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Stress and Built Environments: Assessing Architectural and Urban Impacts

Navid Khaleghimoghaddam[1]
ORCİD: 0000-0003-2505-207X

Abstract

Considering the intricate relationship between the built environment and users' mental well-being, the present study aims to evaluate how architectural and urban spaces significantly influence stress levels of residents. In this regard, the neighbourhood of Aydogdu in the city of Konya, where traditional and modern lifestyles are in conflict and certain urban problems are beginning to emerge, was chosen as a case study. Data were collected by using the questionnaire on environmental factors causing stress in the neighborhood and Dass' Standard Questionnaire for measuring stress. Data analysis was performed through using the Pearson correlation coefficient and the results showed that there is a significant relationship between environmental factors and the occurrence of stress in the neighborhood. Accordingly, the factor of environmental qualities has the greatest impact, and the climatic factors have the least relationship with the stress of citizens. The results of regression analysis showed that environmental qualities, visual elements, and regulation of environmental conditions predicted 67% of citizens' stress. The analysis of variance also indicated that young people aged 18 to 46 years are more influenced by the factors in which environmental stressors are found.

Keywords: *Stress, city, psychological well-being, architecture*

[1] Assist. Prof. Dr., Konya Food and Agriculture University, Faculty of Enginering and Architecture, Department of Interior Architecture, E-mail: navid.khaleghi1363@gmail.com

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Stres ve Yapılı Çevre: Mimari ve Kentsel Etkilerin Değerlendirilmesi

Navid Khaleghimoghaddam[2]
ORCİD: 0000-0003-2505-207X

Öz

Bu çalışma, yapılı çevre ile kullanıcıların zihinsel esenliği arasındaki karmaşık ilişkiyi göz önünde bulundurarak mimari ve kentsel mekânların mahalle sakinlerinin stres düzeylerini hangi ölçülerde etkilediğini değerlendirmeyi amaçlamaktadır. Bunun için, geleneksel ve modern yaşam tarzlarının çatışma halinde olduğu ve birtakım kentsel sorunların görünür olmaya başladığı Konya şehrinin Aydoğdu mahallesi, alan araştırması için seçilmiştir. Veriler, mahallede strese neden olan çevresel faktörlere ilişkin anket ve stresi ölçmek için Dass Standart Anketi kullanılarak toplanmıştır. Veri analizi Pearson korelasyon katsayısı kullanılarak yapılmıştır ve sonuçlar çevresel faktörler ile mahallede stres oluşumu arasında anlamlı bir ilişki olduğunu göstermiştir. Buna göre, vatandaşların stresi ile çevresel nitelikler en büyük ilişkiye sahipken, iklimsel koşullar en az etkiye sahiptir. Regresyon analizi sonuçları, çevresel niteliklerin, görsel unsurların ve çevresel koşulların düzenlenmesinin vatandaşların stresinin %67'sini etkilediğini göstermiştir. Varyans analizi ayrıca 18 ile 46 yaş arası gençlerin çevresel stres faktörlerinin bulunduğu bileşenlerden daha fazla etkilendiğini göstermiştir.

Anahtar Kelimeler: *Stres, kent, psikolojik sağlık, mimarlık*

[2] Dr. Öğr. Üyesi, Konya Gıda ve Tarım Üniversitesi, Mühendislik ve Mimarlık Fakültesi, İç Mimarlık Bölümü, E-posta: navid.khaleghi1363@gmail.com

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Introduction

The world is urbanising at a rapid pace and most people now live in urban areas. Urban sprawl has led to environmental, health, cultural, social and civic health problems. The industrialisation of societies, population growth, immigration and urbanisation in most countries have changed health indicators so fundamentally that the increase in psychosocial issues and problems has brought about mental illness being the leading cause of disability and sudden death and these problems should be considered a major health priority in all societies (Murray, Bhavsar, Tripoli and Howes, 2017). A glimpse of the multiple dimensions of health as described by the World Health Organisation, which include physical health, mental well-being and social health, it is clear that mental health is the most significant strata. This assertion is based on the crucial premise that a comprehensive understanding of health remains incomplete if mental well-being is not taken into account (Bahadori, Pourjafar and Ranjbar, 2021). Environment is considered one of the most important determinants of mental health, along with innate characteristics, lifestyle, social and economic variables (Barton, Thomapson, Burgess and Grant, 2015; Farmanova, Bonneville and Bouchard, 2018). Unfortunately, today's cities have become a platform for automobile traffic and facilitating the movement of capital and goods without paying attention to people's mental needs. In 2010, mental disorders accounted for an average of 56.7 of the 258 million disabled people worldwide (Whiteford, Ferrari, Degenhardt, Feigin and Vos, 2015). In our modern age, characterised by unprecedented access to health information and an increasing emphasis on physical well-being, it is evident that society is increasingly attentive to individual health concerns. Amidst this zeal for physical health, however, an alarming trend is emerging: the neglect of mental well-being. Although attention to individual health is increasing, mental health is declining by the day (Office for National Statistics [ONS], 2017). Despite the abundance of self-care practises and wellness routines, rates of anxiety, depression and other mental health disorders continue to rise. This paradoxical phenomenon highlights the urgent need for a holistic approach to health — one that recognises the interconnectedness of physical and mental wellbeing.

Promoting health and hygiene is one of the World Health Organisation's Sustainable Development Vision 2030 goals. The United

Nations and the World Health Organisation call for a multi-faceted approach to mental health protection and prevention of psychological problems through the Comprehensive Mental Health Action Plan (Moorea et al., 2018). After the loss of peace in cities, people have suffered from illnesses such as depression, stress, anxiety, etc., causing behavioural abnormalities among citizens (Weijs-Perrée, Dane and van den Berg, 2020).

Studies suggest that exposure to architectural and urban structures is gradually rising, so much so that the 21st century has been called the century of management and communication, as well as the century of stress, anxiety and nervous disorders (Bandelow and Michaelis, 2015). The relationship between the physical environment and stress levels in various studies reveal that the design of the environment can directly or indirectly cause stress (Han, Wang, Seo, He and Jung 2022; Hoisington et al., 2019). The physical environment can play a basic role in causing or eliminating stress. Environmental anxiety tends to be troublesome and uncontrollable. These tensions change constantly or periodically at low to moderate levels (Pragati, Priya, Rajagopal and Pradeepa, 2022; Xiao, Zhao, Luo, Liu and Greenwood, 2022). Therefore, a weighty plan should be seriously considered to control stress through architectural and urban environments. Among the preeminent built environments that must be considered in controlling their environmental factors is the central and ancient structure of cities. Today, the old structure of cities based on the principles of local architecture and urban planning has changed and is in conflict with recent developments having become one of the most crowded and anxious urban structures.

The main focus here is to scrutinize the impact of the relationship between environmental factors and the development of stress among citizens, as well as the impact of individual characteristics such as age, gender, and education on the level of perceived stress due to these elements, which requires further research and investigation. Based on this, the current study tries to evaluate the relationship between these factors and perceived calmness or stress among residents of Aydogdu neighborhood in the Konya city context. This neighborhood has been undergoing change for a long time. It is meaningful to examine how the inhabitants of the neighborhood are affected by this process, especially the housing, the residents and the mental health of the citizens. Furthermore, located near the center of the old city of Konya, Aydoğdu neighborhood

has deteriorated due to the contrast between traditional and modern lifestyle. In addition to its proximity to the city center, the increase in pedestrian and cycling traffic have made it one of the most stressful neighborhoods in the city. Therefore, the present study aims to measure how the urban change process affects the psychology and mental health of citizens in this zone. In this respect, three hypotheses are proposed. First, there is a relationship among the environmental factors of architecture, urban space and citizen stress. Second, the factors mentioned above play effective role in the stress level of citizens. Third, individual characteristics such as age, gender, and education have an influence on the level of stress in architectural and urban spaces. In this context, the previous studies were first examined and reviewed so that the concept of stress and anxiety from the perspective of psychology was identified, the effects of architectural and urban spaces in reducing or increasing psychological pressure were reviewed, and the environmental factors that affect relaxation or psychological stress were evaluated. Then, the results of the studies were carefully classified and the effective criteria for stress in architectural and urban environments were presented in the form of a conceptual research model. In the next step, the relevant criteria were measured among the residents of the studied neighborhood using a questionnaire, and the environmental factors affecting stress were evaluated from their perspectives. Finally, suggestions were made to improve the environmental design and health of the users.

Theoretical Framework

Stress and anxiety

Considering that the environment has an impact on people's mental health and sense of peace and comfort, and people spend a lot of time in architectural and physical environments. Therefore, special attention should be paid to improving people's mental health and regarding their mental well-being in contemporary architecture and urban planning. Huang, Kung, and Hu (2021) showed that five types of built environment were significantly related to depression symptoms in adults. In this regard, of the two types of built environment, 'health services' and 'schools' were less associated with the possibility of depression, while 'cultural and historical facilities', 'entertainment and amusement sites',

and 'country games and sports fields' were significantly affiliated with an increased risk of depression. Tao, Yang, and Chai (2019), based on a social-ecological approach, evaluated the relationship between the built environment and mental health by examining perceived disorders and social interactions under the concept of neighborhood effect. They showed that individual mental health is influenced by the physical environment at the neighborhood level through population density, street connectivity, interaction, and proximity to parks.

Another study conducted by Chen, Zaid, and Nazarali (2016) on the influence of rural and urban living on residents' psyche suggests that urbanization affects a person's psychological environment and urban residents are more susceptible to some personality traits that may be detrimental to a person's mental health. Rishi and Khuntia (2012) proposed that although people described their city as pleasant, they still experienced high levels of stress. The main reason was the presence of noise, accumulation of garbage, air polluted by smoke, and unhealthy environment in slums. This suggests that urban planners should give equal priority to access to natural resources and the environment. Corraliza, Collado and Bethelmy (2017) suggest that nature builds resilience in children, such that children who have more contact with nature are better equipped to withstand hardships than children who do not have daily access to nature. The results of Grahn and Stigsdotter (2010) reveal that people generally prefer quiet and relaxing environments. Based on these results, environmental qualities, nature, functional diversity, shelter, landscape, and social interaction are other factors associated with stress levels.

Any circumstance that affects the well-being of a living creature causes worry. Conflict and various sorts of failure are among the causes of anxiety. The risk of physical injury, the threat to a person's dignity, and the pressure to do things that are beyond human capabilities also cause a person to feel anxious. Indeed, this is an unpleasant emotion expressed in terms of worry, fear, panic, and dread. Anything that disrupts the biological integrity of the organism is considered stress (Sadock, Sadock and Ruiz, 2014). Stress is a condition that arises from the interaction between an individual and the environment that causes psychological and social disharmony. Basically, it is considered the sum of physical, mental, emotional, and behavioral responses exhibited by the organism against

internal or external factors that disturb the stability and natural and internal balance of the body.

Nonetheless, many psychologists believe the difference between anxiety and fear is legitimate, and others have described anxiety as vaguely frightened. At the same time, it is still not possible to distinguish between these two emotions, either on the basis of physiological reactions or of the descriptions a person gives of his feelings. Attributes such as bad, contradictory, frightening, tense, disproportionate, and heavy convey excitement, anxiety and fear. The appearance of these characteristics is easily seen in the body of the city. The spaces that have these characteristics trigger a sense of anxiety and stress in the viewer, and the desire to be in that space is reduced (Nicolas, Martinent, Palinkas and Suedfeld, 2022).

The effect of physical environment on psychological pressure

In addition to the variables of age, gender, and heredity, lifestyle, local social structure, work environment, residential environment, economic-social-cultural status, and environmental condition all have an impact on people's health. The poor quality of the urban environment, air pollution, improper management of urban waste, noise pollution, and the harmful effects of toxic chemicals and heavy metals such as lead and mercury can threaten the lives of metropolitan residents (Bu, Mak, Steptoe, Wheeler and Fancourt 2022). Chronic environmental illnesses are caused by a lack of safety in cities and residential areas, isolation, depression, and social loneliness in cities, as well as inhabitants' overdependence on autos and inactivity. Moreover, environmental health risk factors such as wrath and traffic rage, indifference to the environment, a lack of connection to the urban and residential environments, everyday worry, and stress irritate individuals and contribute to a dangerous cycle of chronic diseases (Fitzpatrick and Willis, 2020). Therefore, it is necessary to recognize the negative impacts of urban development and housing on public health and promote healthy urban living. High-quality urban spaces provide a platform for social interactions and the development of individual skills and abilities, attracting people, work, and even wildlife and birds at micro and macro scales. Low-quality spaces, on the other hand, lead to poor social status and deterioration of environmental and economic quality (Shao, Weng, Liou, Lo and Jiang, 2019).

Physical environments can play a crucial role in creating understanding, providing a sense of participation, and establishing intimate relationships between people. The sense of participation is lower in cities where there are no public spaces and recreational areas than in other cities. Urban spaces have a tremendous impact on people's mood, attitude, and understanding of space, as well as their view of society. Those who live in suitable places have the characteristics of fascination, homogeneity and compatibility, which effectively reduce the psychological pressure of users. Architects and urban planners are able to influence the pattern of activities through design, create favorable and unfavorable conditions, and build lively or soulless cities (Zhoong, Schroder and Bekkering, 2022). Thus, if designers learn more about the environment, human behavior, and environmental sociology, they may construct settings that meet the demands of their users. A comprehensive understanding of environmental dynamics, human psychology, and sociological principles provides designers with the knowledge they need to creat environments that cater to their users' requirements and address their emotional and psychological expects in a profound way. By digging into the complexities of environmental sociology, designers may understand the intricate interaction between people and their environments, allowing them to create settings that promote a sense of belonging, well-being, and productivity. This multidisciplinary approach not only improves the effectiveness of design solutions but also emphasizes the ethical need to build sustainable, inclusive settings that enrich the human experience.

Factors affecting relaxation and psycholojical stress

In the relentless rhythm of modern life, the pursuit of relaxation and the struggle against mental stress have become integral parts of our daily lives. The human mind and body are constantly exposed to a number of influences that can either promote calm or trigger anxiety. Understanding these factors is critical to achieve mental and emotional balance. This study aims to unravel the intricate web of elements that shape users' experience of relaxation and stress, ranging from individual characteristics and coping mechanisms to external circumstances and societal pressures. By analyzing these factors, we embark on a journey toward greater self-knowledge and the ability to strengthen resilience in the face of life's myriad challenges.

Security: In some texts a distinction is made between safety and security. Security refers to the physical health of the person and the prevention of threats that can endanger physical health, and also includes material aspects and external security, while safety tends to focus more on mental and psychological well-being. It encompasses aspects such as emotional stability, peace of mind, and freedom from fear or anxiety (Wonderly, 2019). Security has two dimensions: subjective and objective. In the objective dimension, security involves the absence of threats to acquired values; in the mental dimension, it entails not being concerned that these values would be challenged. Thus, it consists of two main elements, threat and opportunity, and the establishment of security depends on the relative freedom from threats and the proper use of opportunities (Huesca Gonzalez, Grimaldo-Santamaría and Quicios García, 2021). The classifications made by some theorists and psychologists in the field of hierarchy of needs show that they all agree in giving priority to the category of security as a basic human need. On the other hand, safety is considered one of the most important indicators of the quality of urban life, so this index directly and indirectly influences people's attitudes and behavior in daily life.

Visual Comfort: It is one of the fundamental components of a safe environment. There are many factors to achieve visual comfort in physicality. These include the elimination of visual pollution, light, the colors used in the facade of buildings, visual qualities of natural and artificial landscapes, the amount of light and illumination of the urban setting, especially at night, the quality of access to urban space, the transportation network and urban facilities (Xue, Fan, Dong, Hu and Yue, 2022). Yadav (2019) divides the built environment into three categories: homogeneous, aggressive, and comfortable. He considers a comfortable environment as one that, despite the presence of a large number of different elements, has become more desirable through features such as curved lines in thickness, a variety of colors, surfaces, sizes, shapes, and colors closer to the natural surrounding.

Environmental quality and vitality: The vitality, dynamism, and attractiveness of urban space and architecture reflect the types of activities that take place and can be effective in relieving stress. Numerous experts have presented various qualities to achieve a high quality urban environment, but the ideas are bifurcated. Some theories

that emphasize the objective realm of the individual have considered the quality of the urban spaces as an inherent quality and property of the physical surrounding and independent of the observer, so that the qualities clearly comes from the 'form' of the environment. The second category, based on the individual's mental field, considers urban spatial quality to be a 'phenomenon' or 'event' that occurs from the combination of physical, tangible elements, cultural patterns, codes, and the individual's mental faculties (Fang, He and Wang, 2021). In addition to vitality, qualities such as legibility, sense of belonging, flexibility, visual features, quality of public space, harmony with nature, climatic comfort, permeability, sensory richness, safety, efficiency, and cleanliness enrich architectural and urban design (Istrate and Chen, 2022). Relied on the comprehensive review and a process-oriented approach towards fostering peace within the built environment, it can be deduced that four key factors – environmental security, visual aesthetics, vitality and environmental quality, and climatic conditions – play pivotal roles in cultivating a profound sense of vitality within urban environments and architectural spaces. These factors not only instill a deep-rooted attachment to the place but also promote a state of tranquility among individuals. Figure 1 illustrates the conceptual model of the study, while table 1 provides an overview of the principal architectural and urban components, as well as their respective subcomponents, which exert an influence on stress level of users.

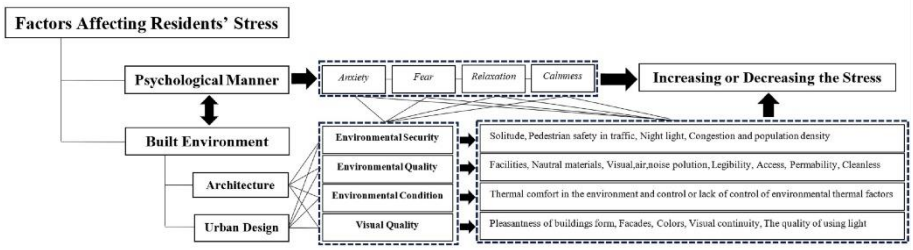

Figure 1. The conceptual model of the study

Table 1. Architectural and urban factors affecting stress level of residents in Aydogdu neighborhood

Components	Effective Factors
Environmental security	Spatial solitude Pedestrian safety in traffic Night light Congestion and population density
Environmental quality	Service facilities Natural materials Visual, air, and noise polution Legibility Accessibility & Permability Cleanless
Environmental condition	Thermal confort in the environment and control or lack of control of environmental thermal facades
Visual qualities	Pleasantness of buildings form and facades The quality of colors Visual continuity The quality of using light

Methodology

As the method, a descriptive-correlational research approach was employed, which included administering a survey instrument. The 'stress' level of residents is considered as a dependent variable, while 'environmental security', 'environmental qualities', 'climatic conditions' and 'visual qualities' are introduced as independent variables, each with their specific sub-variables, and the correlations between them are studied. The statistical population of the study consisted of the residents of Aydogdu neighborhood in Konya city. The number of participants was set at 324 (160 males and 164 females; M = 34.55) using the Cochran formula. They were randomly selected and were all located at the case study site. The survey was distributed to participants during personal visits. An ethics committee approval was forwarded to the relevant body of the Konya Food and Agriculture University. The content of the survey included 15 questions to assess the factors that influence the stress level of residents in the architectural and urban space. In this respect, the relevant questions were categorazed according to the four dimensions of environmental security, environmental quality, environmental condition, and visual qualities, considered in Table 1 and Figure 1.

Four questions were evaluated regarding the effective factors of security component (*Spatial Solitude:* It is possible for me to walk, sit, relax, and calmly observe different areas of the neighborhood; *Pedestrian Safety:* I cannot easily cross the streets, also, parking automobiles in my neighborhood's streets and open areas have generated congestion; *Night Light:* Lighting of walkways has increased security during the night and give me a sense of calm and serenity; *Congestion and population density:* I'm not comfortable being outside the home because of the presence of unknown persons in open places and tunnels).

Six questions were used about the effective factors of environmental quality component (*Service Facilities:* The existence of services such as bus stations, bank ATMs, kiosks, green spaces, etc. have provided comfort and convenience and reinforced residents' satisfaction; *Natural Materials:* The open spaces of the neighborhood and the natural materials surroundings make it possible to see a green landscape, walk in it calmly, and relax after a long day at work; *Visual, air, and noise polution:* The sounds I hear are not disturbing and the various spaces of my neighborhood provide me with the opportunity to get away from disturbing noises or odors, and I feel quiet and peaceful; *Legibility:* The physical environment of the neighborhood such as paths, nodes, landmarks, alleys or streets are clear and recognisable and this makes me feel safe; *Accessibility and Permability:* I arrive at my neighborhood and access its various spaces very easily. Generally, it is easy to reach in the city and is easy to navigate; *Cleanless:* The cleanliness of the neighborhood has caused me to feel fresh and I'm comfortable being outside the home).

One question was asked as to the effective factor of environmental conditions (*Thermal Comfort:* How would you rate the overall thermal comfort of your neighborhood during different seasons (e.g., summer, winter, spring, fall)? Please consider factors such as temperature, humidity, wind conditions, and shade availability when answering), and three questions were assessed for the effective factors of visual quality component (*Forms and Facades:* The shapes of new buildings and other elements in the neighborhood are pleasant, coordinated, do not cloud my mind with inconsistency, and they look warm and inviting; *Colors and Lighting Quality:* Generally the new colors and lighting systems used in neighborhood environment give me a sense of calm and serenity; *Visual Continuity:* I enjoy walking on a continuous path that passes new houses and buildings, plants, trees, shops, etc.).

The questions were rated on a Likert scale of very low, low, medium, high, and very high. The validity of the survey was confirmed by a pilot study with 30 users. Surveys were distributed and collected over three days. Each survey took 6-8 minutes to complete. The Cronbach's alpha coefficient for this phase was 0.89. In order to check stress, Dass test questionnaire was used. Pearson coefficients were applied to determine the relationship between the dependent factors and the subscales of the DASS standard questionnaire (stress). The results of the analyses were evaluated through the magnitude and significance of the correlation coefficient, and it was discovered that the dependent variables rose as DASS scores increased. Regression modelling was utilized to ascertain how the dependent factors affected the results of the standard DASS questionnaire. Multiple regression analysis assessed the extent to which the relevant factors could be explained by a number of independent variables (DASS scores). These analyses were interpreted using statistical measures such as regression coefficients, p-values and coefficients of determination. Factor analysis was then employed to further investigate the relationship between the subscales of the DASS standard questionnaire and the dependent factors and to determine which DASS scales were more strongly associated with the dependent factors. Cronbach's alpha coefficient of this questionnaire was also 0.82. The results were analysed operating inferential statistical methods and SPSS software. In this research, given that the assumptions of the test are parametric, parametric tests of correlation, regression and covariance analysis have been conducted. Analysis of covariance was performed to examine the link between the variables from the correlation coefficient and the predictive power of the variables from the regression, and to examine the differences in age and education considering that the number of their subgroups was more than three groups. Indeed, rigorous statistical techniques were applied to ensure the robustness of findings and meaningful conclusions.

Case study

Aydogdu is a neighborhood in Meram district of Konya city. The location is 30 minutes' walk to the center (Alaaddin Hill), 7 minutes by car. Population of the neighborhood: 12,372 people for 2018, 12,129 for 2019,

11,907 for 2020, 11823 for 2021, 11,687 for 2022, and 11752 for 2023. 15,000 people are expected for 2024 or 2025. Aydogdu's general housing type is single-family houses and low-rise buildings. Due to constantly urban change, more and more high-rise buildings have been built in recent years. The residents of the neighborhood want urban redevelopment and changes because of the old buildings, but they are affected mentally, psychologically, and financially by the slow pace of this process. Yet, seems that the neighborhood has recently become very liveable because of the ageing buildings and an increas of the quality of the building stock. Of course, the number of people moving out of or into the neighborhood has greatly risen. It is supposed that such change is having a negative impact on the spirit of the place. Due to urban change, there are more and more empty properties and vacant houses. The tension created by these empty buildings does not create a warm public perception of urban change. As the erasing approach is applied, the public prefers not to focus on aspects such as the relevance of the newly constructed buildings and their compatibility with the local culture. Because of the ageing of the roads and the tardy introduction of natural gas, the frequency of potholes and height inequalities on the roadways is rather considerable. Due to urban development, it appears that the majority of them are not restored, which may cause stress for inhabitants.

Figure 2. The location of case study in the city of Konya (First row: satellites.pro/Google_plan/Konya map; Second row: Google Map; Third row: Author)

Findings and discussion

Based on the first hypothesis, to study the relationship between the architectural and urban spaces factors and the stress of citizens, Pearson's correlation coefficient was calculated and the results are presented in Table 2. As shown, the environmental quality has the highest correlation coefficient of $r=0.79$, $p < 0.01$ with the stress of residents, and it means that by improving the quality of visual elements, this is reduced, and the adjustment of climatic environmental conditions also has the lowest correlation ($r=0.34$, $p < 0.01$). But, all relationships are significant at the 0.01 level; that is, with a certainty of 0.99, it can be said that as environmental factors improve, stress level of citizens decrease.

Table 2. The relationship between the environmental factors and the stress level of residents

Variable	Statistical index of predictor variable	Correlation coefficient (r)	Significance level (p)
Stress	Environmental security	0.68	0.000
	Environmental quality	0.79	0.000
	Environmental Condition	0.34	0.000
	Visual Qualities	0.62	0.000

To negotiate the second hypothesis, the environmental factors are able to figure the stress level of citizens, a multivariable regression analysis was performed under the assumptions of linearity, normality, and constant data variance. As the results show, in the first step, the environmental qualities were used in the equation, which had a predictive power of 0.72. This means that such dimension was able to explain 0.50 of the variance in stress. In the second step, the predictive power increased to 0.76 by adding the second dimension, i.e., the feeling of security in the environment, which means that the two mentioned dimensions together

explained 0.58 of the stress. In the third step, adding the third dimension, i.e., the quality of visual elements, increased the predictive power to 0.81; this means that the aforementioned three dimensions together explained 0.64 of the stress variance. Finally, adding the environmental climate increased the predictive power to 0.80. That is, they explained 0.67 of the stress of the citizens. In addition, in order to determine the contribution of each of the dimensions of the environmental factors of the architectural and urban spaces on the stress of the residents of the neighborhood based on the beta regression coefficients, it is noteworthy that the contribution of the environmental qualities, the feeling of security, the quality of the visual elements, and the environmental condition respectively are 24%, 21%, 29%, and 17%.

Table 3. Regression model fitting results

Step	Predictor variable	R	R2	B	Beta	T
1	Environmental quality	0.72	0.50	0.42	0.78	19.14
2	Environmental quality	0.76	0.58	0.36	0.49	14.58
	Environmental security			0.16	0.34	7.58
3	Environmental quality	0.81	0.64	0.21	0.36	9.11
	Environmental security			0.19	0.22	9.36
	Visual quality			0.16	0.24	8.88
4	Environmental quality	0.80	0.67	0.19	0.24	6.05
	Environmental security			0.16	0.21	6.01
	Visual quality			0.14	0.29	6.13
	Environmental condition			0.12	0.17	6.09

In order to test the third hypothesis of the research that there is a relationship between individual characteristics and the level of stress, the results showed that individual characteristics such as age, gender and education are effective on their stress level in built environments. T-test for independent groups was used to check the difference in stress according to gender, and the results are shown in Table 4. As the results demonstrate, according to the obtained averages, the difference between the average stress of women and men is only 0.049. Considering that the obtained t value is lower than the critical level of t (range 1.96 to-1.96) and the significance level is higher than 0.05, therefore there is no major difference in the level of stress according to gender.

Table 4. The difference in stress level of citizens according to gender

Variable	Gender	Avarage	Avarage Differences	df	t	Significance Level
Stress	Men	2.41	0.0493	312	-0.572	0.14
	Women	2.35				

A one-way analysis of variance (ANOVA) was employed to explore variations in stress levels among citizens concerning their age, with the resultant findings detailed in Table 5. Analysis of the data presented in this table reveals statistically notable distinction in stress levels among neighborhood residents, stemming from disparities in age and educational background. This conclusion is supported by the observation that in both instances, the F-statistic exceeds the critical value (Degrees of Freedom: 5 and 360), and the corresponding p-value is less than 0.05, indicating statistical significance. To pinpoint which specific groups exhibit remarkable differences, Tukey's Post Hoc Test was subsequently applied.

Table 5. One-way analysis of variance to investigate the stress of citizens according to age and education

Variable	Freedom Degree	Mean Square	F Value	Significance Level
Age	7.165	5	1.552	0.032
	181.323	360	0.629	
	200.412	365		
Education	5.698	5	0.841	0.030
	139.514	360	0.366	
	144.952	365		

Table 6. Difference of significance level in age groups of 18 to 46 years old and citizens over 60 years old

Variable	Groups Differences		Avarage Differences	Standard Error	Significance Level
Age	18-46 years	Under 18	-0.104	0.141	0.842
	old with	46 to 60	-0.202	0.158	0.682
	Women	Over 60	-0.572*	0.184	0.012

Table 6 shows that there is a main difference between residents aged 18 to 46 years and residents over 60 years. There is no clear distinction among the other groups according to the significance level determined in the corresponding table. However, the variance between these two groups

is important based on the calculated significance level (0.012), which is less than 0.05. Considering that the calculated average difference is -0.572, it means that the average stress of citizens over 60 years old is 0.572 lower than that of residents between 18 and 46 years old. This means that residents between 18 and 46 years old are more stressed than those over 60. It can be supposed that this is influenced by the built environment, or personal factors such as economic difficulties or the anxiety over the future. Regarding the level of education, the results show that this difference is serious between the two groups of citizens with a diploma and those with a Phd degree, as shown by the calculated significance level (0.015), which is notable according to the average difference (-0.455). It can be concluded that citizens with a college degree have less stress than citizens with less than a diploma.

Conclusion

Physical environments have always been a source of crowding, traffic, pollution, and insecurity since modern era, and as the city grew larger, so did its problems. These problems have led to various changes in the mental and physical state of the residents, of which the presence of stress is one of the most significant, hence the majority of people living in cities and urban neighborhoods constantly experience stress in their environment. In this research, by analyzing the results and measuring the correlation between the variables, it was shown that there is a crucial relationship between the environmental factors and the generation of stress, with the factor of qualities having the greatest relationship and the climatic factors having the least relationship with the stress of citizens. From this point and the author's field observation, two basic issues can be proposed. First, although the narrow streets and the organic structure cause daily landscaping problems, the trees along the streets protect the old texture by providing sufficient shade. Second, although the sense of security is by default considered the first factor for peace, this factor is second by a small margin in this neighborhood, and especially the real residents are not very dissatisfied with the security of the neighborhood. This point shows that despite the social change of the residents in the present time, the feeling of security has not yet become a crisis factor, which may be due, among other things, to the average social class and the

significant pedestrian traffic around and in the center of the neighborhood.

Also, the results of regression analysis indicated that environmental qualities, visual elements, and regulation of physical conditions predicted 67% of stress. This suggests that these elements have a great role in determining the stress level, which should be given serious attention in urban planning and design. Additionally, the analysis of variance also suggested that young people aged 18 to 46 years are more influenced by the factors in which environmental stressors are found. Therefore, it is necessary to make more efforts to reduce their anexity by strengthening vitality and creating entertainment spaces. The current study explored the causes of stress in a neighborhood and identified their respective roles, and following its findings can provide the possibility to regulate and prioritize stress-reduction strategies in the urban environment.

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Navid Khaleghimoghaddam

Mimarlık alanında doktora unvanına sahiptir. Konya Gıda ve Tarım Üniversitesi İç Mimarlık Bölümünde Doktor Öğretim Üyesi olarak çalışmaktadır. Nöro-mimari, bilişsel psikoloji, çevre psikolojisi alanlarını inceleyerek beynin duygusal davranışını ve mekânsal algılama mekanizmasını araştırır. Ayrıca, ibadet ve şifa

mekânları ve mimarlık eğitimi gibi konular üzerinde psikolojik ve fizyolojik yaklaşımlara dayanarak çalışmaktadır.

Holds a doctorate in architecture. Works as an assistant professor at the Department of Interior Architecture at Konya Food and Agriculture University. In general, studies on key topics in architecture and neuroscience with psychological and physiological approaches, such as the study of the brain's perceptual mechanism and emotional behavior, spaces of worship and healing, neuro-architecture, cognitive psychology, environmental psychology, and architectural education.

E-posta: navid.khaleghi1363@gmail.com