Journal of Advanced Zoology
ISSN: 0253-7214
Volume 44 Issue S7 Year 2023 Page 2060-2068

On The Study Of Environmental Factors Affecting Stress Reduction For Young Users In Local Small Urban Parks: A Structural Equation Modeling Approach

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Abstract

This research aims to provide a structural equation model of the environmental variables that affect young users' daily stress reduction in local small parks. This study is an applied research that employs descriptive correlational methodology. The statistical population consisted of students from Shahid Beheshti University and Shahid Rajaei University using the small local parks in Tehran's distinct 1 and 4, which are the paper's case studies. Negin Park, Golrizan Park, Golestan Yekom Park, and Sha'banloo Park are the small local parks studied in this research. These parks are in the Velenjak neighborhoods in Distinct 1 and the Shian and Lavizan neighborhoods in Distinct 4. In this research, 30 users in the pilot neighborhood completed questionnaires. The Cronbach's alpha value is 0.814, indicating that the questions have suitable reliability. The authors used AMOS software for the structural equation modeling. The results demonstrate that the model fit was acceptable and congruent with the reality of the community. Readability directly and meaningfully affects the sense of belonging. It means that higher readability of the environment leads to a greater sense of belonging. In addition, environmental variety has a direct and significant impact on one's sense of belonging. It indicates that increasing environmental variety leads to a greater sense of belonging. On the other hand, the readability of the local park has a substantial effect on the mediating role of sociability and environmental responsiveness on the experience of security. However, the non-direct connection of variety with a sense of security was not significant.

Keywords: Stress Reduction, Environmental Factors, Structural Equation Modeling, Local Small Parks.

Introduction

Stress and the reduction of everyday stressors are crucial social issues (Nicoară ND, et al., 2023). Today, almost everyone is familiar with the "stress" word because it has become an inseparable part of human life, and people have been dealing with stressful events since childhood (Iranpour, 2018, p. 61). Stress arises as a result of actual or mental challenges and problems. In another definition, stress refers to the overall reactions of humans to unexpected and incompatible internal and external factors so that when the internal or external

balance is disrupted, stress occurs (Tarsa, 2017, p. 136). Recent research indicates high anxiety scores in Iran (Damari et al., 2019).

Green parks and other public areas are particularly significant for city living quality. Most significantly, green spaces serve as areas for leisure and recreation as well as social gathering places and improve the city's climate. Natural environments are getting smaller and pushed farther from the city centers as a result of urban expansion. This conflicting development pattern is driven by people's innate tendency to gravitate towards relatively natural places that provide opportunities for mental renewal (van den Berg, Hartig, and Staats 2007). Air pollution, heat stress, high transportation density, visual overload, and occupational pressures are all connected with health risks in urban areas (Gong et al. 2016). Social stressors such as traffic and fear of violence have also been identified as sources of health risks (Bogar and Beyer, 2016). The world is experiencing modern urbanization, with 70% of the world's population expected to reside in cities by 2050. This trend is especially noticeable in developing nations, where populations are becoming increasingly disconnected from natural landscapes (Wang et al., 2019). As a result of the decreased availability of natural places, ailments associated with urban living, such as stress, have emerged. Reducing stress is essential to a healthy urban lifestyle because it is closely related to mental health. Studies indicate a connection between human health and the sensory experience of the natural environment (Grahn & Stigsdotter, 2010). Many urban communities face health issues due to psychological stress and a sedentary lifestyle. Thus, urban green spaces as revitalizing environments are proposed as a shield against high-stress urban life.

The fact that countries devote over three percent of their national budget to managing and controlling stress (Azad Marzabadi and Salimi, 2004) is evidence of the significance of stress and its detrimental effects on people's physical and mental well-being. Stress is known to be linked to several physical and mental illnesses or the onset, progression, and aggravation of these illnesses. Stress has also been linked to activity, and to achieve optimal performance, people need a healthy balance of stress because, in the absence of stress, people will not put forth the effort required to complete tasks. Excessive stress, on the other hand, impairs performance and decreases production. As a result, addressing the issue of stress is critical.

This study focuses on the impact of environmental elements in stress reduction in small urban green spaces to explicate the role and importance of different factors because there is limited research about them. Most studies have concentrated on stress-inducing elements in city dwellers and the role of stress reduction in improving quality of life. In research on pocket parks undertaken in Iran, more emphasis has been placed on how to intervene in the creation of this sort of park in abandoned spaces, as well as the social role of these parks (Heidari Bakhsh). Global research has primarily focused on the social aspects of smaller parks, with only a few studies addressing the usefulness of tiny local parks for physical activity. There have been no organized studies on stress and small-scale green areas in Iran. The topic discussed in this study has not been addressed in earlier studies. As a result, it would be an effective step in identifying the factors influencing stress reduction and implementing them by urban green space architects and designers to improve the quality of the country's urban parks.

Theoretical Foundations of Research

Small-Scale Local Parks (Pocket Parks)

A pocket park is a place we use to put our hands in our pockets and feel warmth, security, and seclusion. A pocket park may be considered a hand-made warm space that provides a small haven for people (Iwashita, 1988). Some define pocket parks as small spaces in densely populated cities, surrounded by tall buildings and open on one side (Gollwitzer, 1968), which is the definition that refers to the first pocket park built in the Parley Park neighborhood of New York City in 1967. Others define them as natural spaces on the city surface cared for by residents with the aim of wildlife conservation (Little, 2011). Different studies have provided their own specific definitions for pocket parks. A small green space can also enhance social interactions by creating meeting points and pathways that encourage people to walk or bike, making the city more vibrant (Ward Thompson and Travlou, 2007) and promoting public health through increased physical activity (Reijneveld, 2007).

The Impact of Sense of Belonging on Stress Reduction

The sense of belonging is an essential and efficient part of the relationship between humans and the environment. One criterion used to assess the quality of the environment is the sensation of belonging, and characteristics like the form and arrangement of the physical elements are vital in forming this feeling of belonging. An effective connection between individuals and places—such as their house, neighborhood, or preferred leisure spots—is known as the sense of belonging to a place. On the other hand, the sense of belonging to a place is part of an individual, including meanings, thoughts, and values that define a person's

identity and are closely related to places. An individual feels a sense of belonging and affinity to a location when they are identified by it (Subiza-Pérez, Vozmediano, and San Juan, 2020).
Evidence indicates that the level of perceptual recovery can be influenced by individuals' various experiences, their connection to nature, and their social contexts (Bowler et al., 2010). Additionally, self-regulation with particular qualities of well-known locations matters more than interesting scenic features (Korpela et al., 2010). Furthermore, studies demonstrate that the natural landscape might have a higher impact on people's feelings of place attachment than social aspects. A natural environment with strong and distinct local characteristics usually creates a sense of place attachment (Scannell and Gifford, 2010). Research indicates that experiencing a sense of identity and belonging in particular places can improve one's chances of restoration. Additionally, those who spend time in natural and green urban environments express a stronger sense of place belonging, and health compared to those who do not (Knez and Eliasson, 2017; Carrus et al., 2016).
Previous studies have shown that attachment to a place can ultimately bestow restoration capabilities to places or natural environments. For example, a study demonstrated that exposure to natural environments increased individuals' cognitive capacity, but only when nature was accompanied by a prominent identity feature (Morton et al., 2017).
In other words, a sense of belonging to a place enhances the potential for restorative and reduces daily stressors in a natural or artificial environment. Specific factors associated with a sense of belonging to a place, such as familiarity, type of environment (urban or natural), and preferences, have been identified as influential factors in the degree of restoration. Therefore, the restorative potential of the environment can be strengthened by individuals' environmental preferences (Hartig and Staats, 2006).

The Impact of Variety on Stress Reduction

Variety is one of the spatial aspects that can be characterized in a variety of ways, including distinct materials and diverse flora cover, resulting in variation in space height and shape, color, and other physical properties. Maintaining harmony and cooperation between the elements of space is important in creating variation in space. Increasing spatial diversity has a significant impact on spatial appeal. A few studies have also investigated the relationship between the biodiversity of green spaces (typically defined in terms of species diversity) and mental revitalization and stress reduction. It has been demonstrated that images with higher biodiversity are associated with patterns of brain activity that indicate increased attention when compared to those with lower biodiversity (Johansson et al., 2014). Thus, one of the variables contributing to mental restoration is increased attention, which raises the factor of mental restoration (Young et al., 2020).
Evidence has shown that the number of plant species in green spaces is positively related to the perceived quality of "distinct identity". Although many visitors who do not have a background in biology or have limited knowledge about plants and animals may have a low ability to recognize the number of species and may not perceive all biodiversity in urban green environments accurately, inferring biodiversity may be overestimated or underestimated from the actual level (Dallimer et al., 2012). It has been concluded in a study that psychological revitalization in visitors does not correlate with actual biodiversity in urban green environments, but is associated with the perceived biodiversity (Dallimer et al., 2012). In a study, a lack of evidence regarding the positive relationship between species diversity and the psychological restoration of urban green space visitors has been reported. However, a significant relationship has been observed between the perceived biodiversity of the site and the sense of connection with nature, which is associated with psychological restoration (Southon et al., 2018). In another study, it has been stated that perceptual environmental conditions can have a much greater impact than those measured objectively, and this form of cognitive bias can significantly affect the psychological well-being that visitors experience in urban green environments (Coldwell and Evans, 2018). In conclusion, to establish a specific relationship between species diversity and the psychological revitalization of visitors in urban green environments, further studies are needed to understand the underlying processes.

The Impact of Sense of Security on Stress Reduction

Security, like many topics in the social sciences, lacks a unifying definition, and several definitions might be used for distinct tangible and mental components of it. According to several ideas, security can be defined as independence from threats. According to Abraham Maslow's hierarchy of wants, the second need of an individual is security. In urban contexts, a lack of security, feelings of danger, and fear of crime contribute to a drop in the usage of public places and inefficiency.
In other words, the sense of security is considered one of the important indicators of urban quality of life. One of the most crucial factors affecting people's decisions to attend and spend leisure time in recreational areas like parks is security. The spatial structure is useful in developing a sense of security and, consequently,

lowering people's stress levels, as do other markers like enough illumination at night, readability, and social acceptability of the environment. Parks, as urban green islands, have the potential to create microclimates at the city level. Environmental comfort also becomes an effective factor in increasing the sense of pleasure and satisfaction in using parks and their psychological services, turning parks into prominent behavioral centers in the city (Shakibaei and Saeedi-Mofrad, 2021). Physical comfort is unquestionably linked to mental tranquility. Thus, parks can play a significant role in minimizing typical urban visual and aural pollution and, through suitable design provisions, provide the best environmental conditions in their scales, thus lowering people's everyday stress levels.

The Impact of Sociability on Stress Reduction

Sociability is one of the concepts used in environmental psychology, referring to spaces that serve multiple purposes and provide various daily activities for users, facilitating social interactions. Establishing an appropriate level of collective interactions in living environments is considered one of the effective components in perceiving life quality. Some theorists emphasize the impact of this quality on attachment to living spaces (Daneshgar Moghadam et al., 2011). Participation and involvement in social activities are important variables in achieving pleasure and satisfaction. A small green area can boost social connections by establishing meeting places and routes that encourage people to walk or ride their bikes, making the city more active and dynamic (Ward Thompson and Travlou, 2007). Placing oneself among others and communicating with them in a public urban environment reduces daily mental pressures. As a result, sociability is one of the environmental factors influencing stress reduction.

Research Method

This study is an applied research that employs descriptive correlational methodology. The statistical population consisted of students using small urban parks. The statistical population consisted of students from Shahid Beheshti University and Shahid Rajaei University using the small local parks in Tehran's distinct 1 and 4, which are the paper's case studies. Negin Park, Golrizan Park, Golestan Yekom Park, and Sha'banloo Park are the small local parks studied in this research. These parks are in the Velenjak neighborhoods in Distinct 1 and the Shian and Lavizan neighborhoods in Distinct 4.

In this research, 30 users in the pilot neighborhood completed questionnaires. The analysis of the questions showed internal consistency and an appropriate reliability coefficient. The Cronbach's alpha value is 0.814, indicating that the questions have suitable reliability. The authors used AMOS software for the path analysis and structural equation modeling.

Findings

The established model between environmental-physical components and the stress of users in small local parks, along with the path coefficients, is shown in Figure 1.

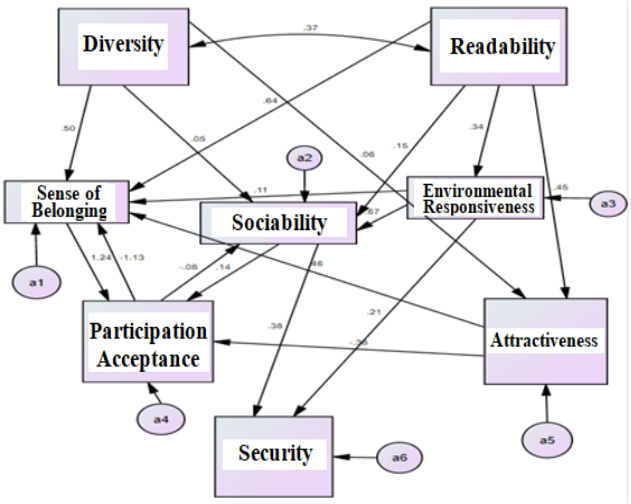

Figure 1. Final Model of the Relationship between Environmental Components and Stress Reduction in Young Users (Source: Author)

Based on the calculation of the effect size of the model on the variables and according to Table 1, it can be generally concluded that attractiveness influences approximately 22%, environment responsiveness about 11%, participation about 35%, sense of belonging around 65%, sense of security about 30%, and sociability about 51%.

Table 1. Determining the Effect Size of the Model on the Variables under Discussion

R	Effect Size (R2)	Related Factor	Factor
0.477	0.228	Attractiveness	**F6**
0.340	0.116	Environmental Responsiveness	**F4**
0.592	-0.351	Participation Acceptance	**F2**
0.714	0.511	Sociability	**F1**
0.809	-0.656	Sense of Belonging	**F5**
0.550	-0.303	Security	**F8**

In fact, path analysis helps identify the mechanisms through which variables affect each other and reports on the relationships between variables in the real world. Additionally, it reveals some hidden relationships between variables that may not be observable in the real world. Table (2) provides the standardized direct, indirect, and total effects.

Table 2. Standardized Direct, Indirect, and Total Effects (Source: Author)

Standard Error	Total Standard Effects	Standard Indirect Relationship	Standard Direct Relationship (Regression Weights)	Relationship of Two Variables
0.075	0.340**	0.000	0.340**	**Readability to Environmental Responsiveness**
0.033	0.451**	0.000	0.451**	**Readability to Attractiveness**
0.056	0.063--	0.000	0.063--	**Diversity to Attractiveness**
0.117	0.426**	-0.213--	0.639**	**Readability to Sense of Belonging**
0.118	0.342**	0.193**	0.149*	**Readability to Sociability**
0.161	0.228**	-0.268**	0.495**	**Diversity to Sense of Belonging**
0.246	0.080--	0.456**	-0.376**	**Attractiveness to Participation Acceptance**
0.088	0.659**	-0.008--	0.667**	**Environmental Responsiveness to Sociability**
0.148	0.369**	-0.090--	0.459**	**Attractiveness to Sense of Belonging**
0.182	0.032--	-0.022--	0.054--	**Diversity to Sociability**
0.062	0.003--	-0.109--	.112—	**Environmental Responsiveness to Sense of Belonging**
0.044	0.463**	0.253**	.209*	**Environmental Responsiveness to Sense of Security**
0.026	0.381**	-0.002--	.383**	**Sociability to Sense of Security**
0.310	-0.468**	0.659**	-1.000**	**Participation Acceptance to Sense of Belonging**
0.284	0.515**	-0.725**	1.000**	**Sense of Belonging to Participation Acceptance**
-0.040	0.058--	-0.082--	.140--	**Sociability to Participation Acceptance**
0.160	-0.035--	0.049--	-.084--	**Participation Acceptance to Sociability**
p<0.01**	**p<0.05***	**p>0.05--**		
p<0.01**	p<0.05*	p>0.05--		

Based on Table 2, the standardized direct effect of "Readability" on "Environmental Responsiveness" is 0.340, which is statistically significant with a confidence level of $p < 0.01$. However, it does not have an indirect relationship, so the total standardized effect is also 0.340, and it is statistically significant with a confidence level of $p < 0.01$. This means that about 11% of "Environmental Responsiveness" depends on "Readability." The standardized direct relationship of "Readability" to "Attractiveness" is 0.451, which is statistically significant with a confidence level of $p < 0.01$. It does not have an indirect relationship, so the total standardized effect is also 0.451, and it is statistically significant with a confidence level of $p < 0.01$. This means that about 20% of "Attractiveness" is influenced by "Readability." According to the current model, the standardized direct relationship of "Diversity" to "Attractiveness" is 0.063. It does not have an indirect relationship, so the total effect is 0.063, which is not statistically significant with a confidence level of $p > 0.05$.
The total standardized effect of "Readability" on "Sense of Belonging" is 0.426, and it is statistically significant with a confidence level of $p < 0.01$. In the indirect relationship, "Readability" is influential on "Sense of Belonging" through the mediation of "Social Participation" and "Attractiveness," but this relationship is not statistically significant, indicating no mediating effect in this relationship. Thus, "Readability" affects the "Sense of Belonging" by about 17%.
The direct relationship between "Environmental Responsiveness" and "Sense of Security" is 0.209, which is statistically significant. In the indirect relationship, it is also significant with the mediation of "Sociability" on "Sense of Security." In total, 21% of "Sense of Security" is explained by "Environmental Responsiveness."
One of the acceptance criteria for the model is that the obtained number for the p-value is greater than 0.50. For this model, according to Table 3, it is 0.834, indicating that the model is acceptable. This means that if this model is repeated 1000 times, it will be repeated 834 times. The model's chi-square value is 0.5777, and the model's degrees of freedom are calculated as 10. Therefore, dividing the chi-square value by the degrees of freedom results in 0577; this is less than 2, confirming the acceptability of this model.

Table 3. Model Acceptance Indices (Source: Author)

Chi Square / Degrees of Freedom CIMN/DF	Significance Level (p-value)	Degrees of Freedom (DF)	Chi Square CMIN	Characteristics
0.577	0.834	10	5.777	**Model**

Table 4. Model Fit Indices (Source: Author)

Root Mean Square Error of Approximation (RMSEA)	Normalized Fit Index (NFI)	Comparative Fit Index (CFI)	Goodness of Fit Index (GFI)	Characteristics
0.000	0.989	1.000	0.993	**Model**

According to Table 4, the Goodness of Fit Index (GFI) for this model is 0.993, which is a desirable value. Therefore, the model's fit is also acceptable.

Conclusion

This study aimed to present a model of environmental components effective in reducing stress and daily tensions of young users in small local parks. The results demonstrated that the model fit is adequate and consistent with the community's reality. As a result, the extracted model represents a true depiction of the relationships within the research group. According to the relevant model and the calculated effect sizes in the tables and analyses conducted, among various factors, the "Sense of Belonging" has the highest influence, accounting for 65% of the model. Following that, "Sociability," "Participation," "Sense of Security," "Attractiveness," and "Environmental Responsiveness" also affect the model in their respective order. Factors influencing the "Sense of Belonging" within the model are "Participation," "Readability," "Variety," and "Attractiveness," defining meaningful relationships with the "Sense of Belonging." "Sociability" is also influenced by "Environmental Responsiveness" and "Readability" to an extent of about 43% and 11%, respectively. "Sense of Security" is influenced by both "Sociability" and "Environmental Responsiveness." "Attractiveness" is affected by "Variety" and "Readability." Lastly, "Environmental Responsiveness" is influenced by "Readability". These relationships are statistically significant based on the analyses.
The sense of belonging is directly and significantly influenced by readability. It means improving the readability of the environment is boosting the sense of belonging. Previous research has found that readability

and perceptual clarity contribute to a knowledge of the place, which in turn helps to develop a sense of belonging as an effective relationship with the environment. The development of a sense of place and a deeper connection to it is facilitated by a legible environment in which users can understand, arrange, and create a sense of its components. According to Schultz, a location's readability affects its sense of place and belonging, making it one of its personality traits. Moreover, Rogan lists readability as one of the three components of a sense of place, together with perception and preference of the visual surroundings and activities' suitability for achieving human objectives.

Furthermore, variety has a direct, and significant impact on the sense of belonging. This implies that an increase in environmental diversity leads to a boost in the sense of belonging. Enhancing the quality of diversity in natural and artificial elements, can lead to a more attractive environment and effortless mental engagement, according to Kaplan, thereby strengthening the sense of place and increasing the influence of the environment on the human mind and psyche. It can also provide greater satisfaction to users by meeting a broader range of desires and needs, which, in turn, leads to a more effective bond with the place and, consequently, influences the sense of belonging.

The readability of the local park, on the other hand, has a considerable and meaningful influence on the experience of security via the mediation of sociability and environmental responsiveness. The indirect association between variety and a sense of security, on the other hand, was not found to be significant. According to the findings of this study, the readability and perceptual ease of the local park environment leads to an increase in sociability by drawing a wider range of audience and giving them mental peace. This, in turn, increases social supervision, removes hidden corners, and ultimately enhances the sense of security.

Regarding the relationship between readability and environmental responsiveness, the readability and easy perception of spatial arrangements and structures lead to consideration of users' various needs and desires. In other words, it enhances environmental responsiveness, leading to a more active and enjoyable environment, an increase in social supervision, and ultimately influencing the sense of security.

The target population of this study was young users of four local parks in different districts of Tehran, which may limit the generalizability of the research. Some relationships within the model, such as the relationship between participation and the sense of belonging, despite being statistically significant, have a considerable predictive error, which may cast doubt on the results. Nevertheless, the sample size for the conducted tests indicates sufficiency. Increasing the number of respondents can provide more generalizable and accurate results.

Acknowledgments : We are grateful to all the scientific consultants of this paper.

Conflict of interest: Authors declared no conflict of interest.

Financial support: There is no funding support.

Ethics statement: Authors contributed equally to the conceptualization and writing of the article. All of the authors approved the content of the manuscript and agreed on all aspects of the work.

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