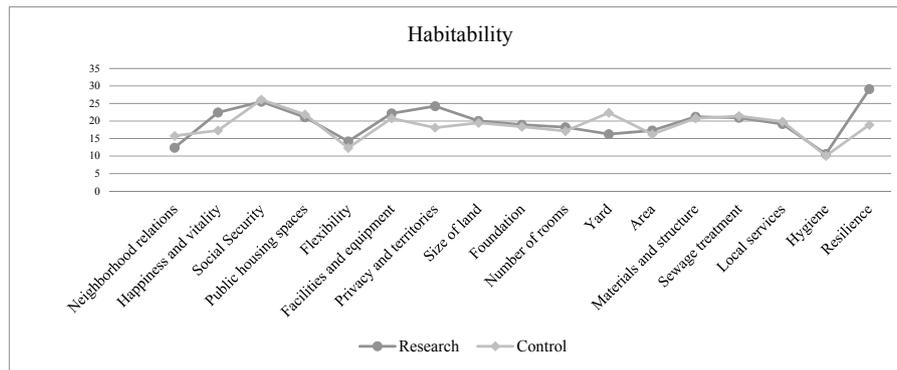


Fig. 3. Average Ranking of Indicators of Habitability

C) satisfaction: Based on Figure 4, it was found that, owing to severe and widespread psychological, environmental and cognitive disarray in the interval between the past and present in the lives of post-earthquake survivors, lack of participation in design, limited design options, and the construction of housing, followed by the initial similarity of the reconstructed housing has led to the increased importance of housing design indicators according to individual taste, fondness of house and the view of the house being consistent with the dignity of the family, differentiate between oneself and others and personalize the space. Furthermore, the disaster-stricken community also insisted on the importance of a low number of floors or the

preservation of the pre-disaster skyline as an important indicator of proper housing. For reasons such as the economic benefit of the household or the requirements of reconstruction plans, the increase in the density of housing units led to changes in the skyline, which was in contradiction to the basic will of the residents. In terms of desirability, the cost-effectiveness of housing was perceived to be important by the disaster-stricken communities. Qualitative findings further indicate that changes in the structure, materials, and design of post-construction housing have led to higher costs of repair and development of housing, which is reflected in the evaluation of desirable housing.

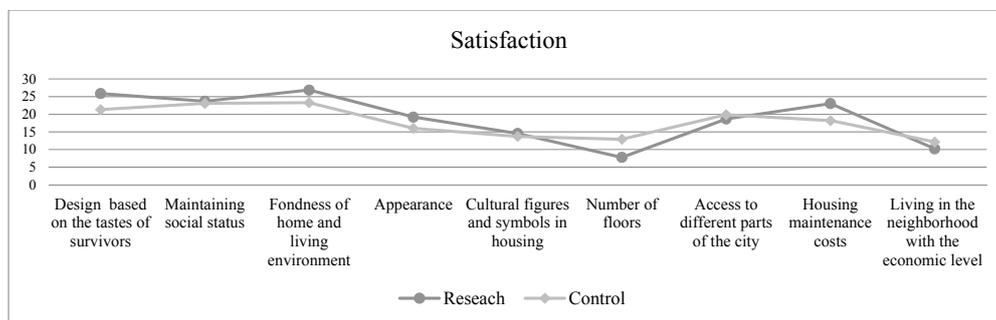


Fig. 4. Average Ranking of Satisfaction Indicators

Regarding the second research question, it should be stated that, based on the analysis, the functional and physical-spatial dimensions and indicators related to housing, which are limited to the residential unit and meeting the needs of the individual and family and are separate from the environment and collective space, are of the highest importance according to the community. As such, indicators of privacy, territories, safety, and strength, foundation, number of rooms, materials and structures, thermal comfort, and landscape and skyline are the most significant factors of the aforementioned area. In social-cultural and environmental dimensions, indicators of social security, lack of intrusion by the neighborhood, and proper access to different parts of the city have been evaluated as of higher value. In the second dimension of factor-variable relations, in the factors of perception of quality, habitability,

and satisfaction, variables of privacy, territories, the meaning of house, taste-based housing design, home fondness, view, maintenance costs, safety, and strength were deemed more important than the control group, while willingness to maintain the house, floors, communication with neighbors and the presence of the yard were appraised as less important.

Based on findings, it can be concluded that:

A) At the individual level and earthquake risk perception, life-threatening events, and physical destruction has increased the significance of safety and strength of the house against earthquakes;

B) At the individual-interpersonal level, the result of homelessness, living in emergency and temporary shelter, and reconstructed housing from the perspective of quality perception, habitability, and satisfaction suggest the importance of taste-based housing design,

home fondness, protection of territories, privacy, and meaning of home, which in the realm of perceptual-cognitive change, they have arisen from the need for self-belief and the preservation or revival of one's self-concept;

C) Indicators of the satisfactory appearance of the house and the vitality of the living environment imply how the affected communities regard the attitude of

others towards them;

D) non-significance of variables related to neighborhood units, light, favorable view of the outside space, and the tendency to maintain housing suggest the contradiction in cognitive schemas or imbalance between cognition and mental views of self, home, landscape, and the outside world.

A summary is provided in Figure 5.

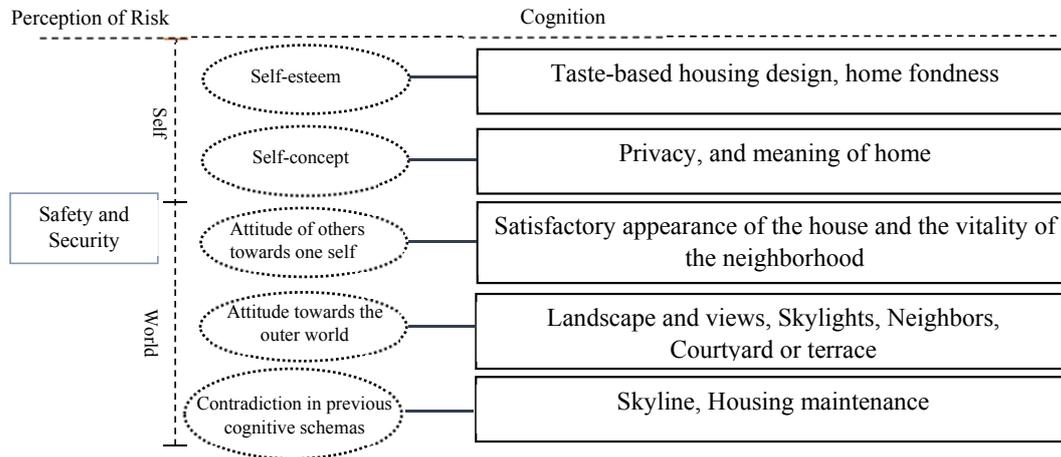


Fig. 5. Perceptual-Cognitive Structures

4. CONCLUSION

The sudden occurrence of earthquakes and other traumatizing experiences often exposes survivors to a plethora of vulnerabilities, alienates them from previous knowledge, and disturbs their attitudes regarding the significance of different aspects of housing and changes inflicted on the normal flow of life. The research hypothesis, that is, the eradication of the familiar sense of place and alteration in the perceptual-cognitive structures of housing and the desired environment was subjected to test. Findings suggest (1) the heightened importance of safety and strength of the reconstructed house owing to the perception of risk, a threat to life and destruction, and (2) the impact of experiences of homelessness and living in a post-disaster temporary housing on the protection of territory and privacy. Furthermore, housing reconstruction policies such as poor community participation in housing design, construction process, and financial support in housing construction or repair, along with selected values and agendas in designing and building houses and neighborhoods at the individual-interpersonal level have left people in the quest for a sense of self-confidence, self-protection, and self-concept. Consequently, the significance of housing design according to taste

owing to the capacity to create differentiation and personalization, in contrast to the contradictions of not wanting to renovate and repair housing, further highlighted the importance of cost-effectiveness in constructions. The limitations in the options for housing construction and, hence, lack of consistent-looking housing, have led to the importance of desirable facade indicators, the vitality of the neighborhood to improve perceptions of others regarding themselves, and the expression of the distinction between self and other through social dignity. In the dimension of cognition of the surrounding environment and the collective functioning of the living environment, the lack of importance of variables related to neighborhood units, light and landscape, and unwillingness to maintain the house, all suggest a conflict in cognitive schemas and/or disproportion in cognition and mental views of self, home, and environment of the pre-and post-earthquake world. Overall, considering the cognitive changes, and hence the inconsistencies, that have occurred for survivors, the planning and principles of housing and living space reconstruction should not be limited to the home as the only actual source of the healing, as the socio-cultural and environmental aspects should also be subject to meticulousness and delicacy.

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HOW TO CITE THIS ARTICLE

Asadi, S., Sharghi, A., & Mottaki, Z. (2021). The Impact of Earthquakes on Survivors' Perceptual and Cognitive alterations in Residential Environment; Case Study: Bam Earthquake, 2003. *Armanshahr Architecture & Urban Development Journal*. 14(35), 11-22.

DOI: 10.22034/AAUD.2020.219197.2122

URL: http://www.armanshahrjournal.com/article_135468.html



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