

Evaluation of the Criteria Affecting the Mental Health of Citizens in Public Spaces from the Perspective of Prospective Studies, Case Study: Tarbiyat and Vali-Asr Pedestrian Walkways in Tabriz

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ABSTRACT

Mental health has become a major concern in today's societies. Public areas such as parks, squares, and cultural and social centers provide the basis for social communication, which can play a decisive role in improving this aspect of life. More precisely, indicators such as design desirability, accessibility, and the diversity of functions offered in these places directly affect the improvement in the satisfaction and quality of life of individuals. The current study was conducted to evaluate the criteria affecting citizens' mental health in public spaces, with a view to future studies. The study area for this research is the two pedestrian walkways, Tarbiyat and Vali-Asr. This research is considered applied in its purpose and follows a descriptive-analytical, qualitative approach in its methodology during the phase of identifying the components. Qualitative data were collected through structured interviews with 25 experts related to the research field. Based on their opinions, four main criteria were identified as influential factors, comprising 24 components. The interaction analysis method in the MICMAC software was used to analyze and analyze the data. Given the rapid pace of social and cultural developments, analyzing these criteria from a prospective perspective, while revealing the challenges and opportunities ahead, provides a basis for practical solutions to improve mental well-being. The research findings show that performance criteria, including components such as accessibility, safety, comfort, visual appeal, diversity of activities, and pedestrianization, have had the greatest impact on the mental well-being of individuals in public spaces in Tabriz. In other words, the results of this study can serve as an efficient tool for urban planners and designers in Tabriz and pave the way for improving the quality of life and mental health of its residents. Finally, paying attention to these influential indicators can be an effective step towards increasing social well-being and shaping a healthier, more sustainable society.

Keywords: Mental Health, Tabriz Citizens, Public Spaces, Futures Studies.

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1. INTRODUCTION

In today's world, due to rapid changes in social, economic, and technological fields, psychological pressures and multiple challenges that people face, the importance of mental health is becoming more and more apparent. Public spaces are places where people go to communicate, exchange ideas, and build social relationships. These spaces can include parks, squares, shopping malls, and even virtual spaces.

Rapid urbanization and its consequences have created a serious challenge for the mental health of metropolitan residents. Factors such as density pressure, job insecurity, cultural gaps, and socio-spatial inequalities have led to increased psychological tension in urban environments. In a way that epidemiological studies confirm the higher prevalence of mood and anxiety disorders in densely populated urban areas. According to statistics, urbanization has led to a significant increase in the burden of mental and neurological diseases. Resistance to available treatments is also more common in residents of metropolitan centers. Extensive studies have shown that children living in urban areas face more mental problems than their peers in rural areas. Noise pollution, a lack of mutual trust, and behavioral and cultural differences have led to a loss of security and mental peace among many city residents. One of the most important effects of urbanization is mental stress (Abdolahzade Fard and Shamsoddini 2020). Today, according to estimates, 50 million people in the world suffer from a mental or behavioral disorder. According to the World Health Organization, mental disorders account for three to four percent of countries' gross domestic product annually. In Iran, according to the latest available documentation and evidence, the prevalence of mental disorders is about 20% of the total population (Ministry of Health and Medical Education 2016). Mental health, as one of the main indicators of societal development and universal human rights, is a priority for most countries. Historically, urban planning and health concerns have gone hand in hand. In fact, much of the impetus for adopting planning regulations can be traced to concerns about the impact of high population density, poor housing quality, and the lack of recreational and health facilities on the health of the urban public. Although the original emphasis was on controlling environmental factors believed to contribute to the development and spread of contagious unemployment, this soon expanded to include factors related to well-being and mental health. The work of early sociologists such as Durkheim, Simmel, Cooley, and Worth sensitized planners and health professionals to the connection between the physical environment and mental health (Elsamahy and Abd el Fattah 2018, 121).

Part of the open and public spaces of the city that reflect the nature of communal life are called urban spaces. According to Maslow's hierarchy of needs, humans are inherently social beings and need to

interact with others. According to Maslow, this need is rooted in a hierarchy that starts with physical needs and, after safety, moves on to social needs, respect, and, finally, self-actualization. In the context of public spaces in Tabriz, this hierarchy is tied to the need for safety (appropriate lighting) and belonging (symbolic identity) (Giddens 1994). Due to their high capacity for various types of commodity transactions, information exchange, and news dissemination, urban spaces provide a suitable platform for the development of face-to-face interactions and the expansion of the scope of social communication. The expansion of these collective relationships increases social capital and strengthens individuals' trust and security in society. Accordingly, despite the high capacity of urban spaces to strengthen interactions and group behavior, these places, due to their nature, are considered the context for the manifestation of collective behavior more than any other area. From this perspective, Mumford considers the main function of the city to be to give it a public form. He believes this is the same concept Martin Buber rightly discussed under the title "the relationship between I and you". Such a function provides the basis for gatherings, recurring meetings, and various competitions among individuals and groups, thereby preparing the stage for the performance of social life; in this stage, the roles of actors and spectators constantly shift. Accordingly, the social function of urban open spaces enables people to gather (Choay 1996). Mental health refers not only to an individual's ability to manage stress and cope with everyday challenges, but also affects the quality of social relationships, job performance, and ultimately, life satisfaction. Promoting mental health in communities requires multifaceted approaches that include education, social support, and access to health services. Educational programs can help increase public awareness about mental health and encourage individuals to seek help when needed. Appropriate design and management of these public spaces can improve the quality of social life and increase citizen participation. In addition, examining the cultural, economic, and social dimensions of these spaces can help identify challenges and opportunities in different communities. Accordingly, providing a comprehensive introduction to public spaces can pave the way for deeper studies and effective decision-making in this field, and ultimately help promote social interactions and improve living conditions in communities. Future studies in this field can help provide effective solutions for managerial decision-making by identifying future trends, challenges, and opportunities. Ultimately, by considering these criteria and analyzing them comprehensively, the mental health of citizens in public spaces of Tabriz can be achieved. In this regard, the present study seeks to answer the question of how to evaluate the criteria affecting the mental health of Tabriz citizens in public spaces from a futures studies perspective.

2. RESEARCH BACKGROUND

Attention to the design and use of public spaces, including parks, squares, and community centers, is particularly important. Studies show that public spaces can play an important role in strengthening social connections, reducing stress, and creating a sense of belonging to society. Also, factors such as access to social services, security, and comfort in these spaces can help improve citizens' mental health. Studies conducted in other metropolises also show that public spaces, with appropriate design and the provision of recreational facilities, can significantly contribute to increased vitality and mental health. In addition, future research approaches can help identify future trends and needs of citizens in this field, and, based on this, effective policies can be adopted to improve public spaces and promote the mental health of society.

Bokaieyan et al. (2023), in a study titled "The Effect of Urban Management Style on Citizens' Physical and Mental Health," concluded that the physical and mental health of citizens is one of the important goals in any society, and urban management style can be considered as an important factor affecting these components. Memar Dezfouli et al. (2023), in their article titled "Redefining the Identity of Urban Public Spaces in the Ahvaz Railway Region," concluded that the manifestation of identity is considered a leap towards a better quality of life. Recognizing individuals' spiritual desires and reflecting them in urban design and the architecture of public buildings, giving each space an identity, is essential to establishing two-way communication between the space and its users. Pourbesat et al. (2019), in an article titled "Investigating the Level of Psychological Health Performance of Citizens in Urban Spaces (Case Study: Borujerd City)," concluded that ensuring the health of citizens as one of the main pillars of sustainable development requires a multidimensional view of physical, psychological, and social relations.

In the meantime, mental health is not only considered a goal of community development but also an indicator of the quality of individual life. McCay et al. (2017), in their study titled "Urban Design and Mental Health," analyzed the opportunities for smart urban design to promote mental well-being, prevent diseases, and support people with mental disorders. In his study titled "Urban Planning and Mental Health," Rohe (2009) presents a process framework for how environmental design features influence mental health. He then examines the relationships among four community design features, social interactions, arousal, and mental health. Parr (1997) argues that this broad reinterpretation of mental health, public space, and the city: Questions of individual and public access should not ignore the critical geography of mental health. Empirical evidence from research in Nottingham, England, shows how individuals with mental health issues personally use public spaces. In the second half of the article, the authors present a socio-political mechanism that operates through users' actions, enabling the power and impact of illness across dispersed locations in the city. Elsamahy and Abd El-Fattah (2018) in a study titled "Mental Health, Public Space, and the City: Questions of Individual and Public Access The title of the study is "Designing Psychological Public Spaces without Psychological Stress", to examine urban public spaces, focusing on users' activities in relation to stressors, in the context of public spaces in the city of Tripoli, Lebanon. By reviewing previous studies, it is possible to understand the distinction of the present study compared to previous studies in studying functional, legal-normative, symbolic, and social criteria; in a way that studies conducted in relation to citizens' mental health have not paid attention to this issue that is, considering functional, legal-normative, symbolic, and social criteria and their influential components. Figure 1 summarizes the objectives and research gaps in previous studies.

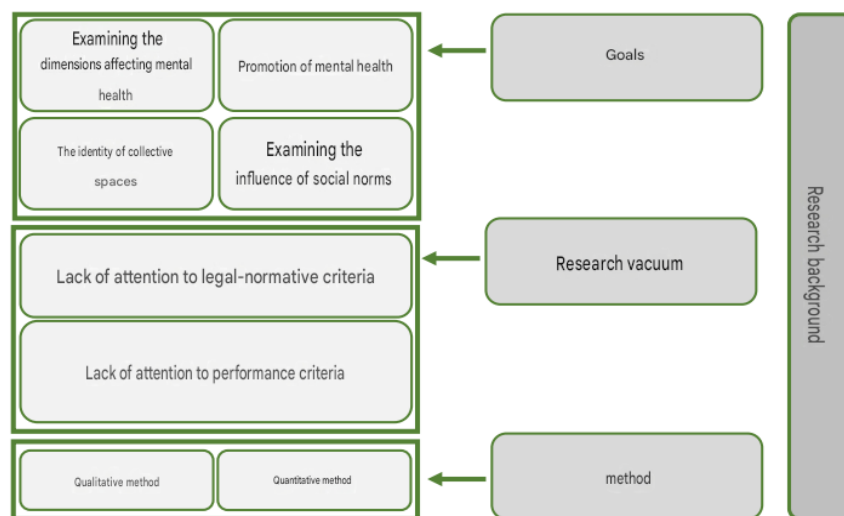


Fig. 1. Objectives and Research Gaps in Previous Studies

3. MATERIALS AND METHODS

The present study is considered applied in its purpose and conducted in its nature, using futures-analytical methods and a combination of documentary and survey studies. The required data was also collected using a questionnaire. In the first stage, indicators affecting the mental well-being of Tabriz residents in public spaces were identified and extracted through the specialized perspectives of professors and experts in architecture, urban planning, and futures studies. In the next step, a Delphi-based questionnaire was distributed to 25 relevant experts. The time period for this study was 2025 to 2030. Then, the indicators

affecting the mental health of citizens in Tabriz public spaces were entered into the MICMAC software, and the resulting outputs were analyzed. For this purpose, the criteria for the first stage were first placed in the work analysis matrix, and the experts determined the relationships among the variables. After completing the information, the interaction matrix was set up in two stages, with the indicators placed in its rows and columns. In this study, the evaluation of indicators affecting the mental health of citizens in public spaces in Tabriz was examined using a futures research approach. Figure 2 shows the research methodology diagram.

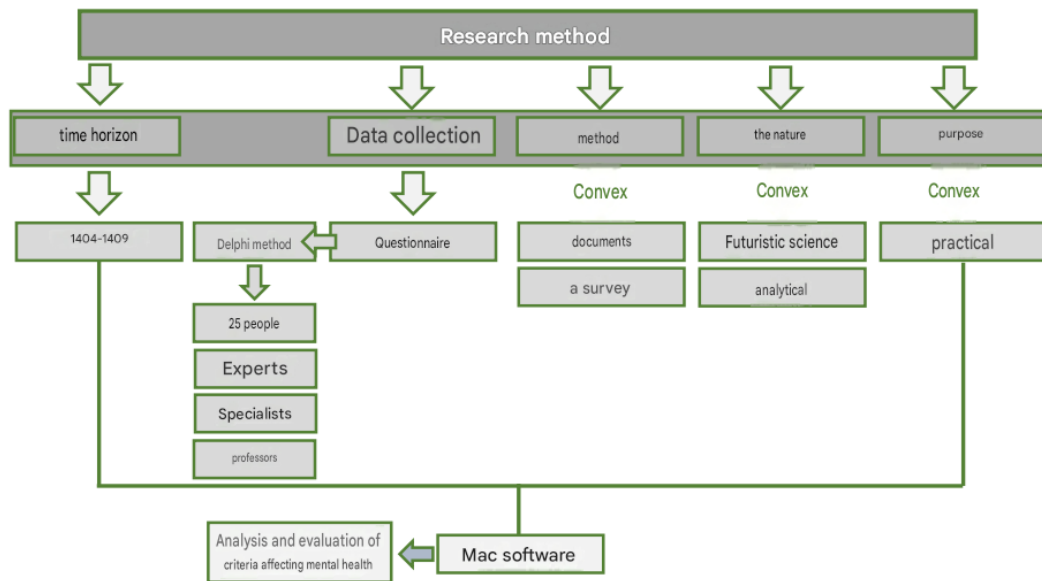


Fig. 2. Research Methodology Diagram

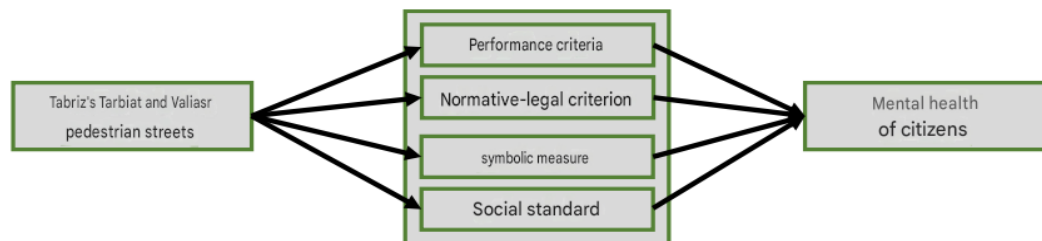


Fig. 3. Research Variables Diagram

4. THEORETICAL FOUNDATIONS

4.1. Mental Health

According to the World Health Organization, mental health is a state of internal balance that enables an individual to recognize and actualize their existential capacities and to have the resilience needed to withstand daily psychological pressures. Such a state will pave the way for effective participation

in daily activities and active involvement in life (Shafiabadi and Naseri 2009). The most desirable state is considered a dynamic and comprehensive state that is not only free of disease symptoms but also characterized by signs of health in the mental, psychological, and social dimensions (Salimi Bajestani 2009). Table 1 presents the definitions of mental health from the perspectives of theorists.

Table 1. Theorists' Definition of Mental Health in the Practice of Mental Health

Author	Year	Definition
Maslow	2013	Mental health is manifested through self-actualization, the highest level of psychological functioning. Achieving this stage requires that an individual's basic needs—including physiological, safety, love and belonging, and esteem needs—be satisfied first, thereby providing the foundation for realizing one's potential and personal capabilities.
Bandura	1997	High self-efficacy and the ability to function effectively within one's environment are considered fundamental components of mental health. Self-efficacy refers to an individual's belief in their capability to organize and execute the actions necessary to manage and control various life situations successfully.
Rogers	1995	According to Rogers, a psychologically healthy individual who has achieved self-actualization demonstrates congruence between self-concept and lived experiences. Such an individual is free from conditions of worth and has overcome the barriers that hinder personal growth and the full realization of their potential.

4.2. Urban Space

Public spaces of the city, as the context for the formation of social interactions, are both influenced by power structures, priorities, and collective anxieties and play a role in their reproduction (Carmona 2010). The importance of urban public spaces lies in their role as a front for social relations (Lara Hernandez et al. 2020). In defining urban space, Colquhoun (1989) proposes two distinct types: social space and built space. Social space refers to the spatial manifestations of social institutions, which are of particular interest to sociologists and geographers. In this view, the physical characteristics of the built environment are considered secondary phenomena, functions of social relations. In contrast, built space focuses on the physical aspects of space and is usually the focus of architects. From this perspective, the morphology of space, its impact on human perception, how space is used, and the meanings derived from it become important. According to Kolbkuhn, this view of architecture itself is divided into two approaches: one that views forms as independent of function, and one that considers functions as determining forms. It is in the interrelationship between form and function that the second approach aligns with the perspectives of geographers and sociologists. However, the architect always remains attached to form, regardless of how it is produced. He defines urban space in two ways: social space and built and artificial space. Social space is the spatial associations of social institutions that sociologists and geographers study; this view tends to see the physical characteristics of the built environment as metaphenomena; on the other hand, artificial space is directed towards physical space. Thus, what architects are interested in is the morphology of space; the way in which space affects our perception, the way in which space is used, and the meaning that can be extracted from it. According to Cole-Cohen, this view leads to two approaches: one that sees forms as independent of function, and one that sees functions as determining forms. The second view is closer to the approach of geographers and sociologists, but, conversely, the architect is

ultimately interested in form, no matter how these forms are produced (Madanipour 2008).

4.3. Public Spaces

Public spaces, as a central part of the urban environment, are the setting for a wide range of collective activities (Lara-Hernandez et al. 2020, 64). Urban public spaces serve as a platform for the development of micro and local economic activities, strengthening household social interactions (Carr et al. 1992), and consolidating social capital (Putnam 2000). Today, public spaces have found a special place in a range of urban policies and strategies worldwide. These policies, which include approaches such as transportation-oriented development, new urbanism, and street-oriented programs, offer initiatives to enhance the urban experience among older people, children, and people with disabilities. Accordingly, accessible public spaces have received special attention for their role in the environmental performance of cities, community empowerment, and individual health (Collins and Stadler 2020, 105). Spaces can also be called open social arenas because they provide the basis for various uses, including unpredictable uses, diverse activities, and the fulfillment of citizens' desires, and individuals benefit from these capabilities. From a physical perspective, urban public spaces are open and accessible, in contrast to private spaces, which are limited and controlled (Aghaeizadeh 2019).

- Classification of Urban Public Spaces

A broad definition of public space is a place universally accessible to all, including everything from national parks to town halls and city centers. Carr et al. identify eleven types of space: 1. Public parks, 2. Squares and plazas 3. Monuments 4. Markets 5. Streets 6. Playgrounds 7. Community open space 8. Greenways and parkways or boulevards 9. Covered markets 10. Found spaces/everyday spaces 11. Waterfronts (Carr et al. 2009, 79).

Functional characteristics: Public spaces have diverse functions and are considered key components of political, social, and economic sustainability, public

health, and biodiversity conservation (Banerjee 2011, 56). Accordingly, public space plays a multifaceted role: it is a platform for pedestrian traffic and movement, as well as a place for social interaction. On the one hand, it is a tool for urban management and an arena for collective self-expression; on the other hand, it is a vehicle for selling mass-produced products and a manifestation of various identities through symbolic and institutional systems (Madanipour 2008).

Legal and normative characteristics. The most important characteristic of a public space is its accessibility and use by all citizens. Being public does not simply mean being able to observe freely, but also requires the possibility of physical contact between people and the space, which includes physical and visual access to the urban environment. Therefore, the concept of urban space can be extended to spaces with unlimited access, although this access may be limited at certain times (Lang 2002).

From a normative perspective, spaces constructed and managed by government agencies are considered public; if private ownership also guarantees free and unconditional access over time, those spaces remain

public (Croucher 2007).

Symbolic Features: Public spaces serve as contexts for the formation of individual and collective memories. These places reflect and preserve people's identities. Physical environments result from the interaction of three main elements: the physical place, the activity that occurs in it, and the meaning that arises from their combination. Individuals not only understand the meaning of public space, but also create meaning by adding value to it. When a social group carries out an activity in a place, the symbolic meaning of that space is revealed, and it becomes an arena for human activities and behaviors.

Social Features: Urban public spaces are not limited to physical components; they gain meaning from the presence of humans and their activities. These arenas are social platforms in which social relations are formed and strengthened. These spaces, as "third places," play a fundamental role in facilitating informal and everyday interactions (Lynch 1960). Figure 4 shows a diagram of the characteristics of public spaces in the city.

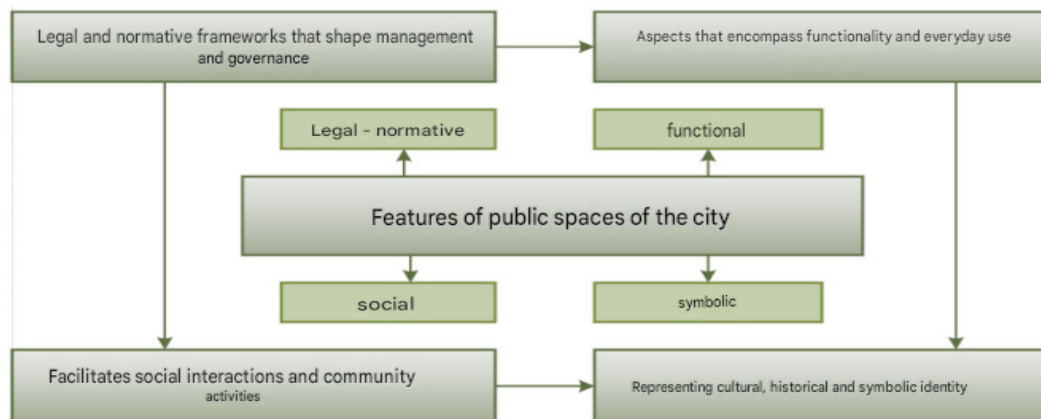


Fig. 4. Characteristics of Public Spaces

Physical and mental health are as closely linked as physical and mental illness. While someone can be physically ill but still be happy, and for someone with good character traits to be depressed, our bodies and

minds are completely interconnected. This is because some environmental factors affect both the body and mind equally (Burton 2015, 96). Figure 5 shows the diagram of mind-body health effects.

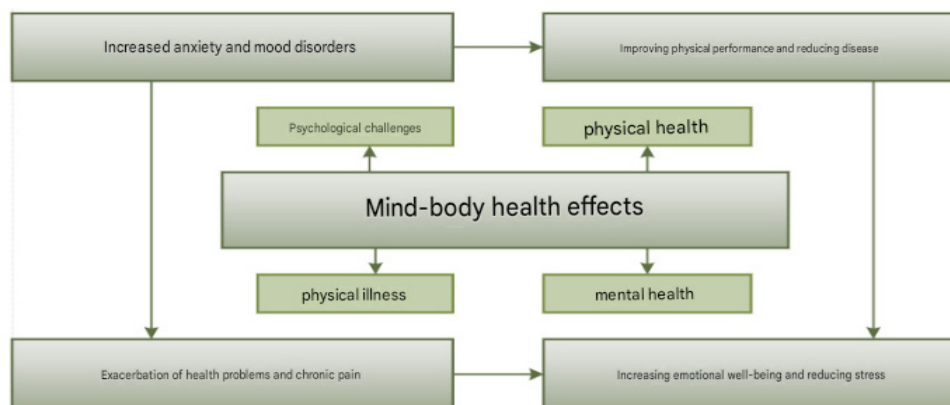


Fig. 5. Mind-Body Health Effects Diagram

- Public Spaces and Mental Health

Urban public spaces can be considered the most important platforms for human growth, creativity, progress, and individual health in society (Astell-Burt and Feng 2019, 134). Living in cities is largely dependent on the quality of the built environment. In such a context, the lack of stimulating spaces for physical activity and the presence of chronic urban

stress can lead to social isolation and reduced civic participation (Mouratidis 2021). The core of the existential philosophy of contemporary urbanism is the creation of healthy and sustainable environments as ideal habitats for residents (Ticlau 2021). Figure 6 presents a diagram of the communication cycle between urban space and mental health.

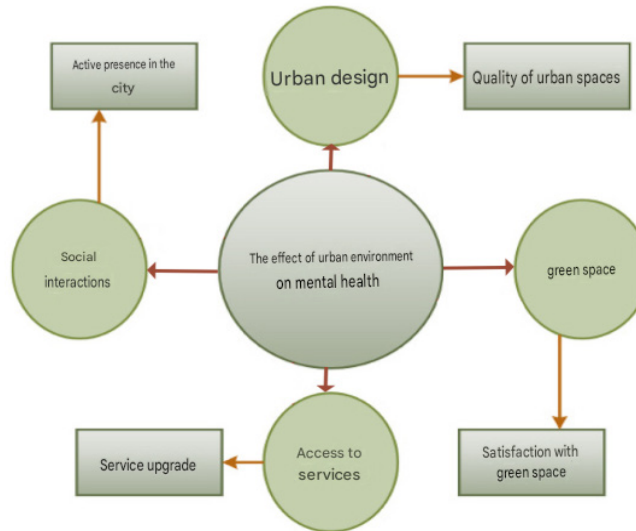


Fig. 6. Communication Cycle between Urban Space and Mental Health

4.4. Futures Studies

Many experts believe that curiosity about the future and the desire to know it have a long history, dating back to human origins, and that concern about the future has always been an integral part of human reality since the dawn of consciousness (Malaska 2000). Humans have long been fascinated by predicting

the future and by understanding and guiding future developments. They believed that knowledge of future events would enable them to shape the future and create desirable outcomes for themselves. Futures Studies is equivalent to the term Future, the study of what is possible, probable, and desirable (Kreibich et al. 2011). Figure 7 shows the futures studies process (Virta and Räisänen 2021).

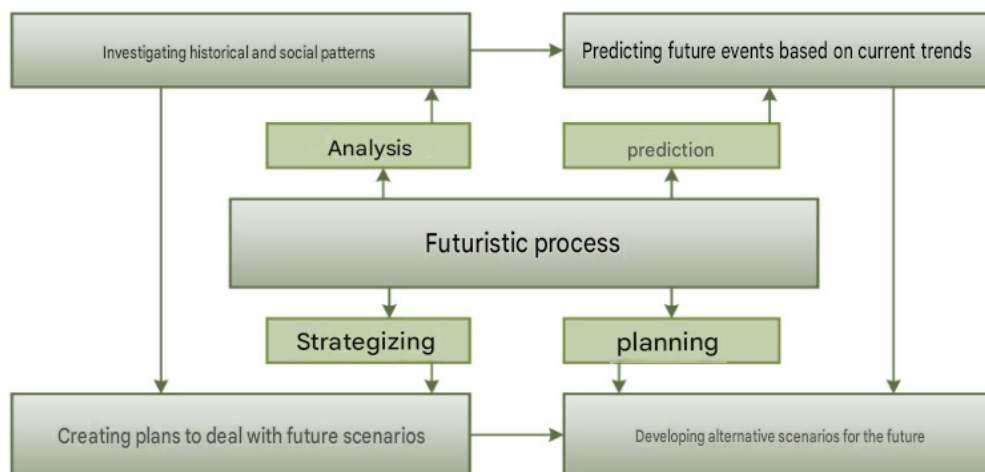


Fig. 7. Futures Studies Process

Based on studies in the field of mental health and public spaces, the criteria and components of this

field have been categorized for examination from the perspective of future studies, as shown in Table 2.

Table 2. Criteria Affecting the Mental Health of Tabriz Citizens in Public Spaces

Criteria affecting mental health			
Functional Criteria	Normative–Legal Criteria	Symbolic Criteria	Social Criteria
Accessibility	Social Norms	Signs and Symbols	Environmental Quality
Safety and Sense of Security	Ethical Frameworks	Meanings	Social Interaction
Comfort	Cultural Influences	Behaviors	Safety
Visual Attractiveness	Equality	Traditions	Diversity and Inclusion
Diversity of Activities	Right to Participation	Sensory Experience	Accessibility
Walkability / Mobility	Laws and Regulations	Cultural Identity	User Experience

These four criteria were selected to comprehensively analyze the dimensions affecting the mental health of citizens within the framework of futures studies; so that the functional criterion due to the direct impact of efficiency and physical comfort in reducing daily stress, the normative-legal criterion for creating a sense of psychological security and spatial justice through compliance with laws and citizenship rights, the symbolic criterion considering the historical identity and specific architecture of the Tarbiyat and Vali-Asr pedestrian walkways to strengthen the sense of belonging and connection with collective memory, and the social criterion due to the vital role of human interactions and social presence in preventing isolation and promoting mental health, each of which has been selected as key components in simultaneously covering the material and spiritual dimensions of the urban environment. It is worth noting that this prioritization and selection of components were based on respondents' responses and the extraction of opinions from experts and citizens, to provide more accurate and efficient solutions for urban management.

5. STUDY AREA

The study area includes two prominent pedestrian walkways in Tabriz city. Tabriz, the most important metropolis in northwest Iran and the capital of East Azerbaijan Province, is located on an area of 24,498 hectares at 46 degrees and 25 minutes east longitude and 38 degrees and 2 minutes north latitude from the Greenwich meridian. The Tarbiyat sidewalk in the 8th urban area, measuring 00 meters in length and

15 meters wide, serves as a connector between Imam Street and Tabriz Bazaar in the city's central core. This axis, which had a residential history, was converted into a sidewalk to revive traditional architecture, following the deterioration of its historical facades and heavy traffic. This street is located near Saat Square and Tabriz Bazaar, and its facades are influenced by Baku architecture. Some of the valuable buildings in this area were destroyed in the imposed war. The Vali-Asr sidewalk is located in the northeast of Tabriz and District 1 of the municipality. This axis, which was established in the area of the same name before the Islamic Revolution, was built by a landowner of Khoy with the municipality's participation and was previously called "Vali-Ahd Alley". This 300-meter-long, 15-meter-wide sidewalk is considered one of the city's important shopping and entertainment destinations, thanks to its stores offering reasonably priced goods, clothing brand representatives, and numerous restaurants and coffee shops. Given the change in the research scope from the metropolitan level to these two pedestrian walkways, they were selected as case studies to assess the criteria affecting citizens' mental health. Focusing on these two axes allows for a more detailed analysis of physical components such as historical architecture, visual identity, and environmental quality, as well as behavioral aspects including social interactions, security, and economic activities. The findings of this prospective study, by analyzing the current situation and presenting appropriate scenarios, will provide practical and reliable solutions for urban management to promote mental health in public spaces. Figure 8 shows the scope of the case study.

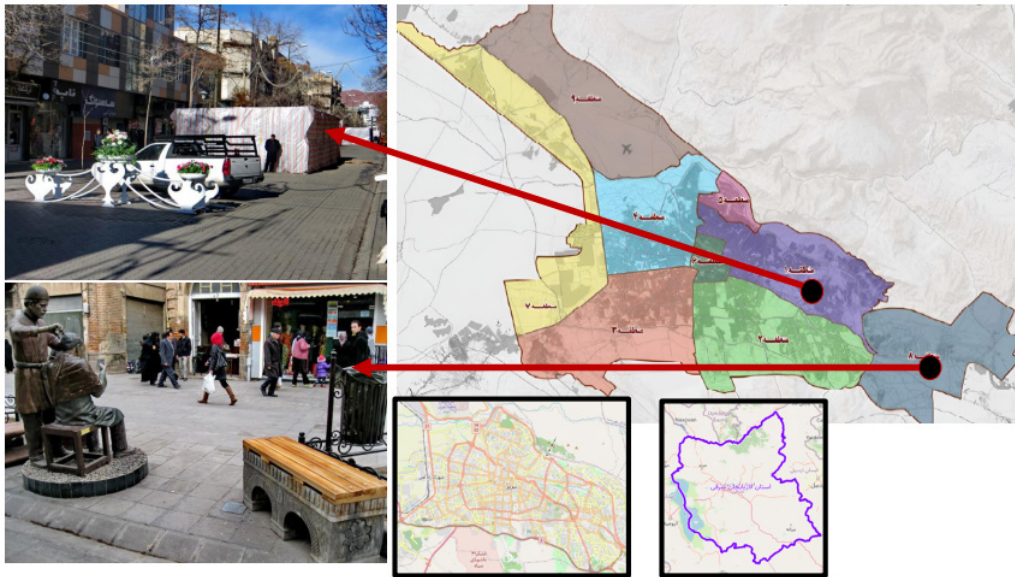


Fig. 8. Study Area

6. DATA ANALYSIS

In this study, to analyze the systemic relationships among components affecting mental health, the cross-effects analysis technique was used in the MICMAC software environment. For this purpose, a survey of 25 experts was designed as a 24x24 matrix. In this

matrix, the effects were evaluated on a scale of 0 to 3, and potential effects (P) were also considered. Then, the resulting matrix was recalculated over 2 iterations (per the software standard) to achieve stability. Figure 9 shows the influence of variables in the cross-effects analysis in MICMAC.

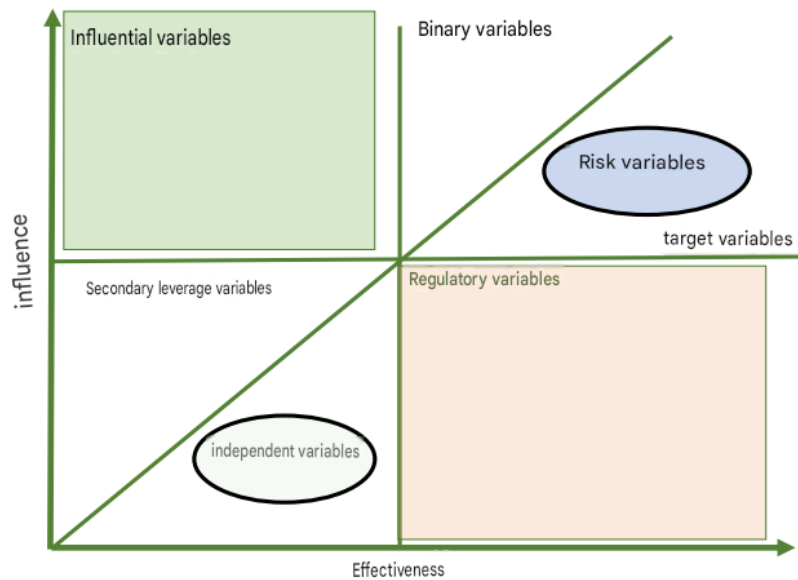


Fig. 9. Dual Roles of Variables in the Cross-Effects Analysis

The distribution pattern of factors in the diagram indicates the stability or instability of the system. This initial diagnosis determines the framework for analyzing the effective factors. In stable conditions, the distribution of factors is L-shaped; this means that a group of factors has a strong influence, while the other arms are highly dependent. Accordingly, in

stable systems, factors are divided into three major categories: influencing factors (drivers), affected factors (terminals), and independent factors. In contrast, unstable systems are more complex. In these systems, factors are scattered across the plane and around the diagonal axis and often exhibit borderline and intermediate behavior. Due to the greater number

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of variables, analyzing these systems is more difficult. The factors are divided into five main categories: 1) determining factors (influencing), 2) bimodal factors (including two subsets of risk and goal), 3) influenced factors (system outputs), 4) independent factors (including discrete factors and secondary levers), and 5) regulatory factors. It is worth noting that in scenario-based research, the depth of knowledge and expertise of the experts is preferred over the quantity of the sample, and the minimum desired sample size is 25 people. According to the materials mentioned

in the research method section, library studies, functional criteria, normative-legal criteria, and symbolic and social criteria were identified as factors affecting mental health in the city of Tabriz. After confirming the influential criteria, 24 factors affecting the future of citizens' mental health in public spaces were identified from a futures studies perspective in the city of Tabriz. To ensure the comprehensiveness of the extracted components, the experts listed in Table 3 were consulted.

Table 3. Characteristics of the Interviewees

No.	Number	Educational Level	Relationship to the Research Topic
1	12	Ph.D.	University Faculty Members in Architecture, Urban Management, Urban Planning, and Futures Studies
2	8	Master's Degree	Futures Studies Researchers with Expertise relevant to the Research Topic
3	5	Bachelor's Degree	Urban Planners, Specialists, and Urban Managers

In the first stage of implementing the model in the present study, all 24 components affecting citizens' mental health in the city's public spaces were entered into the MICMAC software. These criteria were selected to represent the different components of mental health in public spaces and to play an important role in the analysis and evaluation of factors affecting the mental health of Tabriz citizens in public spaces. For each component, short indicators were considered to enable more accurate measurement and evaluation. In general, mental health and these components act

as basic tools for evaluating these criteria. In this regard, paying attention to the interactions among components and their connections can help better understand the mental health status of Tabriz citizens in public spaces. Also, using this data, it is possible to conduct a more detailed analysis of the city's strengths and weaknesses in mental health and identify the pathways that affect the mental health of Tabriz citizens. Table 4 shows the criteria, components, and shorthand indicators of the components in the MICMAC software.

Table 4. Indicator Identifiers in the MICMAC Software

Row	Components	Short Indicator
Functional Criterion	Accessibility	C1
	Sense of Security	C2
	Comfort	C3
	Visual Attractiveness	C4
	Diversity of Activities	C5
	Walkability	C6
Normative–Legal Criterion	Social Norms	N1
	Ethical Frameworks	N2
	Cultural Influences	N3
	Equality	N4
	Right to Participation	N5
	Laws and Regulations	N6
Symbolic Criterion	Signs and Symbols	S1
	Meanings	S2
	Behaviors	S3
	Traditions	S4
	Sensory Experience	S5
	Cultural Identity	S6

Row	Components	Short Indicator
Social Criterion	Environmental Quality	SO1
Social Criterion	Social Interaction	SO2
	Safety	SO3
	Diversity and Inclusion	SO4
	Accessibility	SO5
	User Experience	SO6

The findings from the Delphi technique implementation among 25 urban managers served as the basis for analyzing the interaction effects of mental health components in Tabriz public spaces. This analytical process provides a more precise understanding of how each element is related and how much influence each has on the others. More precisely, to analyze these relationships, 24 cross-effect matrices were formed, in each of which the

intensity of the effect of one component on the other components was measured. In this model, the range of effects is classified into five levels: no effect (coded 0), slight effect (coded 1), moderate effect (coded 2), strong effect (coded 3), and potential effects (coded P). It is worth noting that the average absolute value of the opinions was used in extracting the final matrix. The method for scoring the research indicators is detailed in Table 5.

Table 5. Scoring Method between Variables in MICMAC Software

Score	Type of Impact
0	No Impact
1	Relatively Weak Impact
2	Moderate Impact
3	High Impact
P	Potential Impact

Table 6 shows the cross-effect matrix in the MICMAC software.

Table 6. Cross-Effects Matrix in MICMAC Software

	C						N						S						SO					
C	0	3	2	2	2	3	2	1	1	3	2	1	1	1	3	1	3	1	3	3	2	3	3	2
	0	0	3	2	1	2	3	2	2	3	1	3	1	1	3	2	3	2	3	3	3	2	2	2
	3	2	0	3	2	2	1	2	2	1	2	2	1	1	2	P	2	1	2	2	2	P	2	2
	3	2	2	0	3	3	2	1	1	1	1	1	3	3	2	1	3	1	2	2	1	3	2	2
	2	3	2	3	0	2	2	2	2	2	2	1	3	2	3	3	2	2	2	3	1	2	1	2
	3	2	2	2	2	0	2	1	1	1	1	0	2	1	2	1	3	1	2	3	1	3	3	2
N	3	1	0	2	2	2	0	2	2	2	2	2	3	3	2	1	2	2	2	1	1	0	2	
	2	2	P	0	0	0	3	0	0	2	P	2	2	2	3	2	P	2	P	2	1	P	P	2
	P	P	1	P	P	0	3	2	0	2	2	3	3	3	3	2	2	3	2	3	1	2	0	1
	1	2	2	P	P	0	2	2	2	0	3	2	1	2	3	2	P	2	2	3	0	2	P	0
	P	2	2	P	2	1	2	P	P	3	0	P	P	0	2	P	P	1	2	3	P	2	P	2
	P	2	2	3	P	0	P	2	P	P	2	2	0	2	2	2	P	2	P	2	3	P	P	0
S	3	3	3	2	P	2	2	2	2	3	P	2	0	3	3	2	3	2	2	2	P	2	3	P
	2	P	2	P	2	2	2	2	2	P	3	0	0	2	2	3	3	3	3	3	1	P	2	3
	0	2	P	0	2	3	3	2	2	2	2	P	3	P	0	2	3	2	3	3	3	3	0	2
	2	P	P	1	2	0	2	3	3	2	2	P	3	3	3	0	3	2	2	3	P	P	2	3
	2	1	P	2	2	P	P	0	0	1	P	0	2	3	2	P	0	P	2	3	2	P	P	1
	P	1	P	2	P	2	2	2	2	2	1	P	3	3	2	2	2	0	2	2	P	1	2	3

C										N					S					SO				
SO	2	3	2	3	3	0	2	P	P	1	1	2	3	3	3	1	P	1	0	3	P	P	0	P
	P	2	2	2	2	2	3	2	2	P	2	P	P	2	3	2	3	3	3	0	1	2	2	3
	3	3	2	P	P	P	2	2	2	1	1	2	P	0	2	0	3	2	2	2	0	P	2	3
	3	2	3	2	3	3	1	1	1	P	1	1	2	3	2	1	2	2	2	3	0	0	3	2
	3	2	3	2	1	3	1	1	1	2	1	2	P	P	2	1	3	2	2	3	1	3	0	2
	2	3	2	2	3	1	2	1	1	2	1	2	0	3	1	3	1	2	3	1	2	2	3	0

The process of calculating cross-effects in the relevant matrix was carried out in two iterations, in accordance with the MICMAC software's basic

proposal to achieve matrix stability. Table 7 shows the number of iterations required to calculate the cross-effects matrix.

Table 7. Number of Iterations of Calculating the Cross-Effects Matrix

Row	Dependence (%)	Influence (%)	Repetition (%)
1	95%	97%	1
2	101%	99%	2

The MICMAC software primarily offers two types of analysis: charts and analytical graphs. The first type examines the direct effects between variables, while the second type focuses on identifying indirect effects. More precisely, the analysis of direct effects is based on the interactions in the initial raw matrix and allows for the examination of the inherent characteristics of each component within the overall context of the system. In contrast, the analysis of indirect effects is carried out by calculating higher powers and repeating the initial matrix; in the present study, according to the software's default, this was repeated twice. The

ultimate goal of these two analytical methods is to identify and prioritize the most influential factors in the field of study. Comparing the results from these two perspectives allows identification of key factors and provides a more comprehensive understanding of the systemic relationships among variables. This analytical process provides a suitable platform for a more detailed analysis of complex relationships and obtaining reliable findings. Table 8 shows the characteristics of direct effects (MDI) in the MICMAC software.

Table 8. Characteristics of Direct Effects (MDI) in MICMAC Software

Index	Dimensions (Matrix Size)	Number of Iterations	Number of Zeros (0)	Number of Ones (1)	Number of Twos (2)	Number of Threes (3)	Number of P	Total Sum	Fill Density
Value	24×24	2	54	82	228	129	83	522	90.625

In the structural analysis matrix, the row sums of each variable represent the level of influence, and the column sums of each variable represent the level of susceptibility of that variable. Based on the analytical results of this matrix, the performance criterion has

the greatest impact on the mental health of citizens in public spaces in Tabriz, the normative-legal criterion has the least impact, and the symbolic criterion has the greatest susceptibility. Table 9 shows the level of influence and direct influence of the components.

Table 9. Level of Influence and Direct Influence of the Components

No.	Component	Effectiveness	Susceptibility
1	Accessibility	39	48
2	Sense of Security	45	49
3	Comfort	36	39
4	Visual Attractiveness	53.5	40
5	Diversity of Activities	32	49
6	Walkability	33	41
Total (Functional Criteria)		220	271
7	Social Norms	46	41
8	Ethical Frameworks	33	26

No.	Component	Effectiveness	Susceptibility
9	Cultural Influences	31	36
10	Equality	54	30
11	Right to Participation	30	22
12	Laws and Regulations	31	26
Total (Normative–Legal Criteria)		211	186
13	Signs and Symbols	37	51
14	Meanings	44	41
15	Behaviors	51	50
16	Traditions	32	39
17	Sensory Experience	47	23
18	Cultural Identity	39	33
Total (Symbolic Criteria)		255	227
19	Environmental Quality	50	37
20	Social Interaction	60	43
21	Safety	25	33
22	Diversity and Inclusion	34	43
23	Accessibility	30	41
24	User Experience	40	44
Total (Social Criteria)		239	241
Grand Total		925	925

In the next step, in order to identify key components, the stability or instability of the system is analyzed. As mentioned in the methodology section, the distribution of variables in the scatterplot indicates the stability or instability of the system. Examining the scatterplot of variables affecting the mental health of citizens in Tabriz's public spaces indicates the instability of the system, as most variables are distributed along the diagonal of the plane. Based on the instability status of the system, five categories of variables can be distinguished: determinant variables (influencing), bimodal variables, regulatory variables, affected variables (outcome), and independent variables. One of the main achievements of the MICMAC software is the provision of a structural analysis matrix that displays different factors in a two-dimensional space. This display is a four-part diagram that helps separate the four main groups of variables. In this way, analysts can better understand the relationships and interactions between variables by examining these groups and achieve a deeper analysis of the data. This analysis supports strategic decision-making and ultimately improves management and planning processes. By using this tool, organizations can identify their strengths and weaknesses and get closer to their goals by optimizing performance. Analysis of direct effects using MICMAC software shows that factors such as "diversity of activities," "signs and symbols," "traditions," "comfort," "accessibility," "mobility," "diversity and inclusion," "visual attractiveness," "user experience," and "accessibility" are among the

components that affect the mental health of citizens in public spaces in Tabriz. Of course, the final result in this regard requires a simultaneous examination of both direct and indirect effects.

Regulatory factors can serve as key variables in advancing system sustainability. Notably, in the present analysis, none of the components related to citizens' mental health in public spaces are among the regulatory factors. This indicates the multidimensionality of the criteria affecting the mental health of Tabriz citizens in public spaces, as perceived by experts.

In the meantime, "cultural influences" have been identified as a determining factor in the mental health of citizens in public spaces. Based on the model outputs, the "equality" component is placed in the risk and hazard factors group due to its complete alignment with the diagonal axis. Also, the two components "social norms" and "laws and regulations" are very close to the diagonal axis (hazard axis), which, due to this proximity, can be generalized and transformed into hazard factors.

The components of "ethical frameworks," "right to participate," and "laws and regulations" are classified as independent factors. The component of "sensory experience" is considered an influencing factor (a dependent variable). The components of "cultural influences" and "safety" are also recognized as secondary leverage factors. Figure 10 shows the cross-effects map in the MICMAC software.

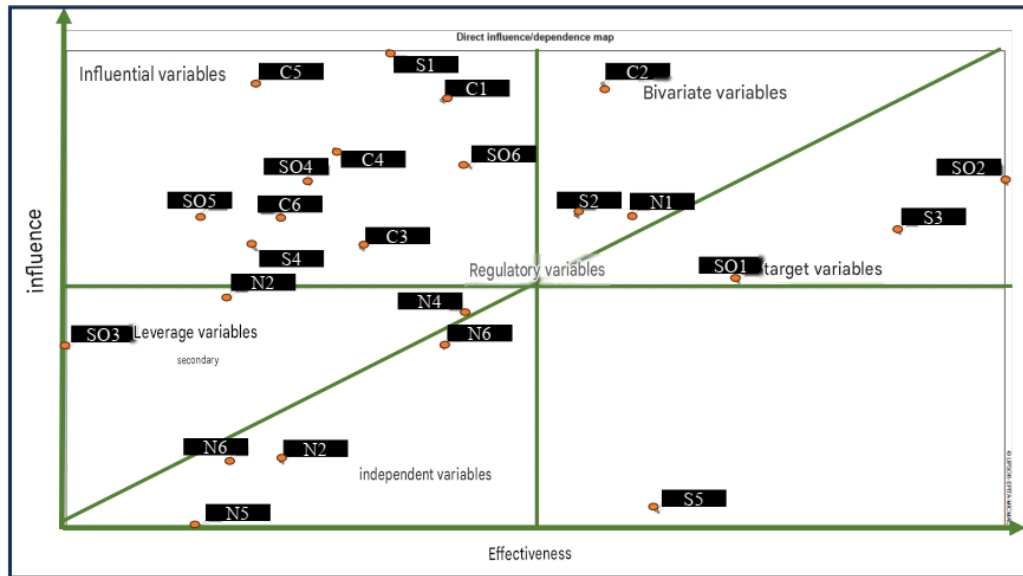


Fig. 10. Cross-Effects Map in MICMAC Software (MICMAC Software Output)

The graphs of direct and indirect effects of the indicators are given in Figures 11 and 12. In these graphs, red lines mean strong effects, blue lines mean

moderate effects, and black dotted lines mean weak effects. The first factor is the one the arrow points to.

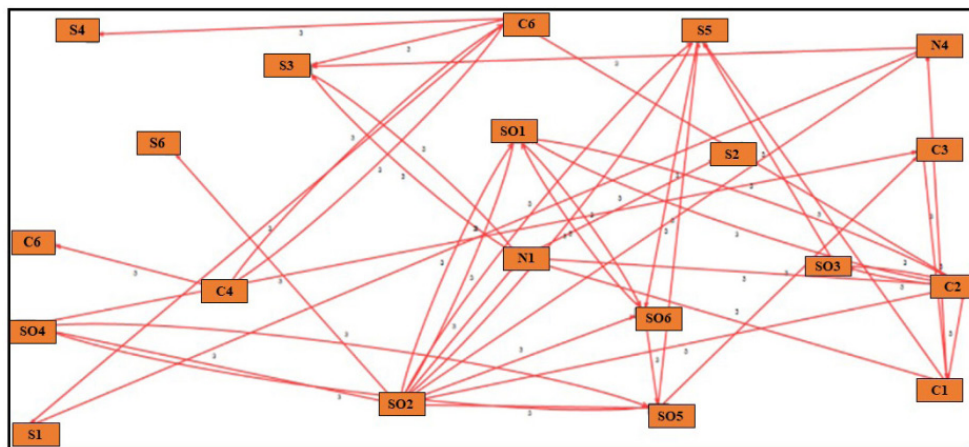


Fig. 11. Graph of Direct Effects Cycle by Variable Number (Output of MICMAC Software)

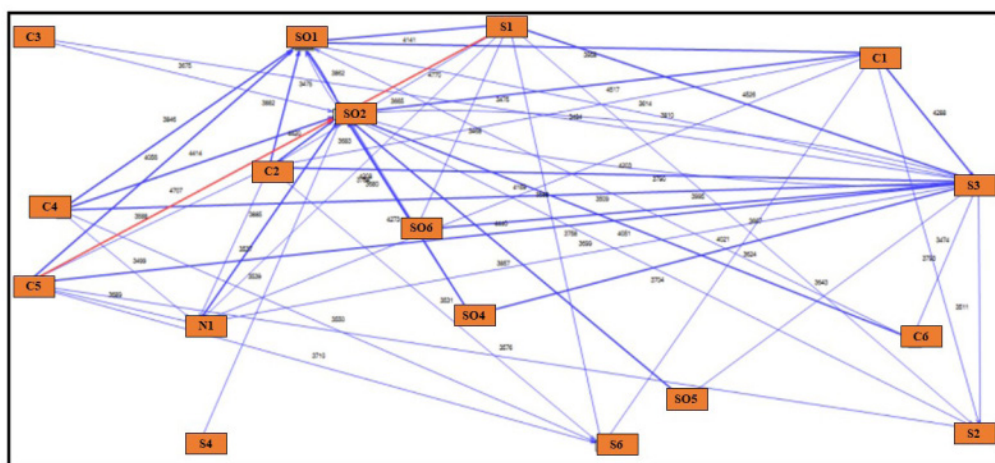


Fig. 12. Indirect Influence Cycle Graph by Variable Number (Output of MICMAC Software)

Figure 13 also shows the potential indirect effects between variables.

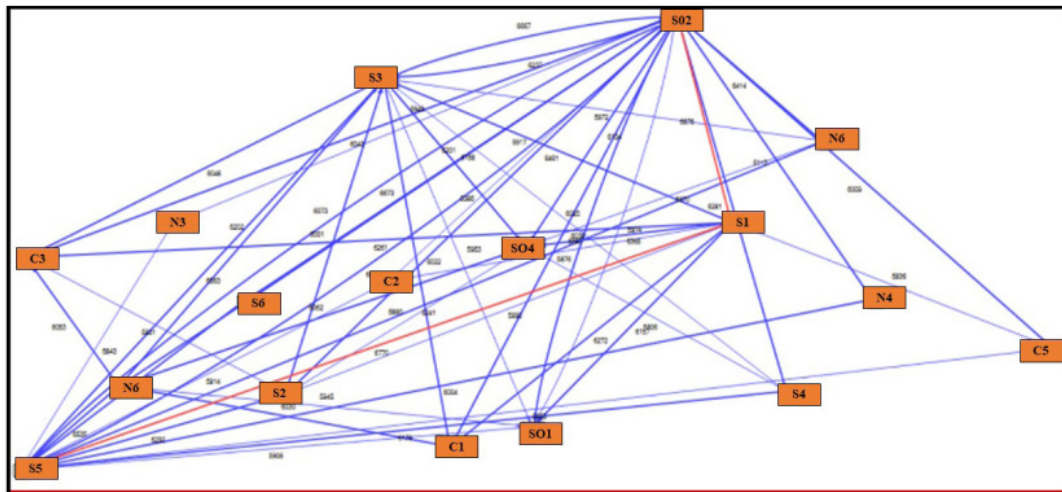


Fig. 13: Potential Indirect Effects Graph (Output from MICMAC Software)

In the following, the driving factors are identified, and the displacement and prioritization of variables based on their degree of influence and susceptibility (both

direct and indirect) are examined. Table 10 presents the key components affecting citizens' mental health in public spaces in the city of Tabriz.

Table 10. Key Components Affecting the Mental Health of Citizens in Public Spaces in the City of Tabriz

Direct Rank	Component	Influence	Component	Influence
1	Signs and Symbols	551	Signs and Symbols	541
2	Sense of Security	529	Diversity of Activities	532
3	Diversity of Activities	529	Accessibility	518
4	Accessibility	518	Sense of Security	550
5	Visual Attractiveness	486	Visual Attractiveness	503
6	User Experience	547	Diversity and Inclusion	483
7	Social Interaction	464	User Experience	479
8	Diversity and Inclusion	464	Walkability	459
9	Walkability	443	Social Interaction	456
10	Social Norms	443	Sensory Experience	441
11	Meanings	443	Social Norms	441
12	Accessibility (Extended)	443	Behaviors	433
13	Behaviors	432	Environmental Quality	428
14	Comfort	421	Meanings	423
15	Traditions	421	Comfort	418

Given that the software exponentiates the matrix several times to calculate indirect effects, the sum of indirect effects and impacts reaches multi-digit numbers, making it difficult to compare with direct effects. To solve this problem, the software provides a table of the contributions of factors, based on direct and indirect effects, on a scale of 10,000. Accordingly, the sum of effects and impacts is calculated to ten thousand, and the contribution of each factor to this number represents its contribution to the entire system. The component of signs and symbols makes

the largest contribution to both direct and indirect effects; all key components identified in direct effects are repeated in indirect effects with a slight shift.

7. CONCLUSION

The present study aimed to evaluate the criteria affecting the mental health of citizens in public spaces of Tabriz city, using a futures research approach in the study area of Tarbiyat and Vali-Asr pedestrian walkways. The results of the structural analysis in

the MICMAC software indicated that the system of mental health criteria in this area is unstable, which underscores the need for management intervention and careful planning. Based on the findings, of the 24 components entered into the model, 15 were identified as the most influential. The studies showed that “signs and symbols” are the most important drivers of mental health in the studied pedestrian walkways, ranking highest in both direct and indirect impact. This component, among the symbolic criteria, indicates that visual identification and the presence of meaningful elements in space introduce other effects. After that, the components of “feeling of security,” “variety of activities,” and “accessibility” were ranked next. Interestingly, in this analysis, the top three components (signs and symbols, feeling of security, and diversity of activities) are related to symbolic, functional, and performance criteria, respectively, which indicate the combination of citizens’ needs in these spaces. One of the important achievements of this research was the separation of criteria by impact level. The results indicate that the “functional criterion” with a total score of 271 had the greatest impact on citizens’ mental health. This means that in Tarbiyat and Vali-Asr pedestrian walkways, the physical functions of the space, such as accessibility, comfort, and mobility, are the foundation for improving mental health. In contrast, the “symbolic criterion,” with a total score of 255 in susceptibility, had the greatest impact on other criteria; in other words, symbolic criteria (such as cultural identity and meanings) are themselves strongly influenced by the performance of space and social factors. The analysis of the dispersion of variables also showed that although none of the components were identified as a regulating factor (which would make the system stable), the component of “cultural influences” was identified as a determining factor, and “equality” as a risk factor. The proximity of “social norms” and “laws and regulations” to the risk axis also warns urban managers that weakness in the legal and normative dimensions can become a serious obstacle to mental health in these spaces. Finally, the components of “sensory experience” and “safety” were identified as secondary influencing and leverage factors, respectively, indicating that citizens experience the sensations arising from space as a final output that must be supported by safety and cultural factors. The findings of this study are consistent with and differ from global and domestic studies on mental health and public spaces. In Rohe’s (1985) study on the model of community design features and their impact on mental health, “social interaction” was emphasized as the main axis. Although in the present study, “social interaction” (seventh place with a score of 464) is among the key components, the results of the study showed that in the cultural-urban context of Tabriz (Tarbiyat and Vali-Asr pedestrian walkways), “signs and symbols” and “sense of security” have a

higher priority than pure interaction. This indicates that, before social interaction takes place, Tabrizi citizens seek visual identity (signs) and psychological security in the space. In the study by Elsamahy and Abd El-Fattah (2018), which focused on reducing stress in public spaces in Tripoli, physical factors and the reduction of psychological pressure were emphasized. The results of the present study confirm this view by emphasizing “comfort” and “visual attractiveness” (ranked fifth). However, by adding the dimension of “futures” and identifying “cultural influences” as a determining factor, it enriches the literature on the subject. In fact, while previous studies focused more on the current situation, the present study has drawn future relationships and systematic effects using MICMAC. Also, the study by Pourbasat et al. (2012) in Borujerd referred to the physical, psychological, and social dimensions of health. The present study, by separating the criteria into four categories (functional, legal-normative, symbolic, and social) and proving the dominance of functional criteria, has made this perspective more precise and shows that in Tabriz pedestrian walkways, the functional dimension (accessibility and diversity of activities) is the main driver of the social and psychological dimensions. This finding is also in line with the results of Memardezfuli et al. (2023) on the importance of identification, as “signs and symbols,” the strongest influential factor, are the same identification tool emphasized in the Ahvaz research, but here presented in a quantitative, modeled form. Despite the effort to conduct a detailed study, some limitations should be considered:

1. The spatial scope of the research was limited to the Tarbiyat and Vali-Asr pedestrian walkways. However, this increased the depth of the analysis, generalizing the results to other public spaces (such as parks or squares) in Tabriz should be done with caution.
2. The Delphi method and MICMAC analysis relied on the opinions of experts and managers. At the same time, citizens’ perceptions of mental health may differ in subtle ways from those of experts and are not included in this model. Based on the results of the structural analysis and identification of key and driving components in the Tarbiyat and Vali-Asr pedestrian walkways, the following suggestions are presented at four levels:

A) Suggestions at the level of performance criteria
Considering that the “performance criterion” had the highest impact on the system and components, such as “feeling of security” (rank 2), “variety of activities” (rank 3), and “accessibility” (rank 4) were at the top of the list, the following actions are necessary:
Strengthening the feeling of security (key component):
Given the second-ranked impact of security, it is necessary to provide appropriate lighting, electronic surveillance (CCTV cameras), and facade design that enhance street visibility and eliminate blind spots to reduce citizen anxiety.

Increasing the diversity of activities (key component:) To promote mental health through diversity, sidewalk use should not be limited to passing through. Creating temporary seating areas, cultural kiosks, local shops, and play areas for children provides the necessary diversity to accommodate different age groups.

Improving accessibility and comfort: Facilitating physical access for people with disabilities and older people (emphasis on the accessibility component) and standardizing urban furniture (benches, trash cans) to increase physical “comfort”, which is the infrastructure of mental health, should be on the improvement agenda.

B) Suggestions at the level of symbolic criteria (focusing on the driving component)

The analyses showed that “signs and symbols” (rank 1) is the most important factor affecting the entire system, and the “symbolic criterion” has the greatest susceptibility. Therefore:

- Visual identification: The design of urban elements, signposts, and flooring should be carried out using indigenous symbols of Tabriz (such as traditional architecture, carpet weaving, or meteorological symbols) to strengthen the sense of belonging and identity among citizens.

- Giving meaning to space: Since the “meanings” component is also among the top 15 components, the design of pedestrian walkways, stories, and historical narratives of the city should be embedded to transform the space from a physical passageway into a “meaningful space” that connects with the inner peace of citizens.

C) Suggestions at the level of social and cultural criteria

Considering the identification of “social interaction” (rank 7) and “diversity and inclusion” (rank 8) as key components and “cultural impacts” as a determining factor:

- Interaction design: Creating communal seating

platforms, open spaces for conversation, and small squares along the pedestrian walkways that encourage informal interactions.

- Culture and inclusion: Holding local and cultural festivals on the pedestrian walkways that create public presence and a sense of “diversity and inclusion.” Considering “cultural influences” as a determining factor requires that urban management consider the cultural and indigenous sensitivities of the people of Tabriz in spatial design.

D) Suggestions at the level of legal and normative criteria (risk management)

The results showed that the “equality” component is in the risk zone, and “social norms” and “laws and regulations” are at the risk border. Therefore:

- Ensuring spatial equality: Urban management must ensure that pedestrian walkways are a space for all groups (women, children, low-income groups) and that no group feels discriminated against or does not belong.

- Reviewing laws and regulations: Given the high sensitivity of this section in the model, laws related to roadblocks, monitoring behaviors, and space use should be formulated and implemented in a way that, while maintaining order, does not harm citizens’ social freedoms to experience presence.

E) Suggestions for future research

Conducting comparative research on pedestrian walkways in Tabriz and other Iranian metropolises to measure the impact of “signs and symbols” across different cultural contexts.

Investigating the direct impact of physical changes (e.g., lighting or furniture) on citizens’ psychological indicators using longitudinal methods to confirm results from future research modeling. Also, Figure 14 shows the criteria and components affecting the mental health of citizens in public spaces in the city of Tabriz.



Fig. 14. Diagram of Criteria and Components Affecting Mental Health in Public Spaces

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CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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The author states that he had directly participated in the stages of conducting research and writing the article.

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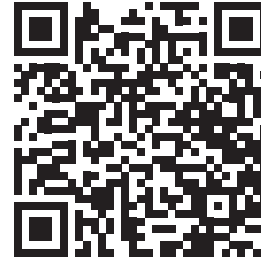
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