

# Structural equation modeling (SEM) the relationship between environmental quality and social cohesion components by explaining the mediating role of social resilience in urban cultural spaces

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## Abstract

The quantity and quality of urban cultural spaces are one of the most critical factors in the cultural development of any society. Social cohesion is a set of relationships, a coherent and organized link between group members, which originates from shared value systems and norms, collective belonging, and interaction between them. In this respect, the current research was carried out to illuminate the impact of environmental quality components on social cohesion by explaining the mediating role of social resilience in urban cultural spaces. The present study is applied in terms of purpose and descriptive survey in data collection. The research population comprised all the users of urban cultural spaces in Tabriz, from which a sample of 193 users of Al-Ghadir and 29 Bahman cultural centers was selected by simple random sampling. The data collection instruments were researcher-made questionnaires on the components of environmental quality, social cohesion, and social resilience. The validity of the questionnaires was established through face validity and content validity. Cronbach's alpha coefficient was used to determine reliability. In order to test the hypotheses, the structural equation method was used using SmartPLS software. The results of data analysis show that physical and structural components have a significant positive effect on social cohesion ( $P < 0.01$ ) and social resilience ( $P < 0.001$ ). The activity component significantly positively affects social cohesion ( $P < 0.05$ ). However, its effect on social resilience was not confirmed. Furthermore, the ecosystem component has a significant positive effect on social resilience ( $P < 0.001$ ), but its effect on social cohesion was not confirmed. Finally, according to the results of social resilience, it mediates the relationship between the physical and structural component and the ecosystem component with social cohesion; the mediation effect was more significant in the relationship between the physical and structural component with social cohesion.

Keywords: Physical component, Structural component, Ecosystem component, Activity component, Social cohesion, Social resilience

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## 1 Introduction

The concept of urban space is the consequence of the integration of social relations, in a physical context, in a semantic context, and in line with the collective functions required by humans [5]. The urban space was created to look at, be there, and live in it to draw us to its depth and engage us in experiences that all people are moving and somehow participating in it [10]. The range of public space refers to all environments that people can access and use. Considering the presented physical, social, and cultural division; public spaces include internal and external public and semi-public spaces [8]. According to the above definition and the placement of cultural collections in public and civil spaces category, it is possible to understand the social dimensions of these spaces through generalization and revision in the field of public spaces [23]. Cultural structures are considered part of the material cultural elements of the society that people use over time and find a sense of belonging to it [44]. Urban cultural spaces (UCS) are places that have different uses according to their architecture; that is why special facilities, equipment, and design are considered for them [48]. Such spaces should have the characteristics of a desirable public space and be suitable places for collective and social activities. On the other hand, along with other functions, cultural functions are a good platform for social interactions due to having informal spaces and programs; in addition, they have different activity systems compared to other urban public spaces (squares, parks, station spaces, etc.) [30]. Therefore, people's need to have places for social interactions and meet psychological needs has become one of the necessities of urban life [12].

Urban cultural spaces have a crucial role in sustainable development from an economic and social perspective; the research conducted in this domain is mainly inclined to particular aspects such as historical heritage or cultural service facilities. However, UCS has not been quantitatively evaluated as an independent device with a clear definition and comprehensive classification [49]. Since the cultural spaces in cities have received less attention from specialists and urban designers and have rarely been able to provide suitable fields for organizing the needs and normative and behavioral patterns of their audience, designing an efficient behavior management strategy is among the most critical needs of urban planning and management for such spaces [2]. Social cohesion is a social concept to organize the similarities and differences in society [17]. The premise is that people have different desires and needs, and it is essential to examine their differences while paying attention to their tastes and needs. Social cohesion is a situation where individuals are connected to form a meaningful and mutually influencing whole [21]. In other words, it is a type of social hierarchy that involves achieving a shared mental model about different people, groups, and social classes who adhere to the rules and recognize and develop their abilities based on intelligence and multiple capabilities. In addition, they have comprehensive and effective participation in society and help the development of the capacities and abilities of society [39]. Thus, social cohesion is generally a set of relationships and integrated and organized links among group members, which originates from value systems, shared norms, collective relations, and relationships [7]. Reviewing the opinions of different researchers, one or more aspects of social cohesion can be taken into account, including social trust; a sense of belonging to community members; social participation; values, identities, and common culture; and social harmony [45]. According to Larousse culture, social cohesion is the position of a group that includes an entirely cohesive group [3]. Social cohesion has a spontaneous state and is the result of accepting and internalizing the value system and norms of a society; it is the consequence of a sense of collective belonging and a concentration of social interaction among the members of a society, among whom there is a great sense of solidarity [1]. In fact, social cohesion is the optimal form of society's structure and culture [51]. According to Worth, city is the physical arena of social relations. Despite the development of urbanization in recent decades, we are witnessing the adverse effects of the downward trend of social relations in cities; among the harmful effects of the weakness of social relations and social cohesion, depression and mental problems of citizens and reducing the amount of cooperation between people in the administration of city affairs can be enumerated [40].

Cultural places and public spaces for social communication and an arena containing social interactions have always been discussed in terms of investigating social cohesion. Besides, cultural spaces help people create a sense of trust and confidence and increase the sense of belonging and dependence. Reviewing the studies conducted on more than a thousand urban public spaces in different countries, it has been demonstrated that four primary factors are more important in measuring the qualitative desirability of the state of urban public spaces. These factors are as the following: access and cohesiveness, comfort and view, uses and activities, and sociability [20]. In investigating the importance of examining social cohesion in urban cultural spaces, Moradian, Rakhshandeh Rou, and Abdulhazadeh Fard [38] found out that, in evaluating the role of urban parks in the social sustainability of cities, freedom in the social, cultural, and environmental contexts of public places such as parks and its function in the social and cultural context is very weak. In evaluating the effect of social and physical dimensions of the neighborhood environment on the mental health and sense of the health of the resident, Mirgholami, Gharebaglou, and Noorzaman [35] showed that the management of collective space, safety, collective identity, social class differences have a higher determinacy level in the mental health of people.

In another study, Alimardani and Ziaratizadeh [4] investigated social cohesion and the factors affecting it in urban spaces. They found that a socially cohesive society can be achieved by internalizing the value system and norms in a society, increasing the sense of belonging to the society, a density of interaction, and social participation in citizens. On the other hand, the quality of the environment is one of the most critical concerns of Urban Design. This issue is so vital that many theoreticians consider "improving the quality of the environment" as the essential task of urban design [33]. In the theoretical articles on planning and urban design, there are different definitions of the concept of environmental quality. These opinions are formed based on the intellectual background of experts or the way they choose indicators; Therefore, the lack of a complete, accurate, and agreed-upon definition of the concept of environmental quality or the way they choose indicators differently in theoretical bases has prioritized this issue in urban design research [29].

Joint studies between humans and the environment indicate that examining the physical space requires consideration of its uses. Barker [6] has emphasized the collective-behavioral nature of activity spaces and has accentuated the social agents in activity places as a capability for space [6]. Hence, attachment to place is not only strengthened by physical dimensions, the quality of behaviors, and social relationships in the space but also effective on its dependence [41]. Therefore, the functional characteristics of public spaces can be effective by the quality and quantity of people's willingness to stop and communicate in these spaces [16]. The occurrence of notable events in public places, especially cultural spaces such as street performances, public arts, and similar events that bring people together, has increased the attractiveness of spaces [47]; in the process of such events, situations are provided to establish communication among people and their willingness to talk with each other [50]. On the other hand, the activity dimension of spaces is also related to the role and uses of the environment. These and many other activities and physical characteristics create personality in public spaces. They effectively provide comfort, well-being, and the possibility of people enjoying being in the space. Besides, spaces which support dynamic interaction, environmental education, and the possibility of creative expression of individuals and groups are successful in establishing social interactions; this leads to an increase in the sense of social solidarity and, as a result, more satisfaction [19].

Many recent studies have concentrated on the relationship between the physical characteristics of space and collective interactions. The focus of these studies is that in an environment, physical space acts as a spatial system, and this spatial system's characteristics influence users' collective interactions [42]. The physical environment provides facilities and spatial organization by strengthening the system and unique patterns of activity in space. In other words, the physical environment leads to the simplicity of building social cohesion and an acceptable level of solitude and comfort in the activity space. This issue examines dimensions, space geometry, and spatial communication in activity spaces. Finally, human-made environments estimate feelings, trust, agreements, experiences, and symbolic, identity, and aesthetic perceptions, which affect the level of perception of users, like the quality of the environment [37]. Therefore, the need to investigate the relationship between spatial organization and the social cohesion of users was prioritized.

Izadi and Ghorbani [23] emphasized the qualitative role of cultural spaces in strengthening social interactions. In a study, Radfar and Nasr [43] investigated the three following factors of effective social indicators and environmental and physical factors in the feeling of social security for citizens; the effect of the form of urban spaces in creating a sense of social security; physical factors effective in reducing the sense of security in urban spaces and showed that efficiency and vitality, continuity of urban life and social security in urban space, and social stability are provided for citizens by creating the sociability feature in the city public spaces and focusing on the environmental qualities of the city public spaces.

Furthermore, Jennings & Bamkole [24] demonstrated that social cohesion requires interpersonal dynamics and a sense of connection between people. Increased social cohesion can be associated with various physical and mental health benefits. The presence of urban green spaces can increase positive social interactions that create social cohesion and promote health and well-being. Therefore, the design of cultural spaces should increase social cohesion and meet the cultural needs of the users. Nevertheless, the role and quality of cultural spaces with an approach to social cohesion have been investigated less. The physical components connected to the social cohesion of the public space are related to factors such as accessibility, placement position, comfort in different climatic conditions, and security. The placement position and accessibility of riding and walking, how to form and organize spaces and form, geometry, order, coordination, personification, harmony, variety of dimensions and proportions, and other aesthetic dimensions can be mentioned as the dimensions of the body of public space and its capabilities about social cohesion [16]. In addition, the presence of natural elements in these spaces increases excitement and vitality [28] and invitations and creates pleasant experiences for people; this increases communal life in the space [15]. Among the activity components related to social cohesion, the problems and obstacles of users' movements, the evaluation of the performance of spaces, the way users use the space and conditions, and the social characteristics of carrying out the activity can be pointed

out [36]. In addition, McCall [32] conducted research about responsive environments, place, and presence and found out that, in non-interactive environments, the choice of space affects the perceived ability in order to play the role and, in effect, create the sense of place and presence of users and create solidarity. Environmental components related to cultural places can affect the social cohesion of users. One of the other variables prioritized with social cohesion in cultural places is social resilience. Recently, resiliency has become an essential concern for cities, so paying attention and dealing with it has been prioritized in the studies. With the development of urbanization, cities have become the center of attention, and the demand for natural resources and attention to their global environmental impacts have increased [9]. Urban development and urban planning activities have increased the pressure on nature and weakened its resilience, often leading to destructive consequences for cities and their residents [22].

Environmental problems associated with urbanization have their roots in ecological and urban development contexts; this has led to the formation of shared research fields between this issue and the resilience of the urban system [11]. Cities cause significant environmental effects; promoting sustainability and resilience in cities, and human settlements is a priority [34]; studies of urban resilience and how to measure it in cities are emphasized.

Resilience has multiple physical, social, economic, subsistence, and spatial dimensions [31]. Despite the critical developments in recent years, existing methods for measuring urban resilience were only concerned with specific disturbances, either from the perspective of engineering resilience or ecological resilience and from an environmental point of view (Bately & Newman, 2013). The concept of resilience evolved gradually, and attention was drawn from its initial ecological concept to the socio-ecological concept and then to a social concept [25]. Based on the research findings, it is declared that resilience in the social system can be investigated by examining managerial, social, cultural, and economic variables in both spatial and non-spatial modes [27]. Economic growth, stability, and income distribution among people are the critical factors of the economic dimension of resilience, which can promote social resilience in urban communities. Population mobility and migration are the other important social and economic resilience indicators. Social capital includes participation, cohesion [13], social trust, and strengthening social networks; the promotion of social memory, including experiences of dealing with changes, is among the main components of the capacity of systems for adaptation and transformation of imposed forms [14].

Therefore, every society has native and defined social characteristics that can identify them and build the ability to plan by emphasizing and relying on those characteristics. Social resilience has several different stages which can significantly survive and strengthen society. The level of flexibility of different groups in the same community is different, and their reactions are also different in critical cases; As such, if we want to have places with better resilience, we need a comprehensive investigation of the potential of response and reconstruction to risks [18]. Empirical research has been conducted on the social resilience concept. However, its impact on social solidarity and cohesion has not been investigated. Thus, presenting the variable of social resilience as a mediating variable seems novel. With its rich history, Tabriz city has played a prominent role in the region in all fields, from independence and constitutionality to art and culture. Today, this city requires its own space so its citizens can present themselves and their city from urban, cultural, social, and civic perspectives. It is claimed that achieving a culture-building and positive place to improve social conditions and urban life is one of the ideal goals of this research. The importance and necessity of paying attention to culture are one way to progress human society. The city is, in fact, a place with the highest level of concentration of power and culture of a community; it is the place of crystallization of the broadest social communication networks, where belonging to it and being from it brings a kind of cognitive identity to a person. Since the city is a crystallization of society's religion and thought, it cannot appear the same in different civilizations. The diversity of cities in the world's history and geography results from this difference more than anything else. Urban design based on the cultural approach becomes the ground for giving importance to any society's cultural and social values. The globalization of every society and nation and recognizing the values of architecture and culture of that society to achieve the ideal long-term goals of any nation starts from the basis of the urban design of that society; The continued use of the society will provide a platform for the globalization of urban design based on the cultural approach of that society and brings beauty and charm to the desired environment. As stated above, many urban design studies have investigated the impact of influential components on various types of social and psychological performance in different places. However, no research in the field of architecture and urban design has investigated the impact of physical, environmental, and activity components on social cohesion with the mediating role of social resilience. Furthermore, since collective cultural and recreational activities in the urban space can be one of the essential platforms for creating social interactions and improving the cultural level of society, cultural and recreational spaces as public spaces play an essential role in communicating people with each other and urban life. Thus, in the present research, the researcher attempts to find the impact of physical, environmental, and activity components on social cohesion with the mediating variable of local-spatial resilience. Is there any relationship between physical, environmental, and activity components with social cohesion? Is there any relationship between local-spatial resilience

with physical, environmental, and activity components that affect social cohesion? In other words, the current research problem states whether physical, environmental, and activity components can change social cohesion if combined with local-spatial resilience. Thus, the conceptual model of the current research is shown in figure 1.

Calculating the factor loadings of the dimension of physical-activity components and social resilience, the proportion and correlation between variables and the degree of correlation between each component and the dependent variable (social cohesion) were examined. This approach will contribute to measure the importance of each component and prioritize the implementation of each one to have places with higher social cohesion.

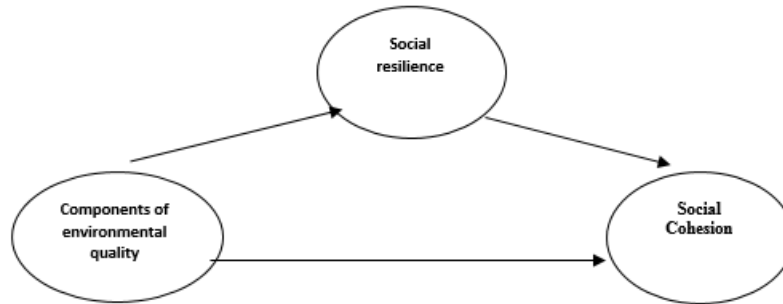


Figure 1: Conceptual model of the research

## 2 Research methodology

This research is practical in terms of purpose because it uses the results to solve societal problems. It is also a survey type in terms of data collection. The generalizability of the results is one of survey research's leading and significant characteristics [46]. This research is a descriptive-correlation type in terms of the characteristics of the research topic. This research aims to objectively, realistically, and systematically describe the characteristics of a situation or an issue. The research data collection method comprises two parts of library studies and field research. Due to the type of research and the statistical population, statistical sample, the best method of data collection in the present research is considered a questionnaire because the questionnaire is a set of goal-oriented questions proposed about the research problem and measures the respondent's opinion, points of view, and insight resorting to various scales [26]. The scope of the current research is the cultural centers of Tabriz city. A cultural center is, in fact, a real enclosed urban space in which very diverse and non-homogeneous commercial, cultural, educational, and theatrical uses are placed together. It is also a place for spending leisure time, social encounters, and associations. A cultural center is where people can participate in cultural production and have a mutual and dynamic relationship with the city. That is why single-purpose and more or less passive uses such as museums and traditional galleries are superior. In a cultural center, along with many educational facilities for art, sports, and technical training, there are many opportunities for displaying products and art and cultural activities.

A Cinema hall (Movie Theater), theater hall, sports hall, music hall, art gallery, and museum can be enumerated among the facilities. Since cultural centers have diverse functions, different groups of people with different ages, occupations, and conditions are attracted; especially if there is a green area next to the cultural centers, they will have more functions and become a diverse and dynamic environment. The cultural function of these cultural spaces, such as neighborhood culture houses, is based on the two axes of implementing cultural plans and providing cultural education. The target research population of the current study is all the users of Al-Ghadir and 29 Bahman cultural centers in Tabriz.

The statistical population of this research was the users of cultural spaces in Tabriz city. This population assumed unlimited users; the sample size was calculated as 384 people using Cochran's unlimited formula. Since the research area is Tabriz city, the people studied are users; this issue is effective in the central phenomenon of the study; certain types of people can provide information for research purposes as they are the only people who can provide such information, or they correspond to some criteria developed by the researcher; the available sampling method was used to select the sample size. In order to obtain permission to distribute the questionnaire, necessary coordination was made with the Vice-Chancellor of Educational Affairs of Cultural Centers, and permission was taken to distribute and complete the questionnaire by the users of Al-Ghadir and 29 Bahman cultural centers in Tabriz, in paper and electronic form.



Figure 2: Al-Ghadir Cultural Center in Tabriz



Figure 3: 29 Bahman Cultural Center in Tabriz

According to the type of project implemented and compliance with ethical considerations, verbal consent was obtained from the participants at the beginning of the research. Before distributing the questionnaires, the participants were provided with the research topic and preliminary information and asked to answer the questions honestly. Then, the questionnaires were distributed to the respondents, the questionnaire guide was read, and, if needed, some explanations were provided about how to respond.

In order to protect the respondents' private and personal information and to ensure the confidentiality of information, it was emphasized not to mention their names and identifying details in the questionnaire. In addition, the subjects were told that the information would be interpreted in groups, and if they would like, the research results would be announced later. In order to avoid the effect of transposition and to adjust the fatigue of the participants, the questionnaires were randomly distributed to the participants, and they were assured that participating in the project would not have any financial burden on them. Besides, the participants were free to withdraw during the research; in the end, the cooperation of the participants was appreciated. After completing the questionnaires, questionnaires with incomplete or unanswered questions were removed from all questionnaires. A researcher-made questionnaire (30 questions) was used to collect data in the field research part of the study. The dimensions affecting the components of environmental quality contain 18 questions in three dimensions, including the physical and structural components (9 questions), size of space, a form of space, environmental comfort, spatial organization, permeability, structural quality, movement, and pause points, physical availability and gathering places, activity component (4 questions), type of activity, arrangement of activities, appropriateness of activities, and demarcation of activities, and ecosystem (5 questions) vegetation, area, climatic quality, native context, and waste management. For social resilience (6 questions), the items examined safety and security, justice, equality and social support, social communication, participation, and awareness. The items for social cohesion (6 questions) were about social trust, a sense of belonging in society, social participation, values, shared identity and culture, and social harmony. The questionnaire items were directly scored

from completely agree (=5), agree (=4), no opinion (=3), disagree (=2), and completely disagree (=1). The validity of the research instrument was evaluated and confirmed by the face validity method, content validity index (CVI), and content validity ratio (CVR). The reliability was confirmed by calculating Cronbach's alpha coefficient. Descriptive statistics and inferential statistics methods have been used in the present research.

In the descriptive statistics section, the demographic characteristics of the statistical sample, including age, level of education, the experience of using cultural spaces, and gender were discussed, using SPSS24 software. In the inferential statistics section, structural equation modeling (SEM) as a multivariate correlation method, partial least squares method, and SmartPLS software (third version) were used to fit and test the hypotheses and models. This is the best method to analyze research with complex relationships between the variables, small sample size, and non-normal data distribution. Since the interaction effect of two variables with a normal distribution is skewed in most cases, it is better to use the PLS method to analyze the interaction effect as it is not sensitive to normal distribution. To analyze the patterns in the structural equation method with the partial least squares approach, the first step is to measure and check the pattern fit and then test the research hypotheses.

### 3 Results

The purpose of the current research was to Structural Equation Modeling (SEM) the relationship between environmental quality and social cohesion components by explaining the mediating role of social resilience in urban cultural spaces. The respondents' demographic information unravels that 102 were female and 282 were male. In examining the participants' education, it was revealed that 21 people had a diploma, 50 people had a post-graduate degree, 234 people had a bachelor's degree, 68 people had a post-graduate degree and above, and the rest of the people did not specify their education. The participants' age was as follows: 68 people were less than 25 years old, 165 people were 25 to 35 years old, 126 people were 36 to 45 years old, and 25 people were more than 45 years old. Table 1 shows the descriptive indicators of the components of environmental quality, social resilience, and social cohesion.

Table 1: Descriptive statistics of the research variables

Variable		Min.	Max.	Mean	SD.	skewdness	Kurtosis	t	Sig.
Environmental quality	physical and structural	9	42	25.91	6.32	-0.234	-0.334	6.95	0.000
	activity	4	19	11.18	3.08	-0.242	-0.104	5.43	0.000
	ecosystem	5	25	12.67	3.81	0.084	-0.219	4.13	0.000
social resilience		6	26	15.94	4.55	-0.168	-0.451	4.63	0.000
social cohesion		6	28	18.24	4.76	-0.673	0.006	3.15	0.000

Table 1 reported the mean score and standard deviation of the physical and structural components (6.32) 25.91, activity component (3.08) 11.18, and ecosystem component (3.81) 12/67. The mean and standard deviation of social resilience (4.55) 15.94 and social cohesion (4.76) 18.24 were obtained. The simplest method to test normality is the skewness and kurtosis indices \_ to examine data deviation from a normal distribution. If the skewness and kurtosis are not in the range of +2 and -2, the data does not have a normal distribution. As can be seen in Table 1, the maximum amount of skewness and kurtosis for the components of environmental quality, social cohesion, and social resilience is in the range of +2 and -2; Therefore, normal distribution of data is expected. One of the univariate analysis tests is the t-test. This test examines and analyzes the research variables' status compared to the measured spectrum's mean. The purpose is to determine the perceptual status of the research population of the variables. Thus, a t-test was utilized with SPSS software.

Since the 5-option Likert scale was used in this research and the options are scaled from 1 to 5, the null hypothesis will be that the value of the test is  $\mu \leq 3$  and the perceived status of the research population of that variable is not desirable (because their answers are around the mean and do not tend to lean in a specific direction). Table 1 shows the results of a one-sample t-test for the research variables. As the significance level of 0.05 is considered, if the significance value is less than 0.05, the test's null hypothesis is rejected, and the perceived status of the research population for the target variable will be desirable. As can be seen, the significance value for all variables is less than 0.05, and the t-value is more than 1.96; thus, the null hypothesis is rejected, and the perceived status of the research population is desirable for all variables.

In order to investigate the two-by-two relationship between research variables, bivariate analysis is used. Spearman's correlation coefficient shows the correlation between two ranking variables (such as Likert scale levels). Correlation between two variables represents the effect of increasing or decreasing one variable on another; however, this correlation does not necessarily predicate a causal relationship between the variables. The results of the bivariate

analysis are presented in Table 2. The items marked with \*\* are significant at the 0.01 level and are considered non-significant otherwise.

Table 2: Correlation between the variables

Variable		1	2	3	4	5
1	Physical and structural	1				
2	activity	0.574**	1			
3	Ecosystem	0.582**	0.619**	1		
4	Social resilience	0.686**	0.525**	0.674**	1	
5	Social cohesion	0.672**	0.535**	0.557**	0.645**	1

Since correlation coefficients are not enough to investigate the causality and predict the dependent variables by the independent variable, structural equation modeling was used to show and measure the relationship between variables. The structural model section measures the relationship between the hidden variables to test the research hypotheses. In addition, structural equation modeling was used to evaluate the research model and explain the relationships between variables. In the present study, SmartPLS software was used to model structural equations. This section is presented in two parts: structural pattern fitting and general pattern fitting. The evaluation of the structural pattern includes a model predictive-ability test and the relationships between the factors. This was done in SmartPLS software. The most important criteria to evaluate the structural model are the path coefficient and the level of determination coefficients, which are examined below. In addition, to evaluate the collinearity problem, a set of exogenous variables must be examined separately to determine whether a variable should be deleted or merged with another variable. Calculating VIF for all items, it was unraveled that all values are less than 5; Thus, it can be declared that there is no collinearity problem. Also, the results of the VIF coefficients for the paths showed that this value for the path of social cohesion with the physical, activity, ecosystem, and social resilience components was equal to 2.326, 2.006, 2.310, and 2.615, respectively; the value for the path of social resilience with physical, activity, and ecosystem components was 1.837, 1.99 and 1.883, respectively. As VIF coefficients for all the paths are less than 5, there is no problem with collinearity. R Squares or R<sup>2</sup> (determination coefficient) coefficients are used to check the structural pattern fitting with the PLS method. The R<sup>2</sup> criterion is used to connect the measurement part and the structural part of structural equation modeling and shows the effect of an exogenous variable on the endogenous variable. The critical difference between the coefficient of determination and the adjusted coefficient of determination (R Square Adjusted) is that the coefficient of determination assumes that each independent variable observed in the model explains the changes in the dependent variable.

Therefore, the percentage shown by the coefficient of determination assumes the influence of all independent variables on the dependent variable. However, the percentage shown by the adjusted coefficient of determination is only the result of the actual effect of the model's independent variables on the dependent variable and not all the independent variables. Another difference is that the appropriateness of the variables for the model cannot be determined by the coefficient of determination even with a high value. In contrast, the estimated value of the adjusted coefficient of determination can be trusted. According to the structural model of the present research, the values of coefficient determination are presented in Table 3.

Table 3: Fitting the variables and the overall research model using the GOF criterion

Variable	R Square	R Square Adjusted	Communality	GOF
Physical and structural	-	-	0.711	
Activity	-	-	0.659	
Ecosystem	-	-	0.693	
Social resilience	0.618	0.612	0.763	
Social cohesion	0.586	0.577	0.676	
medium	0.602	0.594	0.700	<b>0.649</b>

If the graphical output of the coefficient of determination  $R^2$  is in green color, it shows that this criterion is desirable; if it is in red, it shows that the coefficient of determination is not desirable for the variable in question, and the model will be questioned structurally. After checking the structural fit of the pattern, the overall fit of the pattern is used through the GOF criterion presented by Tenenhaus et al. in 2004. This criterion is calculated through the following mathematical equation  $GOF = \sqrt{\overline{Communtalties} \times \overline{R^2}}$ , so that  $\overline{Communtalties}$  is the average communal values of each structure and  $\overline{R^2}$  is the average value of  $R^2$  values of the endogenous construct of the pattern.



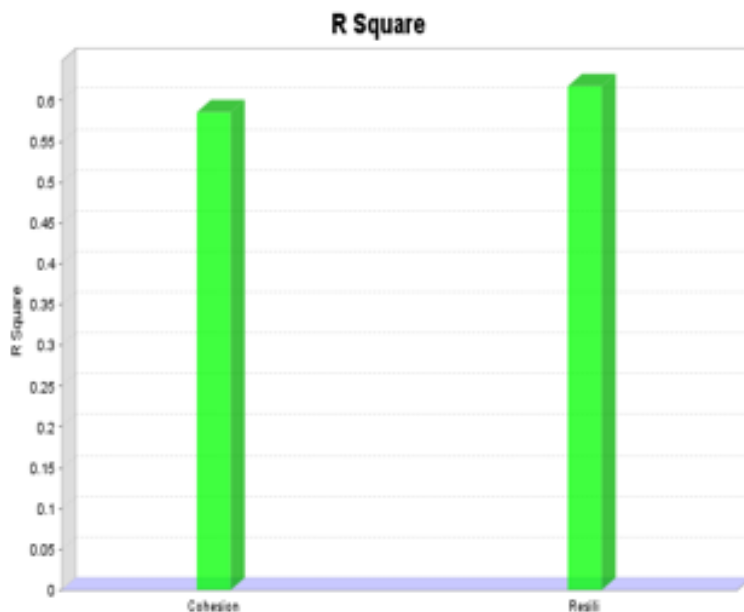


Figure 4: Diagram of determination coefficient  $R^2$

Using this criterion, the fit of the variables and the research model was checked, the results of which are demonstrated in Table 3. According to three values of 0.01, 0.25, and 0.36, introduced as weak, medium, and strong values for GOF, and obtaining a value of 0.649, the fit of the overall model is strongly confirmed. In the path analysis model, the significance of the path coefficient is determined using t (t-value). If the value of t is between 1.96 and 2.57, the relationship between the two constructs is significant at the  $P < 0.05$  level. If the value of t is greater than 2.57, the significance of the relationship is at the  $P < 0.01$  level.

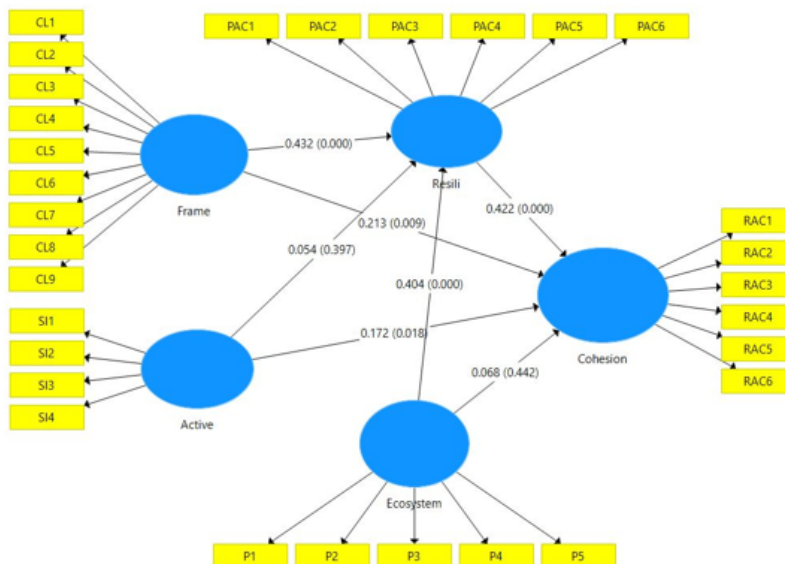


Figure 5: Path coefficient between the research variables

The first research hypothesis tests the influence of environmental components (physical and structural, activity, and ecosystem) on the social cohesion of urban cultural space users. According to Table 5, the t-statistic for the relationship between the physical and structural component and social cohesion is equal to 2.611, outside the range of -1.96 to +1.96; Therefore, the physical and structural component has a significant effect on the social cohesion of the

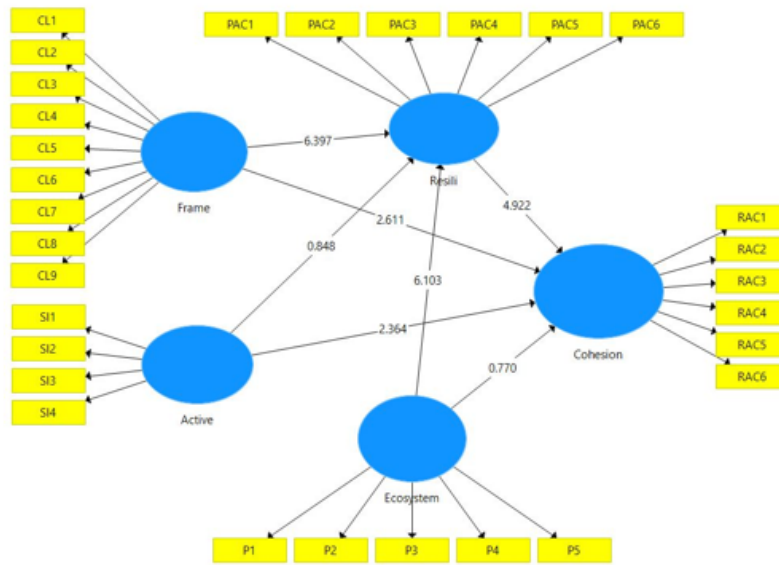


Figure 6: (t) statistic between research the variables

Table 4: Test of the research hypotheses

Predictor variable	Dependent variable	path coefficient	Sig.	t	Result
Physical and structural	social cohesion	0.213	0.009	2.611	Confirmed
Activity		0.172	0.018	2.364	Confirmed
Ecosystem		0.068	0.442	0.77	Rejected
Physical and structural	Social resilience	0.432	0.000	6.397	Confirmed
Activity		0.054	0.397	0.848	Rejected
Ecosystem		0.404	0.000	6.103	Confirmed
Social resilience	social cohesion	0.422	0.000	4.922	Confirmed

urban cultural space users ( $P < 0.01$ ); Also, the path coefficient is 0.213, the significance level of which is less than 0.01; Therefore, the significance level is acceptable.

Furthermore, according to Table 5, the t-statistic in the relationship between the activity component and social cohesion is 2.364\_outside the range of -1.96 to +1.96; Therefore, the activity component has a significant effect on the social cohesion of the urban cultural space users ( $P < 0.05$ ); In addition, the path coefficient is 0.172, the significance level of which is less than 0.05; Therefore, the significance level is acceptable. Finally, in the relationship between the ecosystem component and the social cohesion of the urban cultural space users, according to Table 5, the t-statistic is equal to 0.77 within the range of -1.96 to +1.96; Therefore, the ecosystem component has no significant effect on the social cohesion of urban cultural space users ( $P < 0.05$ ). The second research hypothesis tests the influence of environmental components (physical and structural, activity, and ecosystem) on the social resilience of urban cultural space users. According to Table 5, the t-statistic in the relationship between the physical and structural component and social resilience equals 6.397 - outside the range of -1.96 to +1.96; Also, the path coefficient is 0.432, the significance level of which is less than 0.001; Therefore, the significance level is acceptable.

In examining the influence of the activity component on the social resilience of the urban cultural space users, according to Table 5, the t-statistic is 0.848 - within the range of -1.96 to +1.96; Therefore, the activity component has no significant effect on the social resilience of urban cultural space users ( $P < 0.05$ ). In examining the influence of the ecosystem component on the social resilience of the urban cultural space users, the t-statistic is 6.103 - outside the range of -1.96 to +1.96; Also, the path coefficient is 0.402, the significance level of which is less than 0.001; Therefore, the significance level is acceptable.

The main research hypothesis can not be analyzed through direct analysis of the outputs of the software. In other words, when we cannot directly analyze the results of the indirect effects of bootstrapping, other criteria should be used. The Sobel test was used to test the fourth hypothesis. This test measures the effects of mediation in the relationship between two other variables - this test is used with data with a more significant number. The Sobel test

formula is as follows: the value obtained for the z-value is measured at different levels, like the significant value of t.

$$z - value = \frac{a \times b}{\sqrt{(b^2 \times S_a^2) + (a^2 \times S_b^2) + (S_a^2 \times S_b^2)}}$$

The numerator of the fraction is examined as the coefficient of the mediation path (indirect effect) in this formula. In the above formula we have:

$a$ : Path coefficient value between the independent and the mediator variables

$b$ : Path coefficient value between the mediator and the dependent variables

$S_a$ : Standard error of the path between the independent and the mediator variables

$S_b$ : Standard error of the path between the mediator and dependent variables

**Main hypothesis:** Social resilience significantly mediates the relationship between environmental quality components (physical, structural, activity, and ecosystem) and social cohesion. Because there is a rounding error in the calculation of this test, the numbers are rounded to five decimal places, to get more accurate results.

Table 5: Test of the research hypotheses

Independent variable	Mediating variable	Dependent variable	Path coefficient	z-value	Result
Physical and structural	social resilience		0.191	6.75	Confirmed
Activity		social cohesion	0.024	0.818	Rejected
Ecosystem			0.179	6.030	Confirmed

According to the results of the main hypothesis, the path coefficient obtained from the Sobel test was 0.191, 0.024, and 0.179, respectively; the value of the t-statistic was calculated as 6.75, 0.818, and 6.03, respectively; Therefore, social resilience plays a mediating role in the relationship between the physical-structural and ecosystem components and social cohesion. Because the z-value of the Sobel test is outside the critical range of the significant value of t (more than 2.58), the hypothesis is confirmed at the 99% level for the two physical-structural and ecosystem components. To measure the intensity of the mediation effect, the VAF (Variance Accounted For) statistic is used;  $VAF = \frac{a \times b}{(ab) + c}$ . The value range of this statistic is between zero and one. Values closer to one indicate the high intensity of the influence of the mediating variable. The measurement of this statistic is as follows: a value less than 0.2 means the absence of intensity of the mediation effect; values between 0.2 to 0.8 means moderate mediation; and a value greater than 0.8 means full mediation intensity.

The VAF index was obtained for each environmental component, including the physical-structural, activity, and ecosystem components, in relation to social cohesion with the mediating role of social resilience as 0.46, 0.12, and 0.71, respectively. The results indicate that the mediating role of social resilience in relation to the activity component and social cohesion is rejected (as mentioned before). On the other hand, the mediation of social resilience in the relationship between the physical-structural and ecosystem components and social cohesion is 0.46 and 0.71, respectively (i.e., an average level); the mediation value of social resilience in the relationship between ecosystem and social cohesion was reported stronger.

## 4 Discussion and conclusion

The current research aimed to provide a structural model of the relationship between environmental quality components and social cohesion by explaining the mediating role of social resilience in urban cultural spaces. The results of data analysis indicate that physical and structural components significantly positively affect social cohesion and social resilience. The activity component has a significant positive effect on social cohesion, but its effect on social resilience was not confirmed. Besides, the ecosystem component has a significant positive effect on social resilience, but its effect on social cohesion was not confirmed. Finally, according to the results, it was found that social resilience mediates the relationship between the physical-structural and ecosystem components and social cohesion; the mediation effect was larger in the relationship between the physical-structural component and social cohesion.

To explain the result, it can be declared that in any environment, the physical space acts as a spatial system, and the characteristics of this spatial system are effective in the collective interactions of users. Due to this point, the

physical environment provides facilities and spatial organization that reinforce the particular systems and patterns of activity in the space and weaken other activities. In other words, the physical environment facilitates the formation of collective relationships and provides an optimal level of solitude in the activity space.

The research results demonstrate that the scale of space is one of the critical environmental factors influencing the level of social cohesion in urban cultural environments. The existence of infinite and large-scale spaces reduces the possibility of social cohesion. Furthermore, as the distance between people increases, the possibility of communication decreases. To this aim, special measures should be undertaken to increase social cohesion in prominent urban cultural places. These measures include proper lighting of the space, creating different and mixed activities in the space, and supervising it.

Another important finding is that the physical-structural component in cultural spaces can be reflected in social behaviors through emotional and perceptive ways and justify the behavioral disturbance in the urban space. According to the present research results, the brightness and darkness of urban spaces play a prominent and critical role in the social cohesion of citizens. In order to achieve social cohesion, the urban landscape needs special attention since it is the first contact level of citizens with the environment, which human senses are faced with and receive the necessary information from it.

It is interesting to note that according to the results of the study, the more the landscape and form in the eyes of the citizens, in addition to its aesthetic dimension, provide much and more suitable information to the human needs in the environment, the more the social cohesion increases in the environment. To explain the significant role of the environmental activity component on social cohesion in urban cultural spaces, it can be declared that in the turbulence of today's cities, people are looking for places with unique identities in order to provide comfort and interact with their fellowmen in the context of social dynamics in order to attain their supreme perfection. Social cohesion can be defined as creating interaction between two or more people, which leads to a reaction between them. However, this type of reaction is known to both people. Therefore, relationships without meaning are not included in this definition. Social cohesion and communication can be a physical issue, a look, a conversation, and communication between people, which requires the definition of appropriate events and activities and, as a result, the role-taking of people in the space.

Architecture and urban development should seek to increase social cohesion and human solidarity instead of separation. However, what we face today in most urban spaces is the reduction of social relations and participation of residents in these spaces. Since cultural places play a significant and central role in shaping social interactions, a complete set of urban service activities can be created that are compatible and complementary to each other to push people towards the space using its collective attractions. In this case, with the participation of citizens in their affairs, the decisions of the neighborhood are left to them to feel more belonging to cultural places and strengthen their actions and social cohesion; besides, the concept of place will find a physical manifestation. Experts in social cohesion emphasize the role of public spaces in building social cohesion and believe that, more than any other factor, it is the presence of other people in the space that attracts people. In other words, activity (participation and companionship) is another factor that promotes social cohesion. In explaining the relationship between the ecosystem and social resilience, it can be stated that the ecosystem is one of the approaches to architecture and urban development that interacts with the cultural context. Its purpose is to improve the quality of life for future generations. The ecosystem can be improved by expanding the green area by planting native plants compatible with the climate, attention to the specific culture, spatial identity and belonging to the context, and whatever provides climate comfort.

The research results indicated that all ecosystem criteria provide social resilience, and the ecosystem has a positive effect on social cohesion due to social resilience. According to the research results, it is inferred that social cohesion is a feeling of solidarity, connection, and emotional commitment among the members of a social group and is considered a kind of social capital. Since human social life is associated with some social cohesion in all stages of development, especially in the early stages of social life, the unity of people to cope with natural disasters is the factor that creates social cohesion and solidarity. As urban spaces, in particular, cultural places, find symbolic construction due to cultural and social forces, the heterogeneity of the social context of these types of places has led to a lack of sense of belonging, dissociation, and lack of social communication among them, and ultimately decline of communal life and cultural indicators. Thus, the revival of communal life in urban spaces, primarily cultural places such as cultural centers, through strengthening its components to build social cohesion is essential.

Besides, the resilience of a society is in terms of social dimensions and components, which can guide that society towards resilience in other dimensions and pave the way for its realization. In the same context, social resilience is the capacity of society to adapt to changes or transformations and maintain adaptive behavior. The foundation of resilience is cultural, managerial, environmental, physical, political, and economical. In other words, social resilience includes conditions under which individuals and social groups adapt to environmental changes. Generally, social resilience is

the ability of a community to return to balance or respond positively to problems. Social aspects in resilience are as important as physical infrastructure in crisis management. Improving environmental quality and physical space in such a way as to provide the conditions for the continued residence of residents or users of the place can strengthen the color of belonging, sense of identity, and sense of trust, and as a result, social interactions among the residents, all of which are considered practical components in the formation of social stability of the neighborhood. The research data analysis of the questionnaire and understanding of the inadequacies of the target studied space through the analysis of the behavior map obtained brought about the research suggestions at two strategic and thematic levels. At the strategic level, it is suggested to improve the condition of the furniture in the cultural centers to equip the undesirable behavior in the cultural centers.

Besides, in order to strengthen the behavioral domains and build better cohesion in the existing activities in the space, environmental diversity should be created. In order to improve security, appropriate lighting should be done. Waste management should be segregated on site, and certain distances should be set for waste bins. Regarding the subject matter, it is suggested that the main entrances of these centers should be modified, and in order to create a parking space for the users, a part of the area should be allocated to the parking lot.

## 5 Conflict of interest/Financial support

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