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THE RELATIONSHIP BETWEEN URBAN ENVIRONMENTAL QUALITY AND MENTAL HEALTH (DEPRESSION SCALE): EVIDENCE FROM IRAN

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Abstract: According to the recent studies, there are wide range of psychological disorders in developed and developing countries with different levels of economic conditions. One of the most important psychological disorders and pressures is depression. An issue that has been neglected so far is impact of urban environmental quality on psychological health. Housing in this physical environment plays a very important role in psychological health indexes such as depression. The main purpose of this research is to investigate the relationship between qualitative indexes of housing and depression with a case study of at MoftAbad and Mardavij neighborhoods in Isfahan. Pearson correlation coefficient and linear regression have been used for data analysis. Independent variables of study include qualitative variables of housing that have been studied in accordance with literature in both internal and external dimensions. Dependent variable of study is depression. Depression Inventory Questionnaire of Beck *et al.* (1996) with 21 questions, used to measure depression. Results showed that variables such as interior design, indoor greenbelt, natural received light, natural ventilation, and plant diversity, walking possibility, quality of public spaces, and environmental cleanliness and security have most impact on level of depression of residents in urban neighborhoods.

Keywords: Housing Quality, Urban Environmental, Mental Health, Depression

INTRODUCTION

Urban population of the world has increased considerably during twentieth century, especially after 1950 (Sha & Tian, 2010). According to UN report, more than half of world's population lived in urban areas during late 2008 (Chen *et al.*, 2013). Cities are growing in population and size; and this expansion is a common urban challenge (Zali *et al.*, 2016). One of main concerns of humankind in this age with growing urban population is improving quality of life (Agarwal *et al.*, 2007: 121). In this framework, improving health and reducing mental disorders is one of the main components of quality of life. Evidences suggest that urban growth is accompanied by increased psychological disturbances. The reason is that moving people to urban areas needs more facilities that need to be made available and infrastructures to grow. However, this does not materialize in comparison with increase in population (Srivastava, 2009; Li & Liu, 2018). Thus, increasing urbanization affects citizens' health. On other hand, nowadays, mental disorder is introduced, not only as one aspect of public health, but as part of socio-economic issues (Chong *et al.*, 2017). Therefore, psychological health is important to study regarding both for quality of life and socio-economic aspects. Hence, in this research, the main issue is psychological health and depression of citizens. Depression is one of the most important psychological disorders. It is a major issue in world nowadays (Ram *et al.*, 2017). With prevalence of depression in today's urban communities, it has turned into an ordinary matter. However, depression is important and serious, and affecting factors should be evaluated (Carmody, 2005). Different social, economic, personal, and environmental variable parameters are effective in context of depression prevalence (Saarloos *et al.*, 2011). Previous studies have examined the subject from a personality, social, and economic aspects. However, some studies have emphasized impact of physical environment on depression. (Ho *et al.*, 2017). If we accept that quality of built environment affects psychological health, housing plays a very important role in psychological health indexes in this physical environment (Evans *et al.*, 2000). In fact, housing conditions are crucial to quality of life, health, and well-being (Lawrence, 2006: 540). Despite the fact that people spend a lot of money on housing comparing to other things, research on housing and psychological health is not substantially developed (Evans *et al.*, 2003).

Housing is the main part of built environment that affects people's health and well-being (Campagna, 2016). In other words, housing is one of main components of built environment that affects internal and external aspects of humans' mental health (Howden-Chapman, 2004).

Table 1. Qualitative index of housing and residential environment in previous researches.

Title	Studied Indexes	Resource
Urban environment quality indexes	Population density of neighborhood / Water Quality / Infrastructure Services / Garbage Collection system / Drainage / Sewage Systems / Asphalt and Passage Coverage / Public Transportation / Trees & plants / Cleanness & Hygiene / Air Quality / Public spaces / Health Services / Bookstores / Cultural Spaces / Security / Access to Educational Services.	Sarmento *et al*., 2000
Living Quality and Sustainable Urban Development	Quality of residential units / Independence from automobiles / Safety feeling / Quality of public spaces / Beauty of buildings / Greenbelts.	Kowaltowski *et al*., 2006
Physical Quality of Housing and Neighborhood: Children's psychological Health	Construction materials / order / environmental hygiene / privacy / hierarchy of passage network / spatial integration / activity diversity / building density / population density / possibility for walking / connection with nature / amenities	Rollings *et al*., 2017
Evaluation of relationship between types of housing and satisfaction from habitat environment in Tabriz	Access to the work environment / Access to shopping centers / Access to training centers / Access to public transport / Access to health services / Quality of passageways / Environmental safety / Neighborhood relationship.	Azimi & Esmaeilzadeh, 2017
Housing, stress, and psychological health among immigrants in China's cities	Type of housing / housing costs / number of rooms in residential units / internal residential facilities / housing per capita / noise pollution / neighborhood security / per capita services / access to commercial stores / access to health services / access to schools / amenities / quality of passageways network / Street Lighting	Li & liu, 2018

About internal and external quality assessment of housing, researchers have studied various indicators. Here are some of these indicators, which are basis for selecting independent variables of present study, gathered by the authors.

Various social, economic and environmental factors are influential in the health of humans (Rollings *et al.*, 2017). Evans *et al.* (2001), by comparing the health of urban and rural children, concluded that there is a significant correlation between number of rooms available for household and children's psychological health. They also claimed that in both studied groups, children living in high density housing had less ability to decide and solve problems Evans *et al.* (2002), in their study of small Austrian cities, concluded that there was a significant relationship between residential density children's psychological health. They acknowledge that children living in residential complexes always have a lower level of psychological health than children living in single-family homes.

In a study in New York City, Leventhal & Brooks-Gunn (2003) concluded that migration from high-quality neighborhoods and housings to suburban and low quality neighborhoods creates more anxiety and depression for individuals. Hood (2005) pointed out that Environmental Health Science has broadened its research scope. In fact, nowadays, only impact of environmental pollutants on mental and physical health of humans is not important, but influence of different aspects of built environment, such as work environment, games, and stores, should also be evaluated on health indexes. Ochodo *et al.* (2014) examined physical properties of residential neighborhoods in Kenya, in alignment with health indexes for 544 citizens. Results of this study showed that factors such as vegetation, density of residential units, street lighting, and housing quality affect psychological health of men and women. Gong *et al.* (2016) concluded that access to greenbelt, applications' mixture, traffic, industrial activities, and access to suitable housing is significantly correlated with psychological health. Ho *et al.* (2017) examined relationship between environmental factors and depression in elderly people in Hong Kong. Results of mentioned study showed that there are more depressions among elderly people in neighborhoods where massive physical changes have occurred and the height and density of buildings are high. Xiao *et al.* (2018) acknowledged in study of Chinese cities that conditions of the neighborhood and housing directly affect psychological health of indigenous peoples, and also housing conditions and living environment indirectly affect psychological health of immigrants indirectly through satisfaction from neighborhood.

In general, one could say that urban housings, due to their different qualities, can increase or decrease psychological disturbance, and it can be said that low-quality housing increases psychological disorders (Harvey, 2001). With this approach, the main objective of this study is to investigate the relationship between qualitative housing indexes and citizens' depression rate in a case study for MoftAbad and Mardavij neighbourhoods in Isfahan, Iran.

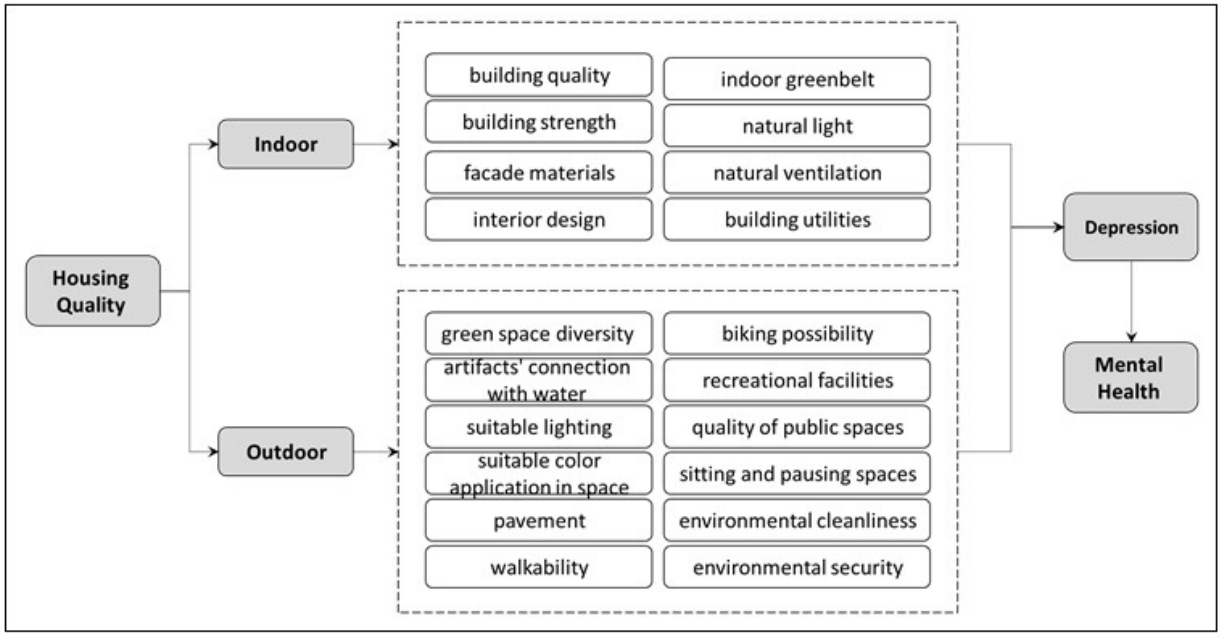

Fig. 1 Conceptual framework.

RESEARCH METHOD

The main purpose of this research is to investigate the relationship between housing qualitative indexes and rate of depression among citizens in Isfahan metropolitan. Based on this, descriptive-analytic research methodology as well as Pearson correlation coefficient and linear regression methods are used.

For this study, eight Variables in internal aspect of housing (building quality, building strength, facade materials, interior design, indoor greenbelt, natural light, natural ventilation, and building utilities) and 12 Variables of external aspect of housing (green space diversity , Built Environment connection with water, suitable lighting, suitable colour application in space, pavement, walking possibility, biking possibility, recreational facilities, quality of public spaces, sitting and pausing spaces, environmental cleanliness, and environmental security) were selected. After selection these Variables, housing quality questionnaire was adjusted. In the next step, respondents were asked to evaluate quality of their housing and residential environment with a score from 0 to 4.

The dependent variable of this research is the degree of depression of residents of neighbourhoods. Second modification of Beck *et al*. (1996) Depression Inventory Questionnaire was used to measure rate of depression in residents of neighbourhoods. In this questionnaire, respondents were asked to consider their feelings in the last two weeks and answer questions. The questionnaire is designed to measure the severity of depression in adults and adolescents of older than 13 years old with 21 questions. Scale of scoring Depression is from 0 to 3.

Participant or statistical population of this research is the number of households living in neighbourhoods of Mardavij and MoftAbad. 250 questionnaires were distributed in each of these neighbourhoods. Finally, in MoftAbad neighbourhood, 203 and in Mardavij, 231 questionnaires were completed and error-free questionnaires were gathered.

RESULT

Descriptive Statistics of participants

At first part of research, socio-economic characteristics of respondents are described. These variables include gender, age, and education, duration of residence in neighbourhood, occupation, and household income. According to findings, 86 males and 117 females completed the questionnaires in MoftAbad neighbourhood. 118 males and 113 females responded to the questionnaires in the district of Mardavij. In total, 47.1% of the sample are male and 59.2% are female. In MoftAbad neighbourhood, major age group is between 30 and 39 in Mardavij district it is over 50. In the MoftAbad neighbourhood, literacy is lower compared to Mardavij. In fact, over 80% of respondents in MoftAbad do not have university education. In contrast, in Mardavij, over 80% have university education.

Based on results, duration of residence in MoftAbad neighbourhood is more than of Mardavij. This is due to the fact that MoftAbad district has a longer history of formation comparing to Mardavij. Survey results indicate that in MoftAbad most people live with low-income levels. However, in Mardavij area, 72% of respondents have a high-income level. Regarding type of occupation, in MoftAbad, people are mostly householders and workers who filled questionnaire. In Mardavij, most people are freelancers (**Table 2**).

Descriptive Statistics of independent and Dependent Variables

In the following, descriptive statistics of independent and dependent variables are explained. Based on findings, in MoftAbad, indexes mostly scored less than two. At indoor environment, indoor greenbelt index with a score of 1.9 is the best condition and index of natural light received in buildings with an average score of 1.42 is in eighth place. Overall, quality of interior environment in MoftAbad is 1.7. In outer environment, the highest average belongs to green space diversity index with a score of 1.45. The lowest mean belongs to index of sitting and pausing space with an average score of 1.09. In total, average score for quality of the external environment in the MoftAbad neighbourhood is estimated 1.24.

Regarding Mardavij, according to findings, quality of interior and external environment is much higher than of MoftAbad for which for interior minimum and maximum average score belong to greenbelt of building and natural ventilation, respectively. Average score for quality of interior environment in Mardavij is estimated 3.16. For external environment, suitable lighting with and average score of 3.38 is better than other indexes. In addition, use of appropriate color in space index has lowest average score of 2.9. In total, average score for quality of the external environment in Mardavij is estimated 3.5. Depression is also evaluated as a dependent variable in the research using Beck *et al.* Depression questionnaires. Results showed that in the average of this index is 2.06 and 0.98 in MoftAbad and Mardavij, respectively (**Table 3**).

Correlation coefficients for the housing quality and Depression

Correlation coefficient is used to examine relationship between two variables. Results of studies indicate that in the studied neighbourhoods as well as in whole statistical sample, all independent variables have a significant and inverse correlation with the dependent variable, i.e. depression. That is, improving status of each of the quality indexes of housing will reduce depression. Based on **Table 3** that is extracted from SPSS, in the studied neighbourhoods, between interior environment indexes, received natural light has most significant correlation with depression. Finally, quality of interior environment in MoftAbad and Mardavij has a significant relationship with depression with an intensity of -0.576 and -0.631, respectively. Among the external environment indexes, green space diversity in MoftAbad and environmental security in the Mardavij district have the highest correlation intensity with dependent variable. Ultimately, correlation of quality of external environment with depression in the MoftAbad and Mardavij neighbourhoods is -0.428 and -0.623, respectively (**Table 4**).

Table 2. Sample distribution based on socio-demographic factors.

Variables		MoftAbad (n=203)		Mardavij (n=231)		Full sample (n=434)	
		frequency	percentage	frequency	percentage	frequency	percentage
Gender	male	86	42.4	118	51.1	204	47.1
	female	117	57.6	113	48.9	230	52.9
Age	20-29	45	22.2	57	24.7	102	23.5
	30-39	62	30.5	46	19.9	108	24.88
	40-49	52	25.6	57	24.7	109	25.12
	50 years and older	44	21.7	71	30.7	115	26.5
Education	Below high school	86	42.4	0	0	86	19.82
	High school diploma	79	38.9	26	11.3	105	24.19
	Bachelor degree	38	18.7	142	61.5	180	41.47
	Master degree and up	0	0	63	27.3	63	14.52
Duration of residence in the neighborhood	1-5 years	47	23.2	113	48.9	160	36.87
	6-10 years	51	25.1	64	27.7	115	26.5
	7 years and more	105	51.7	54	23.4	159	36.64
Family Income Level	Low	140	69	0	0	140	32.26
	Medium	57	28.1	65	28.1	122	28.11
	High	6	3	166	71.9	172	39.63
Occupation	Unemployed	26	12.8	1	0.4	27	6.2
	Housekeeper	80	39.4	64	27.7	144	33.2
	Worker	61	30	0	0	61	14.1
	Student	8	3.9	23	10	31	7.1
	Retired	8	3.9	43	18.6	51	11.8
	Self-employed	14	6.9	70	30.3	84	19.4
	Government employee	6	3	30	13	36	8.3

Table 3. Average score of dependent and independent variables.

	Variables	MoftAbad Neighborhood n= 203	Mardavij Neighborhood n= 231	Full sample n=434
Indoor variables	building quality	1.81	3.20	2.55
	building strength	1.78	3.12	2.49
	facade materials	1.77	3.15	2.5
	interior design	1.73	3.14	2.48
	indoor greenbelt	1.90	3.35	2.67
	natural light	1.42	3.13	2.33
	natural ventilation	1.50	3.03	2.32
	building utilities	1.69	3.19	2.49
	Indoor Quality	1.70	3.16	2.48
Outdoor variables	green space diversity	1.45	3.22	2.39
	Built Environment connection with water	1.32	2.97	2.20
	suitable lighting	1.37	3.38	2.44
	suitable color application in space	1.24	2.90	2.13
	pavement	1.22	3.27	2.31
	walkability	1.30	3.23	2.33
	biking possibility	1.28	2.95	2.17
	recreational facilities	1.18	3.29	2.30
	quality of public spaces	1.15	3.32	2.30
	sitting and pausing spaces	1.09	3.25	2.24
	environmental cleanliness	1.14	2.99	2.12
	environmental security	1.20	3.05	2.18
	Outdoor Quality	1.24	3.15	2.25
Dependent variable	Depression	2.06	0.98	1.49

Modelling Depression Changes Based on Housing Qualitative Indexes

In this stage, to determine which of the independent variables is more effective in depression, linear regression model is used. Depression modeling is done based on qualitative indexes of housing. In the proposed models in linear regression method, predictive variables are determined for dependent variable. We first outline components of the model. The F statistics, derived from the ANOVA analysis, statistically examines model's validity. Detection of this issue with significance of this statistic is possible at an error level smaller than or greater than 0.05. In fact, a significance level of less than 0.05 means that the model is acceptable. Since ANOVA analysis is a useful test for ability of the model to explain effect of each independent variable on dependent variable, it does not directly concern the intensity of relationship. Another component of the proposed model is adjusted coefficient of determination. Value of this coefficient is between zero and one. The higher this coefficient is it means that independent variables can explain large amounts of variance of dependent variable more. In proposed models, standardized regression coefficient (Beta) is used to determine contribution of independent variables. In this context, the higher the beta coefficient of a variable, its role to predict variation of dependent variable will be more.

According to **Table 5**, in the proposed model for MoftAbad, variable of green space diversity with a standard coefficient of -0.411 has most effect on resident's depression. In this neighborhood, environmental security accounts for up to 36.5% of depression changes. Furthermore, interior design and natural ventilation variables also affect depression amount in individuals.

For Mardavij, according to proposed models, green space diversity index with a coefficient of -0.623 has the most effect on depression. In addition, recreational facilities and walking possibility predict 62% and 54% of the depression changes in the neighborhood, respectively. In Mardavij, environmental security, natural ventilation,

Table 4. Correlation coefficients for the housing quality variables and Depression.

Variables	MoftAbad Neighborhood n= 203		Mardavij Neighborhood n= 231		Full sample n=434	
	sig	r	sig	r	sig	r
building quality	0.000	-0.434	0.000	-0.411	0.000	-0.698
building strength	0.000	-0.511	0.000	-0.359	0.000	-0.589
facade materials	0.000	-0.356	0.000	-0.423	0.000	-0.566
interior design	0.000	-0.556	0.000	-0.528	0.000	-0.621
indoor greenbelt	0.000	-0.548	0.000	-0.563	0.000	-0.601
natural light	0.000	-0.558	0.000	-0.611	0.000	-0.711
natural ventilation	0.000	-0.458	0.000	-0.596	0.000	-0.687
building utilities	0.000	-0.421	0.000	-0.298	0.000	-0.411
Indoor Quality	0.000	-0.576	0.000	-0.631	0.000	-0.655
green space diversity	0.000	-0.544	0.000	-0.544	0.000	-0.611
Built Environment connection with water	0.000	-0.425	0.000	-0.539	0.000	-0.532
suitable lighting	0.000	-0.469	0.000	-0.566	0.000	-0.698
suitable color application in space	0.000	-0.420	0.000	-0.651	0.000	-0.589
pavement	0.000	-0.369	0.000	-0.449	0.000	-0.621
walkability	0.000	-0.463	0.000	-0.685	0.000	-0.613
biking possibility	0.000	-0.452	0.000	-0.568	0.000	-0.598
recreational facilities	0.000	-0.442	0.000	-0.616	0.000	-0.701
quality of public spaces	0.000	-0.359	0.000	-0.518	0.000	-0.632
sitting and pausing spaces	0.000	-0.298	0.000	-0.531	0.000	-0.628
environmental cleanliness	0.000	-0.534	0.000	-0.683	0.000	-0.674
environmental security	0.000	-0.521	0.000	-0.745	0.000	-0.634
Outdoor Quality	0.000	-0.428	0.000	-0.623	0.000	-0.654
Depended Variable: Depression						

facade materials, and indoor greenbelt indexes also affect depression extent. Finally, in proposed model for the statistical sample of research, green space diversity and environmental cleanliness indices predict 54% and 51% of depression changes, respectively. In addition, in statistical sample, environmental security, environmental cleanliness, natural received light, natural ventilation, and interior green indexes are also predictors of the variables.

DISCUSSION

Results of this study are in agreement with previous studies and showed that physical environment and its components, such as the quality of housing, have an undeniable effect on mental health indexes. Hence, one should say that physical environment has a psychological dimension. In this context, quality of urban housing, due to the fact that people spend most of their time in it, can increase or decrease psychological disorders. Therefore, it can be argued that in new urban development only the increase in the number of residential units is not important. But, planning and design of houses should be done while paying attention to the fact that housing is a place where people spend most of their time. Therefore, it should be designed in such a way that it does not have any negative effects on human spirits. Meanwhile, it must improve residents' mental health.

Discussion and analysis of results, indicate that quality of built environment consists of exterior and interior spaces has meaningful correlation with depression. But, at current situation, urban planners and scholars do not consider physical and mental health issues in their plans and designs. On other hand, psychologists also pay less attention to environmental issues and urban planning for treatment of disorders. However, integration of psychological and hygiene considerations with environmental and housing indexes has a certain value and will have significant outcomes for urban communities. This has also been confirmed in international researches.

Giurgescu *et al.* (2015) acknowledged that habitat of people in low-quality neighbourhood causes an outbreak of depression and stress. The authors suggested that, in order to increase general health, in addition to hygiene care, we need non-hygiene interventions. Such studies were carried out in Canada, using national data and statistics and showed that people living in low-quality neighbourhoods are more stressed, depressed, and anxious (Schaefer-McDaniel, 2009). Therefore, this hypothesis in the discussion and findings the present study is proved that quality of housing and residential environment has a significant and inverse correlation with depression index.

Table 5. Modelling changes of depression based on the housing qualitative variables.

Model	ANOVA Test		Linear Regression				Model Summary
	F	Sig.	Predictor Variable	B	β	Sig.	
MoftAbad (n=203)	23.614	0.000	Constant	2.16	-	0.000	R=0.741 R^2=0.628 Adjusted R^2=0.542
			green space diversity	-0.459	-0.411	0.023	
			environmental security	-0.425	-0.365	0.000	
			interior design	-0.441	-0.314	0.001	
			natural ventilation	-0.398	-0.311	0.002	
Mardavij (n=231)	32.45	0.000	Constant	2.13	-	0.000	R=0.698 R2=0.685 Adjusted R^2=0.654
			green space diversity	-0.711	-0.623	0.000	
			recreational facilities	-0.652	-0.544	0.008	
			walkability	-0.628	-0.511	0.000	
			environmental security	-0.591	-0.509	0.000	
			natural ventilation	-0.511	-0.456	0.000	
			facade materials	-0.536	-0.441	0.002	
			indoor greenbelt	-0.529	-0.432	0.003	
Full sample (n=434)	79.45	0.000	Constant	2.45		0.000	R=0.781 R2=0.669 Adjusted R^2=0.623
			green space diversity	-0.635	-0.546	0.001	
			environmental cleanliness	-0.601	-0.511	0.000	
			environmental security	-0.529	-0.487	0.000	
			natural light	-0.516	-0.456	0.002	
			natural ventilation	-0.568	-0.446	0.000	
			indoor greenbelt	-0.541	-0.421	0.003	
Depended Variable: Depression							

CONCLUSION

This study examined the issue of citizens' psychological health in relation with qualitative indexes of housing. In this regard, 20 indicators for housing quality and residential environment were selected. , Depression index was also selected as dependent variable for psychological health aspect. Data collection was done using questionnaire technique. Results of study showed that quality of housing and residential environment in MoftAbad neighbourhood is much lower than of Mardavij. In total, average score for quality of interior and exterior environment in MoftAbad neighbourhood was 1.7 and 1.24, respectively. Based on results, in Mardavij neighbourhood, quality of interior and exterior environment earned an average score of 3.64 and 3.15, respectively. Depression, as a dependent variable, was also evaluated using Beck *et al.* (1996) questionnaire. Results showed that in MoftAbad and Mardavij neighbourhoods, average depression was 2.6 and 0.98, respectively. Analysis of findings indicated that all independent variables have a meaningful relationship with the dependent variable at the significant level of 0/000. Results of regression analysis in general showed that variables such as interior design, indoor greenbelt, natural received light, natural ventilation, green space diversity, pavement, walking possibility, environmental cleanliness, and environmental security have the most effect on level of depression of residents of city's districts.

The last word is that we conducted this research in two neighbourhoods in Isfahan city of Iran. Researchers in other countries, cities, and neighbourhoods may give different outcomes. However, the point is that urban planners and psychologists must be more interconnected than ever before. This communication and coordination means integration of health considerations and planning principles in order to reduce negative effects of housing and residential environments on human spirit and mind.

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