

Original Article

Received: 2026/06/03
Revised: 2026/08/01
Accepted: 2026/08/06



COPYRIGHTS

©2027 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.



HOW TO CITE THIS ARTICLE

Kayed Pour M. Saghafi Asl A. Haghlesan M. Measuring the quality of social interactions in contemporary public spaces in Tehran, with an emphasis on the role of physical components. *Urban Economics and Planning* 8(2):142-162.

DOI: [10.22034/uep.2026.584912.1912](https://doi.org/10.22034/uep.2026.584912.1912)

Measuring the quality of social interactions in contemporary public spaces in Tehran, with an emphasis on the role of physical components

Mohammad Kayed Pour¹, Arash Saghafi Asl^{2*}, Masoud Haghlesan³

1. PhD Candidate in Urban Planning, Department of Urban Planning, Ara.C., Islamic Azad University, Tabriz, Iran
2. Associate Professor, Department of Architecture & Urban Planning, Ta.C., Islamic Azad University, Tabriz, Iran
3. Associate Professor, Department of Architecture & Urban Planning, Ilk.C., Islamic Azad University, Ilkhchi, Iran

Abstract

Urban public spaces serve as platforms for social interactions and play a decisive role in strengthening social capital and improving citizens' quality of life. This study aims to measure the quality of social interactions in contemporary public spaces in Tehran, with an emphasis on the role of physical components. The research was conducted in eight selected districts of Tehran. It is applied in purpose and employs a quantitative-analytical approach. Data were collected using a researcher-developed questionnaire with a five-point Likert scale. The questionnaire consisted of 32 items. Cronbach's alpha (0.878-0.896) confirmed its reliability. The statistical population comprised 2,695,041 residents of the selected districts, from which a sample of 384 individuals was selected using simple random sampling based on the Cochran formula. Data analysis was performed using structural equation modeling in SmartPLS and SPSS. The findings indicated that the overall mean score of the physical components of public spaces was 3.09 out of 5, indicating a moderate level. The highest score was related to economic components, with a mean of 3.23. The quality of social interactions was assessed as undesirable, with an overall mean of 2.98; "trust in interactions" (2.68) and "depth of relationships" (2.72) received the lowest scores. Structural model analysis revealed that physical components explained 64.2% of the variance in social interactions. Among these, social components (as mediating variables) had the greatest impact on interactions, accounting for 34.9% of the effect. The results demonstrate that physical components significantly influence the quality of social interactions in Tehran's public spaces; however, these spaces have failed to promote trust and meaningful relationships. Therefore, improving social, physical, cultural, economic, and environmental components should be prioritized in urban planning, with due attention to regional differences and the needs of various social groups.

Keywords

Collective spaces
physical components
social interactions
Tehran city

* Corresponding Author: saghafiaslarash@gmail.com

1. Introduction

Urban space, as the context for the formation of social life, is a structure in which human interactions manifest tangibly and provide the ground for civic participation and collective action. These spaces are not merely a physical body but an arena in which social interactions among different members of society emerge and are strengthened, because the direct presence and encounter of citizens in public places increases social capital, sense of place attachment, and social solidarity (El-Bardisy, 2024; Qi et al., 2024). Social interaction is a dynamic and multidimensional process that takes shape in the context of collective spaces and includes various dimensions such as the quantity of interactions (the number and frequency of encounters), the diversity of interactions (the range of groups involved), the depth of relationships (the quality and continuity of communication), and trust in interactions (the feeling of safety and confidence in relationships). In this study, "quality of social interactions" is defined as a combination of these four dimensions, measured through measurable indicators in the questionnaire; therefore, relationships that lack meaning or a clear response do not fall within the realm of social interaction and cannot form meaningful social participation. Recent studies recognize social interaction in urban spaces as an effective factor in strengthening social cohesion, cultural coexistence, and urban justice; appropriate design of public spaces can provide more opportunities for interpersonal encounters and building social capital (El-Bardisy, 2024; Madanipour, 2020). Among influential theorists of the city and urban life is Jane Jacobs, whose ideas emphasize public spaces as the context for social interactions. Contemporary interpretations of Jacobs's theories see streets, sidewalks, parks, and urban squares not only as functional elements of the city but also arenas for forming public life, everyday encounters, and social relationships. By increasing presence, the possibility of mutual observation, conversation, and informal interaction, these spaces strengthen social cohesion, urban liveliness, and social dynamism (Madanipour, 2020; Gehl, 2013). Contemporary research shows that accessibility, safety, land-use diversity, and the quality of urban spaces' physical design play an important role in strengthening social interactions. Spaces that are suitable for walking and provide opportunities to stop, converse, and gather can help increase social interaction, thereby strengthening social cohesion and reducing discrimination or social segregation.

Interactions and co-presence in public spaces also increase social capital, a sense of participation, and cultural solidarity, which are prerequisites for the realization of justice and social cohesion in contemporary cities (Qi et al., 2024; Sharifi, 2019). In general, contemporary scientific literature emphasizes that the design of urban spaces must go beyond merely functional aspects and pay attention to the social, cultural, and human dimensions of urban life so that the ground is provided for the formation of meaningful and sustainable relationships among citizens (Madanipour, 2020; El-Bardisy, 2024). Because of their role in people's lives and primary relationships, collective spaces are particularly important in creating social relationships. Sociability, as one of the basic human needs, is possible when spaces are designed to support social interaction (Siramkaya & Aydin, 2017: 83). The desire for collective activities in living spaces at different levels of family and community is related to the organization of the physical space, and its quality has a significant effect on residents' lives and is referred to as an important factor in the sense of place attachment. Physical factors can provide the ground for people to enter and then stop in the space. Also, observing factors such as accessibility, visual attractions, and natural factors when designing a collective space can help create a sense of safety and increase interaction among space users (Dabiri and Zare, 2021).

Cities, as the arena of human collective life, have always been a context for social interactions. Public collective spaces, from historical squares to modern parks, play an essential role in forming and strengthening these interactions. Tehran, a metropolis with a rich background and rapid contemporary transformations, has witnessed profound changes in its public spaces. These spaces, once the context for dialogue, cultural exchange, and social cohesion, now face many challenges. On the one hand, pressures from the city's physical expansion, excessive densification, and prioritization of the automobile over the pedestrian have affected the quality of these spaces; on the other hand, social, cultural, and technological transformations have changed the nature of social interactions and expectations from them. In the meantime, the physical body of collective spaces, as the container in which social content flows, plays a decisive role. Physical components such as scale, accessibility, flexibility, urban furniture, the way the space is situated in the urban fabric, functional diversity, and aesthetic quality directly affect the

manner, quality, and continuity of social interactions. In this study, the term physical components is used in a general sense. It includes not only physical and spatial characteristics but also the social, economic, cultural, and environmental dimensions of collective spaces as layers influencing social interactions. This approach is based on the theoretical premise that the quality of social interactions in public spaces is the result of the simultaneous interaction of a set of physical-spatial, activity-social, symbolic-semantic, economic, and environmental factors, and separating these dimensions from one another does not allow a comprehensive analysis of the effect of the built environment on social relationships. Although the study's title emphasizes "physical components," in this study "physical body" is not limited merely to physical and geometric elements. The study's theoretical approach is based on the premise that the built environment, as the context for social interactions, has economic, cultural, and environmental layers, each of which affects the quality of social relationships. Examining these dimensions, alongside purely physical components, allows for a more comprehensive analysis of the effect of the environment on social interactions. Therefore, this study, with a holistic, multidimensional view of the concept of the physical body, examines the simultaneous effect of these components on the quality of social interactions. In other words, space's design can invite citizens to stay, converse, and participate, or repel them and turn it into a spiritless arena for passing through. Given the vital importance of social interactions in individual health and the cohesion of urban society, as well as the unique role of public spaces in facilitating these interactions, assessing the quality of these spaces in contemporary Tehran is an undeniable necessity. This assessment does not rely solely on form; it must also measure the space's success in creating opportunities for encounter, meeting, and interaction among different social groups. This study aims to examine and assess the quality of social interactions in Tehran's contemporary collective spaces, with emphasis on the role of physical components. This study seeks to answer the main question of the extent to which the physical components of contemporary collective spaces of Tehran affect the quality and quantity of users' social interactions.

2. Theoretical foundations

From an urban sociology perspective, public spaces, as vital social contexts, provide the possibility of

observing and understanding the presence of others and shared human experiences. These spaces are not only places for physical gathering but also grounds for informal interactions, conversations, and cultural and social activities, which lead to a sense of belonging and social capital among residents. In addition, public spaces can strengthen interpersonal communication and develop a sense of sociability, because they bring people together in different situations and create shared experiences of the urban environment. In such spaces, people can be present, interact with others, and participate in collective activities away from private spheres such as home or work; these experiences improve the quality of social life and strengthen social cohesion (Lai et al., 2024; Azizi and Pircar, 2023). Public spaces are a medium for communicating with new people and those we know. As a host for our acquaintances, this space is also a valuable blessing for strangers (Brekke et al., 2018). Social interaction is a basic human need that includes recreation, rest, socializing with others, and establishing interpersonal communication in daily life. As a social being, a person acquires part of their identity and mental health through presence and interaction in sociable public spaces. These spaces enable observation, conversation, and communication (Alnaim et al., 2025). Numerous factors can affect sociability and social interaction in public spaces, including urban design features such as accessibility, spatial signs, urban furniture, pedestrian paths, and amenities that facilitate presence and interaction. Also, perceptual and social factors such as a sense of safety, place attachment, and social cohesion of individuals are effective in determining the degree of willingness for social interaction (Qi et al., 2024). In addition, research shows that environmental components, including physical dimensions, spatial-architectural factors, meaning and aesthetics, sense of security, and activity functions, are among the most important determinants of spatial sociability that can increase or decrease social interactions (Jafari et al., 2020). In other words, a public space is sociable when it provides a combination of physical facilities, appropriate spatial structure, visual attractiveness, and a sense of comfort and security for its users. Therefore, social interaction depends on the existence of a sociable, suitable space that covers human needs for socializing and social exchange and encourages people to be actively present and participate in collective life.

Social interactions are formed when individuals

mutually perceive the presence and behavior of others in shared situations and feel that others also perceive them, a process that is part of “social cognition” and includes the analysis, interpretation, and prediction of others’ behavior (Malik, 2024). In situations of physical proximity, individuals naturally categorize others’ characteristics based on visual and contextual cues to form initial collective impressions and behavioral expectations that serve as the basis for decision-making in subsequent interactions. New research shows that the distance between two individuals (proximity/distance) can strengthen or weaken social impressions; physical proximity causes individuals to extract and categorize more information about others’

characteristics and intentions, resulting in stronger evaluative judgments. These categorizations and judgments then affect the selection of appropriate social responses, because individuals use perceptual and categorized information to predict the other party’s behavior and react accordingly (Veranic et al., 2025). The activity dimension of public spaces is related to the activities and uses around them. The behavioral nature of a space is formed through various activities; when people are present and active in a space for watching and listening, they enliven and dynamize the space environment through passive participation and transform it (Ezzeldin & Assem, 2019: 2).

Table 1. Definitions of social interactions and the factors influencing them from the perspective of theorists

Theorist	Theory	Factors affecting social interactions
Hall & Hall (1966)	Theory of social distancing of sociable and unsociable environments	Possibility of face-to-face contact, reduction of physical distances to social distances, quality of movement and pause in space
Whyte, W. H. (1980)	Social behavior in small public spaces	Speed of movement, possibility of stopping, human scale, direction of movement, elements facilitating pause and gathering
Lang, J. (1987)	Patterns of social interaction in the built environment	Place attachment, continuity of presence, quality of environmental perception, spatial legibility
Oldenburg, R. (2013)	Theory of the “third place” and informal social spaces	Presence of people with similar social characteristics, sense of belonging, informality of the space, continuity of interactions
Zucker, P. (1960)	Urban space as the context for collective activities	Movement, liveliness, ongoing activities, connection of spatial form with social behavior
Carr (1992)	Principles of successful public spaces	Comfort and relaxation, security, active interaction (direct communication), passive interaction (observing others), possibility of exploring the environment
Gehl, J. (2013)	Life between buildings and the quality of social interactions	Human scale, visual attractiveness, security, accessibility, diversity of activities, quality of pause spaces

To assess the quality of social interactions, one can focus on the concept of social interaction and the structure and function of social relationships. Social interaction is a process in which individuals communicate and influence each other (Goffman, 1963). The structure of social relationships includes stable patterns of communication, roles, and norms that govern relationships, and its function refers to the consequences of these relationships for individuals and society (such as trust, solidarity, and social capital) (Putnam, 2000). Accordingly, the assessment of the quality of social interactions in this study was conducted based on five indicators that cover both structural aspects (diversity, frequency, and quantity) and functional aspects (trust and depth) of social relationships.

Urban public spaces are contexts that provide the possibility of social interaction, coexistence, and solidarity among various groups regardless of gender, age, ethnicity, or economic level. The existence of open, green, and accessible spaces for all provides the ground for the formation of “social liveliness” and “social capital” (Jennings & Bamkole, 2019; Aelbrecht & Stevens, 2019).

Spatial dimensions such as geometry and spatial configuration, accessibility, proximity, and activities overlap can change the extent and nature of social interactions; spaces with a diverse mix of activities and ease of movement increase opportunities for incidental encounters, conversation, and informal interactions (Gruosso et al., 2025). Spatial quality, users’ perceptions of comfort, security, spatial

legibility, and design quality play an important role in encouraging or preventing collective interactions, because these characteristics also affect how

individuals experience, behave, and communicate in space (Qi et al., 2024). Figure 1 shows the social interaction cycle.

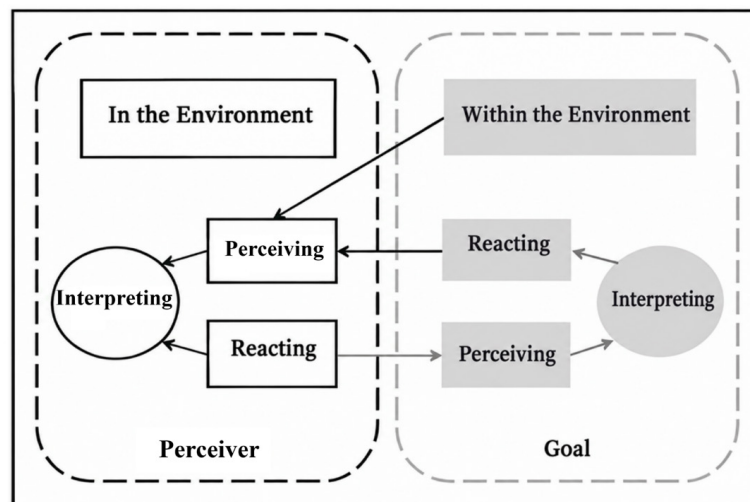


Figure 1. The cycle of social interaction

In this study, the “quality of social interactions” was measured through five indicators: diversity of interactions, meaning the range of different social groups that the user encounters in the collective space (Gehl, 2013; Whyte, 1980); frequency of presence, indicating the number of times the user visits the collective space in a given time period (Oldenburg, 2013); quantity of interactions, referring to the number of people with whom the user communicates

in the collective space (Carr et al., 1992); trust in interactions, expressing the user’s feeling of safety and confidence in encountering others in the collective space (Putnam, 2000; Lofland, 1998); and depth of relationships, referring to the quality, continuity, and meaningfulness of the relationships formed in the collective space (Goffman, 1963; Gehl, 2013). Table 2 presents the principles of individuals in social interaction.

Table 2. Principles of individuals in social interaction

Principles	Interpretation	Source
Civil inattention	They are aware of each other’s presence, but they have no focused participation with one another.	Goffman, 1963; Lofland, 1998
Participation	Interaction in public spaces is a form of cooperation.	Whyte, 1980; Lofland, 1998
Encoding/decoding system	Our reaction to others is not to the act itself but to its meaning; interaction is a process of encoding and decoding.	Mead & Moris, 1934; Whyte, 1956; Blumer, 1969; Lofland, 1973, 1998; LaFarge, 2000; Moskowitz, 2002
Self-presentation	By applying the encoding/decoding system to the body, one can present oneself in public spaces.	Goffman, 1959, 1963; Lofland, 1973

Within the study’s conceptual framework, physical components (as the independent variable) are defined in four categories: physical components in the specific sense include indicators such as the form and geometry of space, urban furniture, lighting, dimensions and human scale, accessibility, and view and perspective. Economic components include economic activities, land and property value, the informal economy, and

construction and maintenance costs. Cultural components include land-use type, lifestyle, the culture of seeing and the view, cultural beliefs and values, vernacular architecture, traditions and rituals, and the cultural calendar. Environmental components also include visual quality, functional dynamism, climatic resilience, environmental comfort, and the use of natural resources. Indicators related to the

social dimension (such as participation, security, sense of belonging, and identity) are identified as mediating or contextual variables and are analyzed separately in the structural model to prevent overlap with the dependent variable (quality of social interactions).

The physical public realm includes urban and physical spaces that, regardless of ownership, the general public can access and be present in. These spaces can be streets, squares, parks, pedestrian paths, spaces surrounding public buildings, and even private spaces opened for public use (Németh & Schmidt, 2011).

In contemporary studies, the concept of “publicness” is not limited to state ownership; rather, it combines ownership, management, access, type of use, and users’ experience (Chambers, 2015). Accordingly, spaces under private ownership, but opened to the public, referred to as “privatized public spaces,” can be considered part of the physical public realm, although control and oversight over them differ and affect the quality of “publicness” (Schwartzmann, 2022).

In the physical dimension, the city’s form and structure include land-use patterns, the street network, the building fabric, open spaces, and how these elements are linked, which is considered the main context for the formation of human behaviors and activities. From the urban morphology perspective, the combination

of physical elements determines the extent to which urban spaces are legible, accessible, and social (Oliveira, 2016). As a key component of the city’s physical body, public spaces not only form the physical and spatial structure of the city but also create cultural-social contexts for the formation of “social contact,” “public culture,” and a “shared emotional atmosphere.” In squares, streets, parks, and bazaars, people from different backgrounds come together, forming a sense of belonging and collective identity; therefore, public spaces are the infrastructure for social justice, solidarity, and civic participation (Low, 2023). Therefore, in studying the physical transformation of contemporary collective spaces and its effect on the quality of social interactions, the simultaneous examination of both the physical and social dimensions is necessary, because physical changes such as the development of public spaces, urban regeneration, or changes in the spatial network can directly affect the patterns of presence, interaction, and social behavior of citizens (Gehl, 2011). The evolution of collective spaces in Iran depicts the continuity and change of the role of the bazaar, square, street, park, and pedestrian path in this process. Figure 2 shows the evolution of collective spaces in Iran.

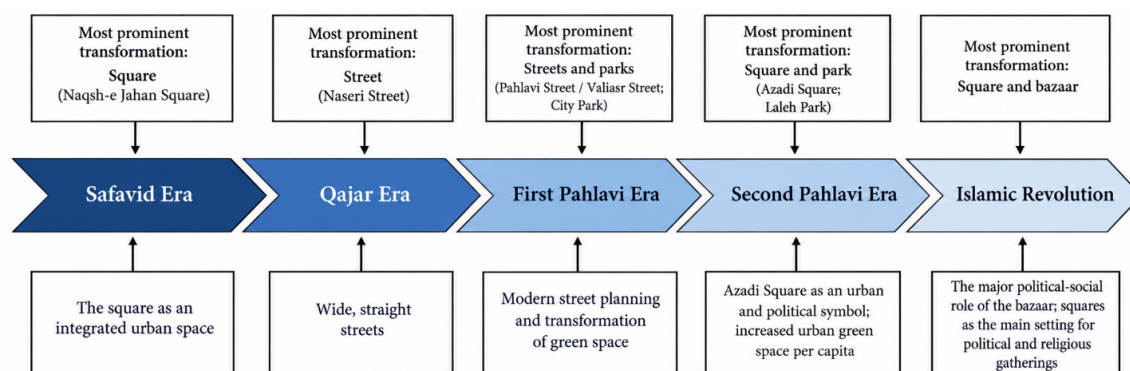


Figure 2. The evolution of collective spaces in Iran

3. Research background

Lashgari and Soheili (2023), in their study on the role of social interactions in creating environmental security in residential complexes (case study: Phase One of Ekbatan Town, Tehran), stated that the creation of a successful public space lies in its ability to accommodate individuals and groups, the in-betweenness of the space, the existence of territory, security, a coherent structure, continuity and legibility and predictability of the space, the existence of appropriate facilities in the space, responsiveness,

provision of environmental comfort and convenience, the amount of information, the environmental excitement and vitality of the space, and social interactions. Dabiri and Zare (2021), in their study examining the effect of security components on the promotion of social interactions in collective spaces (case study: Daneshjoo Park, Tehran), concluded that considering safe spaces for establishing social interactions for specific groups in the form of contemplation spaces, designing the dimensions of space at a human scale, benefiting from landmark

symbols, and lighting the spaces are among the effective measures. Amini and Khademzadeh (2021), in their study of collective life and the city of Shiraz in the Buyid era, showed that the human need for social life has manifested in various types and forms of behavior over different periods. Mosques, bazaars, schools and educational institutions, government palaces, squares, khanaqahs and caravanserais, passages, synagogues, churches, and fire temples hosted residents' social interactions. Historical data suggest that these places, in addition to their function, acted as an urban identity for different social strata, and residential neighborhoods with like-minded residents emerged around them. Mansouri et al. (2020), explaining the effect of Safavid rule on the formation of collective space in the Safavid bridges of Isfahan (case study: Allahverdi Khan and Khaju bridges), stated that in the Safavid period, bridges became a context for collective activities and the role of the government, and instead of the mere function of passage, with their special architecture, they formed an important collective space in the structure of the city of Isfahan. Dehnad et al. (2020), in their study titled explaining the relationship between the components affecting the quality of collective open space in promoting the sociability of the environment, concluded that there are seven components affecting the quality of collective spaces and sociability: safety and security, flexibility, permeability, activity potential, social interactions, place identity, and environmental perception. Haghbeyan and Shokouhi Bidhendi (2019), in their study titled an inquiry into the systematic study of collective life in urban space (case study: the 17 Shahrivar pedestrian path in Tehran), stated that the increasing advancement of technology has reduced citizens' need for shopping, work, and social interactions in urban space. This has increased individuals' power of choice regarding presence or absence in collective space, and as a result, the quality of collective spaces has gained double importance. Shahini et al. (2019), in their study on the role of architectural physicality in promoting collective life in public spaces (case study: Baharestan Square), concluded that, by studying squares, no significant relationship is seen between flexibility, facilities, land-use diversity, and collective life, but gathering potential and spatial determination have a positive effect on collective life.

Turgut and Lazarova-Molnar (2025), in their study "Exploring urban segregation dynamics: A hub-based agent model integrating preferences, social

interactions, and policy interventions," investigated the urban spatial segregation dynamics using an agent-based model. In this study, the urban environment is divided into "functional hubs," including economic, educational, cultural, and green spaces, and areas lacking a specific function; agents make locational decisions based on different preferences toward these hubs. The results show that individual preferences and social interactions simultaneously shape complex patterns of urban segregation. The findings indicate that urban policies can affect spatial segregation patterns and residents' quality of life. Lorenzo et al. (2023) analyzed and categorized the quality of urban public spaces, emphasizing their role in promoting citizens' physical and mental health. The results show that users can be valid evaluators of the quality of public spaces. The findings also indicate that the physical order of the space plays a predictive role in the perceived quality of the environment and the restorative capacity of public spaces and can serve as a basis for improving and adapting these spaces to users' needs. Emil van Eck et al. (2022), in a study titled "Moving marketplaces: Understanding public space from a relational mobility perspective," redefined the concept of public spaces from the perspective of relational mobility and showed that urban markets, as an example of public spaces, are inherently not fixed and bounded places but "spaces in flow" that are formed and reconstructed every day. This study shows that mobility and movement of market actors play a central role in the emergence and reproduction of these spaces; they are linked to social, material, and institutional networks beyond specific spatial boundaries. The relational mobility approach also raises new questions about unbalanced power and social relations in the production of public spaces. It emphasizes that markets, as public spaces, result from networked interactions and complex mobility processes, not merely from bounded and static spatial characteristics. Gao et al. (2022) presented an explanatory framework for the vitality of urban spaces, arguing that in the digital age, the main factor of the vitality of urban spaces has changed from physical functions to spatialized social interactions. By emphasizing human social needs, they identified factors that affect social interactions and developed a quantitative model to measure space vitality. The results showed a positive, significant correlation between spatialized social interactions and spaces' actual vitality. They introduced this framework as a practical tool for the ex-ante evaluation of urban plans.

Sadeghi and Jangjoo (2022), in a study titled “Women’s preferences and urban space: The relationship between the built environment and the rate of women’s presence in urban public spaces in Iran,” examined the relationship between the physical characteristics of the built environment and the rate of women’s presence in Iran’s urban public spaces. The study aimed to explain how women’s individual preferences and the physical characteristics of urban spaces affect the frequency of their presence in public spaces. The results showed that, in the individual dimension, women’s age and marital status are significantly related to their presence in urban spaces. In the physical dimension, a significant relationship was observed between built-environment characteristics and women’s presence, with land use and activity diversity having the greatest effect. Access to public parking and the ability to choose to sit in the shade or sun were also identified as factors that increase women’s presence in public spaces. This study emphasizes the determining role of the physical design of urban spaces in promoting women’s social presence and realizing spatial justice. Mouratidis and Hassan (2020), in a study comparing contemporary and traditional styles in architecture and urban public spaces using virtual reality, examined citizens’ environmental perception and emotional evaluation of these styles. The results showed that contemporary architectural styles, influenced by postmodernism and

known for features such as asymmetry, lack of ornamentation, and an industrial appearance, receive weaker psychological and perceptual evaluations than traditional styles, which are based on symmetry, ornamentation, and visual legibility. In general, contemporary architecture, compared to traditional architecture, has a lower score in the perception of environmental quality and emotional impact on users. The study’s findings raise critical questions about the dominant orientations in contemporary architecture and urban design and their consequences for the livability of public spaces, emphasizing the need to revise the physical characteristics of new urban spaces to promote human experience and psychological well-being.

Numerous studies have examined social interactions in urban spaces (Lashgari & Soheili, 2023; Dabiri and Zare, 2021; Guo et al., 2022; Qi et al., 2024). However, most have examined physical components separately, with less attention to the simultaneous and causal analysis of a set of physical components (in general) with the quality of social interactions as a single structural model. Also, despite the importance of contemporary collective spaces in Tehran, few studies have assessed the quality of social interactions in these spaces using a combined and multidimensional approach. The present study fills this gap by providing a measurement-based, integrated framework. Table 3 presents the research gap.

Table 3. Research gap

Research focus	Status of previous studies	Identified research gap	Approach of the present study
Social interactions in collective spaces	Mostly examined on a case-by-case basis or with a descriptive approach (Lashgari & Soheili, 2023; Dabiri and Zare, 2021).	Lack of quantitative and indicator-based assessment of the “quality” of social interactions	Assessing the quality of social interactions based on measurable indicators
Physical components of collective spaces	Examination of components in a scattered and independent manner (security, lighting, scale, and land use)	Lack of simultaneous and causal analysis between physical components and social interactions	Analyzing the direct effect of physical components on the quality of social interactions
Vitality and quality of public spaces	Focus on vitality or perceived quality of space (Guo et al., 2022; Lorenzo et al., 2023).	Lack of specific focus on social interactions as the main dependent variable	Focus on social interactions as a key indicator of space quality
Spatial context of the study	Limited or non-contemporary case studies, or outside Iran	Shortage of measurement-based studies in contemporary collective spaces of Tehran	Case study of contemporary collective spaces of Tehran

Table 4 presents the dimensions and indicators of physical components and the quality of social

interactions based on the theoretical foundations and research background.

Table 4. Dimensions and indicators of physical components and the quality of social interactions

Number of items	Items (indicators)	Dimensions	Variable
3	Space form, space geometry, spatial proportions	Spatial organization	Physical components of collective spaces
3	Accessibility, permeability, continuity of movement paths	Access and permeability	
3	Urban furniture, lighting, view and perspective	Quality of the physical environment	
3	Human scale, environmental comfort, pause and rest spaces	Comfort and human scale	
3	Land-use diversity, space flexibility, spatial vitality	Physical function of space	
15	Total		
3	Interaction with different groups, diversity of social relationships, communication among different groups	Diversity of interactions	Quality of social interactions
3	Frequency of presence, duration of presence, continuity of presence in space	Frequency of presence	
4	Number of interactions, participation in collective activities, conversation with others, establishing social communications	Quantity of interactions	
3	Feeling of security, trust in others, confidence in interactions	Trust in interactions	
4	Continuity of relationships, intimacy of relationships, meaningfulness of communications, formation of sustainable friendships	Depth of relationships	
17	Total		

Figure 3 presents the research's conceptual model.

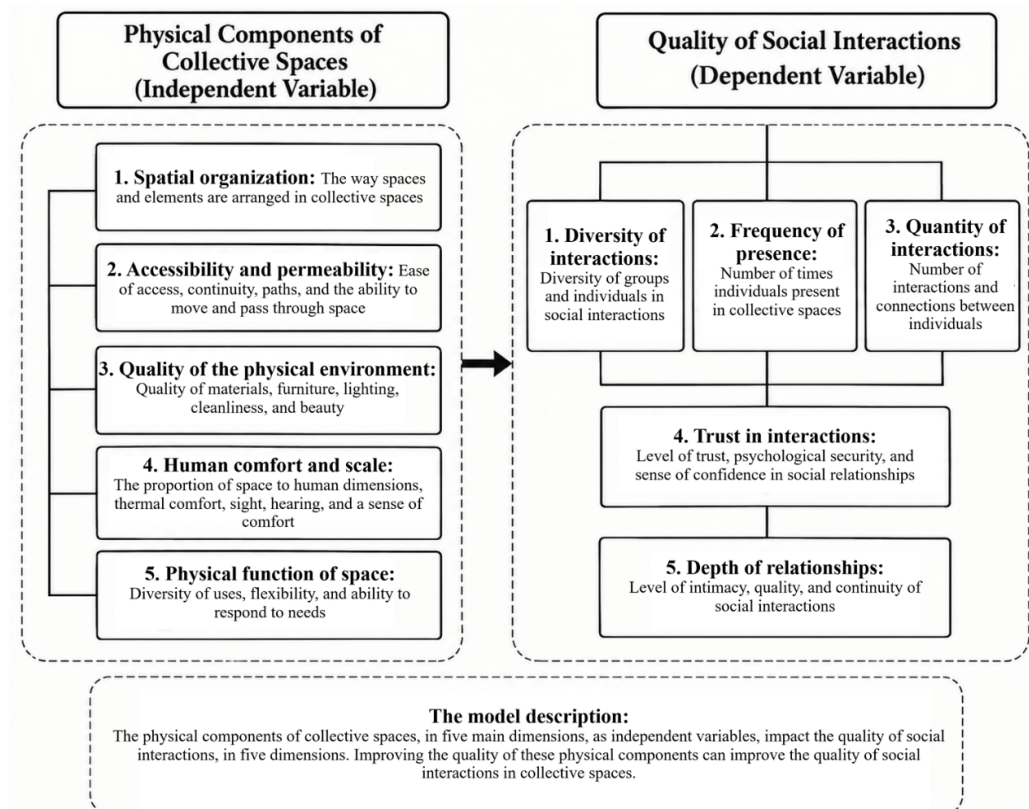


Figure 3. Conceptual model of the research

4. Materials and methods

This study is applied in purpose, quantitative in terms of data, and descriptive-analytical in terms of execution method, carried out as a case study in selected districts of Tehran. The results present the quality of social interactions in contemporary collective spaces in Tehran, with emphasis on the role of physical components in the selected districts. Various tools are used to collect data, according to the research questions and the main problem, and several different tools may be used simultaneously. To collect quantitative data to explain the transformation of the physical nature of collective spaces in the Iranian city in terms of its effect on the quality of social interactions of citizens in the selected districts of Tehran, a questionnaire with closed-ended questions was used. A closed-ended questionnaire is suitable for a large statistical sample. The questionnaire was measured based on the Likert scale (very high, high, medium, low, and very low; 1 to 5). The main data collection tool was a questionnaire with 32 items, of which 17 items were devoted to measuring the dependent variable (quality of social interactions) in the form of five indicators: diversity, frequency, quantity, trust, and depth, and 15 items addressed the measurement of physical components (including five categories: physical, social, economic, cultural, and environmental). It was designed to measure physical-spatial, perceptual, symbolic quality, and social interactions in the collective spaces of Tehran. The questionnaire items were extracted and localized using theoretical frameworks and valid studies in urban design, public spaces, and social interactions. The structure of the questionnaire included six main dimensions: 1) physical-spatial, 2) activity-social, 3) symbolic-semantic, 4) psychological-perceptual, 5) access and communication, 6) identity and social belonging (in perceptual and symbolic items). All items were measured on a five-point Likert scale from very low to very high to enable quantitative analysis, construct validity assessment, and instrument reliability. In this study, the “quality of social interactions,” as the main dependent variable, was measured in the form of five operational indicators, including diversity of interactions, frequency of presence, quantity of interactions, trust in interactions, and depth of relationships. Each indicator was measured using several questionnaire items (5-point Likert scale). Diversity of interactions measures the

range of social groups involved using a Likert scale. Frequency of presence measures the number of visits per week. Quantity of interactions measures the number of people involved in the interaction. Trust in interactions measures the feeling of security in encountering others using the Likert scale. Depth of relationships measures the continuity and meaningfulness of communications using a Likert scale. Trust in interactions indicates the user’s sense of safety and confidence in encountering others in the collective space. Depth of relationships refers to the quality, continuity, and meaningfulness of the relationships formed in the collective space. Together, these five indicators form the “quality of social interactions” score, which was entered as the dependent variable in structural equation modeling. The indicators and items related to measuring the level of satisfaction with physical components in five categories are as follows: physical components in the specific sense include six indicators: form and geometry of space, urban furniture, lighting, dimensions and human scale, accessibility, and view and perspective, which were measured with six items (numbers 18 to 23). Social components include five indicators: social participation, security, sense of place attachment, social identity, and diversity of age and gender groups, which were measured with five items (numbers 24 to 28). Economic components include four indicators: economic activities, land and property value, the informal economy, and construction and maintenance costs, which were measured with four items (numbers 29 to 32). Cultural components include seven indicators: type of land use, lifestyle, the culture of seeing and the view, cultural beliefs and values, vernacular architecture, traditions and rituals, and the cultural calendar, which are included in the perceptual and symbolic items. Environmental components also include five indicators: visual quality, functional dynamism, climatic resilience, environmental comfort, and the use of natural resources, which are shared in the perceptual and symbolic items. Each indicator was measured independently, and the overall score of each category was calculated from the simple average of its indicators. These indicators are not necessarily cumulative in one direction. The reliability of the questionnaires was obtained using the Cronbach’s alpha formula and SPSS software as follows. Table 5 presents the findings obtained from applying the Cronbach formula.

Table 5. Findings obtained from applying the Cronbach formula

Construct	Cronbach's alpha
Physical components	0.886
Economic components	0.892
Social components	0.878
Cultural components	0.894
Environmental components	0.881
Social interactions	0.896

Given that the alpha value is 0.88 and greater than 0.7, we can conclude that the questionnaire has appropriate reliability. The questionnaire was presented to 10 professors and experts in urban planning and urban design, and they confirmed its validity. The statistical analysis of the questionnaire includes "inferential analysis." The statistical population of the study includes citizens in the districts 1, 3, 6, 11, 12, 15, 19, and 22 in Tehran, where the statistical population includes 500,000 people in District 1, 330,000 people in District 3, 251,384 people in District 6, 288,884 people in District 11, 240,720 people in District 12, 659,468 people in District 15, 295,627 people in District 19, and 128,958 people in District 22. The total population of the selected districts is 2,695,041 people. The sample size was determined as 384 people using the Cochran formula. Sampling was carried out by simple random convenience sampling at high-traffic points of the eight districts. The snowball method was used only to access specific groups (the elderly and the disabled). Sampling is single-stage. The districts 1, 3, 6, 11, 12, 15, 19, and 22 in Tehran were selected as sample districts because their physical, economic, social, and cultural diversity enabled comparison of the quality of

social interactions in different urban fabrics. These districts have fundamental differences in terms of geographical location (north, center, south, and west), urban fabric (newly built, mixed, historical, and marginal), income level, and social composition of residents, and for this reason, they are suitable for examining the effect of physical components on social interactions. The demographic characteristics of the statistical sample are presented in Table 5. Out of a total of 384 respondents, 56.8% were men and 43.2% were women, and this relatively balanced distribution provides the possibility of analyzing the diverse experiences of users of collective spaces. In terms of age, the largest share belongs to the age group of 30 to 45 years (40.6%), followed by the group of 18 to 29 years (37%), which indicates the dominance of the active and middle-aged population in the use of public spaces in Tehran. The average age of the respondents was calculated as 35.2 years. In terms of education, the highest frequency belongs to the group with a diploma and associate degree, followed by below diploma, which indicates the appropriate social and economic diversity of the sample. Table 6 shows the demographic characteristics of the statistical sample of the study.

Table 6. Demographic characteristics of the statistical sample of the study

Variable	Category	Number	Percentage
Gender	Male	218	56.8
	Female	166	43.2
Age group	18-29 years	142	37.0
	30-45 years	156	40.6
	46-60 years	64	16.7
	Over 60 years	22	5.7
	Below diploma	142	37.0
Education	Diploma and associate degree	156	40.6
	Bachelor's degree	64	16.7
	Master's degree and doctorate	22	5.7
Average age	—	—	35.2 years

The PLS model consists of two main parts: 1) the structural part: it shows the relationships between latent variables; 2) the measurement part: it displays the relationships between latent variables and indicators.

4.1. Introduction of the study area

The Tehran metropolis is divided into 22 districts and 112 urban areas. In 2016, the Tehran metropolis consisted of 376 neighborhoods; the selected districts in this study include districts 1, 3, 6, 11, 12, 15, 19, and 22, as Figure 4 shows.

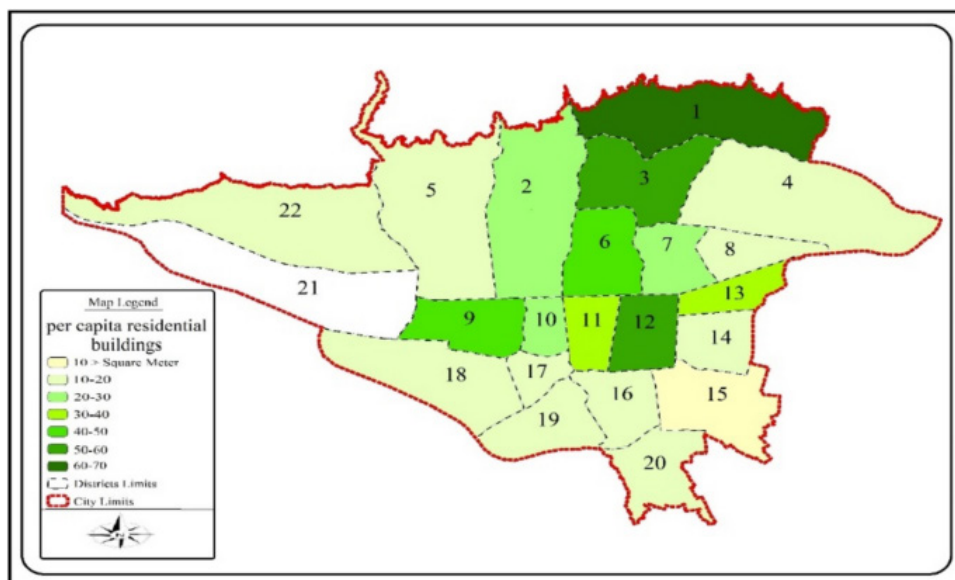


Figure 4. Selected districts of Tehran in the present study

5. Findings

Of the 384 respondents, 218 (56.8%) were men and 166 (43.2%) were women. This relatively balanced distribution, although with a slightly higher presence of men, is consistent with the actual pattern of use of

public spaces in Tehran. The notable presence of women (more than 43%) indicates the relative attractiveness and safety of these spaces for both genders and supports the findings by incorporating different experiences. Figure 5 shows these data.

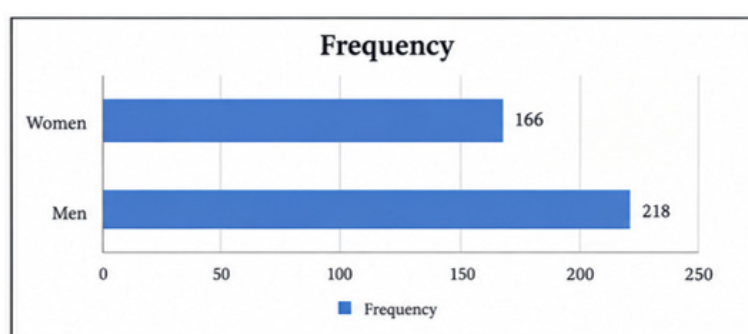


Figure 5. Percentage distribution of respondents by gender

Based on the study's findings, the overall mean for the physical components of collective spaces is 3.09 out of 5, indicating a moderate status for these components. Among the indicators, accessibility (mean, 3.42) shows the highest satisfaction, followed by view and perspective (3.28) and form and geometry of space (3.24). In contrast, urban furniture (mean, 2.76)

receive the lowest score, indicating citizens' dissatisfaction, and the study's qualitative findings also emphasize this weakness. Lighting (2.89) and dimensions and human scale (2.98) are also evaluated as relatively unfavorable. The dispersion of responses is moderate, but the high coefficient of variation for urban furniture (37.7%) and lighting (35.3%) indicates

a significant difference in the quality of these components in different spaces or a difference in users' perception.

The overall mean for the economic components (3.23 out of 5) is higher than that of the physical components, indicating a relatively more favorable evaluation of this aspect. Among the components, economic activities (mean: 3.52) have the highest score, which indicates the diversity of commercial and service activities in collective spaces. Land and property value (3.45) and the informal economy (3.34) rank next; the former indicates the positive effect of public spaces on the surrounding properties' value, and the latter indicates a strong presence of informal economic activities (such as street vending). In contrast, construction and maintenance costs, with a mean of 2.87, have the lowest score, indicating dissatisfaction with the level of investment and maintenance of spaces and consistent with the study's qualitative findings. The

dispersion of responses in these components is balanced.

The overall mean for the social components of collective spaces (2.95 out of 5) is the lowest among the five main components, which indicates serious challenges in this dimension. Among the components, age and gender groups (mean: 3.34) received the highest score, but other key indicators such as social participation at 2.68, security at 2.78, sense of place attachment at 2.82, and social identity at 2.86 are all in an unfavorable status. The lowest score belongs to social participation, consistent with the study's qualitative findings on weak trust and local participation. The high standard deviation and coefficient of variation in components such as social participation and security indicate a significant difference in citizens' experiences and the quality of different spaces. Figure 6 compares the means of the social components.

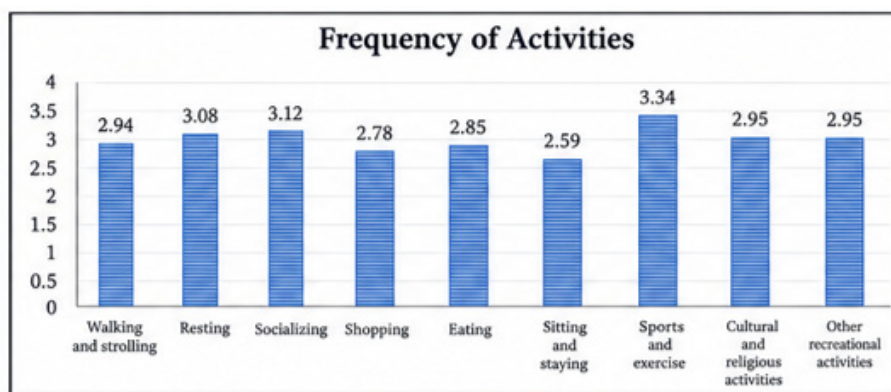


Figure 6. Comparison of the means of the social components

The evaluated mean for the cultural components of collective spaces was 3.10 out of 5, at a moderate level. Among the components, "type of land uses" (3.38) had the highest score, followed by "lifestyle," "culture of seeing and the view," "cultural beliefs and values," and "settlement pattern." However, the components of "vernacular architecture," "traditions and rituals," and "cultural calendar," with means below

three, received low scores, indicating neglect of authentic cultural elements, weakness of connection with historical heritage, and indigenous identity in the design of contemporary collective spaces. This finding aligns with the study's qualitative results, which emphasized the superficiality of cultural function and the rupture from collective memory. Figure 7 shows the means of the cultural components.

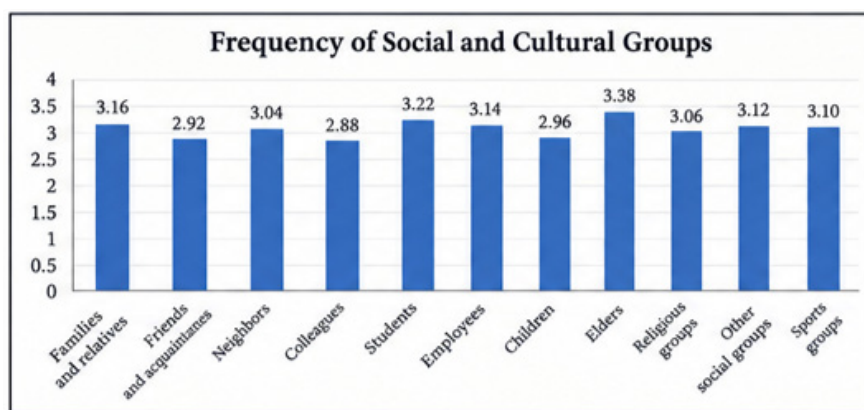


Figure 7. Comparison of the means of the cultural components

The mean for the environmental components of collective spaces was evaluated at 3.10 out of 5, at a moderate level. Among the components, “accessibility” (3.46) had the highest score, followed by “visual quality” and “functional dynamism.” However, the components of “resilience to climate change,” “environmental comfort,” and “use of natural resources” received lower scores, which indicates the

weakness of these spaces in adapting to environmental challenges, providing users’ comfort, and the sustainable productivity of resources. The lowest score is for “climatic resilience” (2.86), which indicates the inefficiency of the design of collective spaces in facing Tehran’s specific climatic conditions such as heat, cold, and air pollution. Figure 8 compares the means of the environmental components.



Figure 8. Comparison of the means of the environmental components

The overall mean for social interactions in Tehran’s collective spaces is 2.98 out of 5, which indicates an unfavorable status below the moderate level. Among the different dimensions, “diversity of interactions” (mean: 3.22), “frequency of presence” (3.18), and “quantity of interactions” (3.14) received relatively better scores. However, the vital components of “trust in interactions” (2.68) and “depth of relationships” (2.72) were evaluated as severely weak, which indicates the superficiality of relationships, the lack of social trust, and the inability of collective spaces to create deep, sustainable bonds. Consistent with the

study’s qualitative results, this finding indicates that existing collective spaces have focused more on the quantity of presence and apparent diversity and have failed to strengthen social capital and meaningful relationships. The “quality of social interactions” was measured solely based on the above five dimensions (diversity, frequency, quantity, trust, and depth) using 32 questionnaire items, and the mean of 2.98 indicates the combined status of these dimensions in the collective spaces of Tehran. Figure 9 compares different dimensions of social interactions.

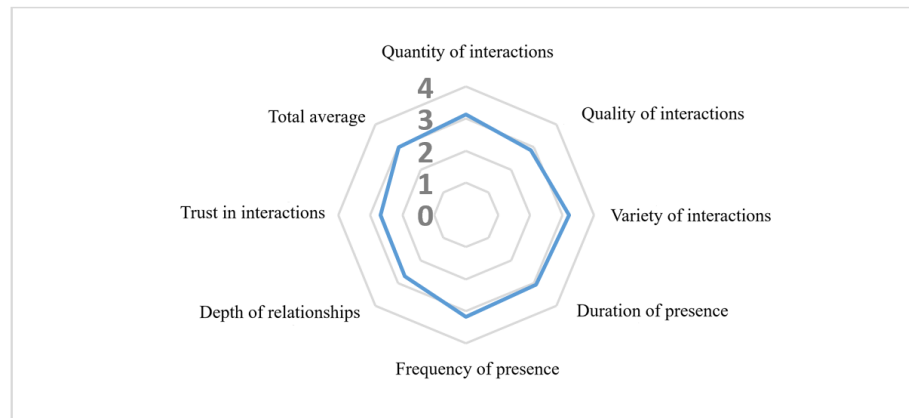


Figure 9. Comparison of different dimensions of social interactions

Based on Table 7, the economic components, with a mean of 3.23, are in first place, indicating citizens' relatively more favorable evaluation of the economic aspects of collective spaces. The environmental and cultural components, both with a mean of 3.10, are in second and third places. The physical components, with a mean of 3.09, are in fourth place. The lowest mean is for the social components at 2.95, which indicates serious challenges in the social dimension of collective spaces. The overall mean for the physical

nature of collective spaces (including five components) was calculated as 3.09, which is at a moderate level. The mean for social interactions (the dependent variable) is 2.98, which is slightly lower than the mean of the physical nature, and this finding shows that the status of social interactions has been evaluated as weaker even compared to the physical nature of the spaces, which is itself at a moderate status. This comparison shows that improving social components should be placed as a priority of planning.

Table 7. Comparison of the overall mean of the five main components of the study

Main component	Mean	Standard deviation	Rank
Economic components	3.23	0.71	1
Environmental components	3.10	0.72	2
Cultural components	3.10	0.74	3
Physical components	3.09	0.66	4
Social components	2.95	0.78	5
Overall mean of physical nature	3.09	0.58	-
Social interactions	2.98	0.81	-

It should be explained that the term physical components in this table and in the present study is used in a general sense and includes all five categories of components (physical, social, economic, cultural, and environmental), because all these dimensions affect social interactions in the form of objective and subjective characteristics of the built environment. In this section, the research hypotheses are tested using inferential statistical methods. First, the normality of

the data distribution is examined, and then, based on the results, appropriate tests are selected and performed. To determine the type of appropriate statistical tests, the normality of the data distribution must first be examined. For this purpose, the Kolmogorov-Smirnov test was used. Table 8 presents the results of the normality test of the research variables.

Table 8. Results of the normality test of the research variables

Variable	K-S statistic	Significance level (Sig.)	Result
Physical components	0.068	0.082	Normal
Economic components	0.071	0.076	Normal
Social components	0.074	0.064	Normal
Cultural components	0.069	0.088	Normal
Environmental components	0.072	0.072	Normal
Social interactions	0.076	0.058	Normal

To test the study's main hypothesis and examine the relationships between the independent variables (physical nature with five components) and the dependent variable (social interactions), the structural equation modeling method with the partial least squares approach (PLS-SEM) and Smart PLS software was used. This method suits analyzing complex relationships between multiple variables and testing theoretical models.

Before examining the structural relationships between

the variables, the measurement model quality must first be evaluated. This evaluation includes examining the reliability and validity of the constructs. Table 9 shows the reliability indicators of the research constructs. To confirm reliability, Cronbach's alpha and composite reliability (CR) must be higher than 0.7. Based on this table, all research constructs have a Cronbach's alpha higher than 0.87 and a composite reliability higher than 0.90, which indicates the very favorable reliability of the measurement model.

Table 9. Reliability indicators of the constructs

Construct	Cronbach's alpha	Composite reliability (CR)	Result
Physical components	0.886	0.911	Favorable
Economic components	0.892	0.914	Favorable
Social components	0.878	0.906	Favorable
Cultural components	0.894	0.916	Favorable
Environmental components	0.881	0.909	Favorable
Social interactions	0.896	0.918	Favorable

Table 10 shows the convergent validity indicator (AVE) of the research constructs. To confirm convergent validity, the AVE value must exceed 0.5, which indicates that more than 50 percent of the variance of the construct is explained by its indicators. Based on the findings, all research constructs have an AVE higher

than 0.5, which indicates favorable convergent validity. The highest AVE belongs to the social interactions construct at 0.592, which shows that about 59 percent of the variance of this construct is explained by its indicators.

Table 10. Convergent validity indicator (AVE)

Construct	Average variance extracted (AVE)	Result
Physical components	0.562	Favorable
Economic components	0.578	Favorable
Social components	0.548	Favorable
Cultural components	0.584	Favorable
Environmental components	0.571	Favorable
Social interactions	0.592	Favorable

Figure 10 shows the structural model diagram with path coefficients.

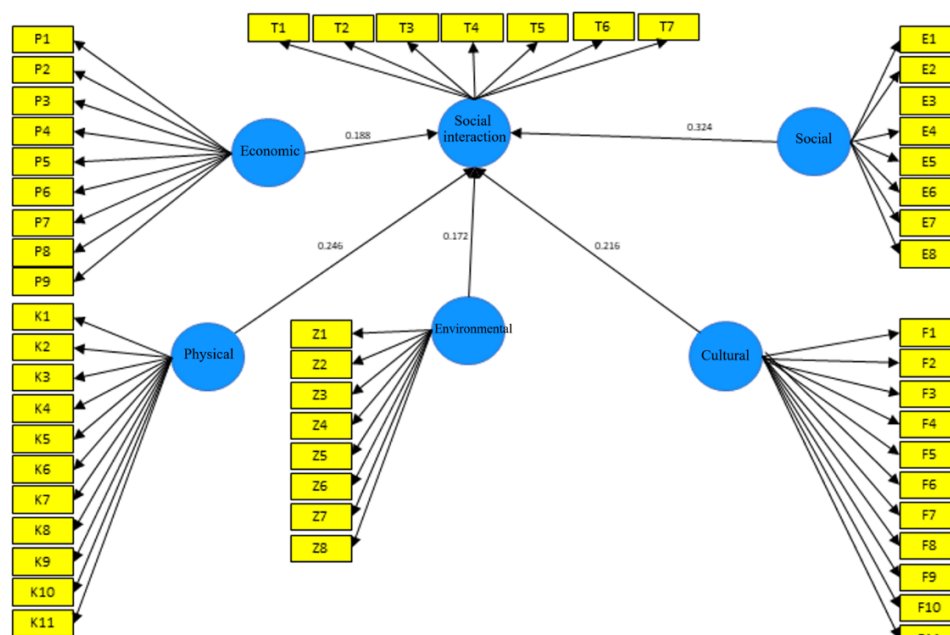


Figure 10. Structural model diagram with path coefficients

The coefficient of determination shows how much of the variance in the dependent variable is explained by the independent variables. Based on this table, the R^2 value is 0.642, which shows that 64.2 percent of the variance in citizens' social interactions is explained by the five components of the physical nature of collective spaces. According to Cohen's criteria, R^2 values in the range of 0.02 to 0.13 are considered weak, 0.13 to 0.26 moderate, and above 0.26 strong; therefore, the value of 0.642 indicates the model's strong explanatory power. This important finding shows that the physical nature of collective spaces plays a key and determining role in the formation of social interactions, and more than 64 percent of the changes in the quality of interactions can be attributed to these components. The f^2 index shows the extent to which removing a specific independent variable creates a change in the R^2 of the dependent variable and thus determines the relative importance of that variable. Based on this table, the social components with f^2 equal to 0.148 have a moderate effect, which shows that this component plays a more important role than other components in explaining social interactions. The other components (physical, economic, cultural, and environmental) have small effect sizes but are all within the favorable range (higher than 0.02), with a

significant role in the model.

The social components, with a partial R^2 of 0.224, have the largest share (34.9%) in explaining social interactions, emphasizing the central role of this component. The physical components (23.1%) and cultural components (19.6%) are in the next ranks. The economic and environmental components, with smaller shares (13.4% and 9.0%), play a complementary role. This finding shows that to have the greatest effect on improving social interactions, we should focus on the social, physical, and cultural components, which together explain 77.6% of the variance of interactions. One aim of this study is to examine the possible differences between the eight selected districts of Tehran in the components of physical nature and the quality of social interactions. Based on Table 11, there is a significant difference between different educational groups in the perception of the quality of social interactions ($F = 2.84$, $\text{Sig.} = 0.038$). The results show that as education increases, citizens' evaluation of the quality of social interactions also increases. Individuals with a master's degree and a doctorate have the highest mean (3.08). Individuals with below-diploma education have the lowest mean (2.76), and the difference of 0.32 units between these two groups is noteworthy.

Table 11. Comparison of the mean of social interactions by selected districts of Tehran

District	Sample size	Mean of interactions	Rank	District characteristic
District 1	52	3.28	1	North of the city, newly built fabric
District 3	48	3.16	2	City center, mixed fabric
District 22	42	3.08	3	West of the city, new fabric
District 11	46	2.94	4	City center, old-new fabric
District 6	50	2.88	5	City center, historical fabric
District 12	48	2.82	6	South of the city, old fabric
District 19	50	2.76	7	South of the city, marginal fabric
District 15	48	2.72	8	South of the city, old fabric
F statistic		F = 6.24		Sig. = 0.000

Based on the analysis of the data collected from 384 respondents in eight selected districts of Tehran, it was determined that the physical components of collective spaces were evaluated at a moderate level, with a mean of 3.09 out of 5, while the social components, with a mean of 2.95, had the weakest rank, and social interactions, with a mean of 2.98, were in an unfavorable status. The structural equation modeling results showed that 64.2% of the variance of social interactions is explained by the physical components (with the sub-components of social, economic, cultural, environmental, and physical), among which the social components, with a share of 34.9%, had the greatest effect. The analysis of variance also showed a significant difference in the quality of social interactions between different districts of Tehran. District 1, with a mean of 3.28, received the highest score, and District 15, with a mean of 2.72, received the lowest score. These findings indicate that improving the social, physical, and cultural components in collective spaces can significantly enhance the quality of citizens' social interactions.

6. Discussion

The findings showed that the quality of social interactions differs significantly across the districts of Tehran. District 1, with a mean of 3.28, received the highest score, and District 15, with a mean of 2.72, received the lowest score. This difference can be attributed to the greater enjoyment of northern districts from high-quality physical components (furniture, lighting, accessibility, and land-use diversity), the different socio-economic composition of residents, and the challenges of southern districts

such as high population density, the lack of high-quality open spaces, and the absence of sufficient security. The severe weakness of the components of trust in interactions (2.68), social participation (2.68), and sense of place attachment (2.82) indicates deeper challenges that can be analyzed within the framework of Oldenburg's "third place" theory. According to this theory, successful public spaces should provide the ground for the continuity of interactions and a sense of belonging, characteristics that are less seen in the collective spaces of Tehran. Increasing individualism, declining social capital, the rupture of neighborhood bonds, automobile-orientedness, and prioritizing economic functions over social functions are among the factors that contribute to this weakness. The clear contradiction between the greatest effect of social components on interactions (34.9 percent) and their lowest score (mean 2.95) shows that urban designers and planners have focused more on physical and economic aspects and have neglected the strengthening of social-psychological dimensions. Redesigning collective spaces with a community-oriented approach should be a priority. The physical components, with a share of 23.1 percent and a mean of 3.09, show that the quality of urban furniture (2.76) and lighting (2.89) needs improvement. The cultural components, with a share of 19.6 percent and a mean of 3.10, indicate neglect of vernacular architecture, traditions, and rituals in the design of spaces, which has contributed to the reduction of the sense of belonging. The economic components, with a mean of 3.23, have the highest score, but presence based on consumption needs does not lead to deep relationships.

7. Conclusion

The present study showed that the physical components of collective spaces in Tehran are at a moderate level, with a mean of 3.09 out of 5. Among the different dimensions, the economic components (mean 3.23) and cultural components (mean 3.10) are in a relatively better status, while the social components (mean: 2.95) show the weakest status. The quality of social interactions was also evaluated at an unfavorable level, with a mean of 2.98. Structural equation modeling confirmed that the physical components of collective spaces explain 64.2% of the variance in social interactions, with the social components (34.9%), physical components (23.1%), and cultural components (19.6%) having the greatest effect. The study's findings align with the results of studies such as Lashgari and Soheili (2023) on the role of physical components in creating security and social interactions and Dabiri and Zare (2021) regarding the effect of lighting and human scale on interactions. Also, the emphasis of international studies such as Gao et al. (2022) on the centrality of social interactions for the vitality of spaces, and the findings of Lorenzo et al. (2023) on the importance of the physical order of space, were confirmed in the results of this research. However, unlike some domestic studies that examined the components separately, this study measured the simultaneous and causal relationship of a set of physical components with the quality of social interactions. The main innovation of this research is providing a quantitative and integrated measurement framework for assessing the quality of social interactions in contemporary collective spaces of Tehran. Localization and operationalization of combined indicators (physical, social, economic, cultural, and environmental) in the form of a structural model, and the direct measurement of the effect of these components on the depth and trust in social interactions, are among the other innovative aspects. In addition, the comparative study of eight heterogeneous districts of Tehran and the analysis of significant differences in the quality of interactions is a new approach in Iranian urban research. This study faced limitations, such as focusing on selected districts of Tehran (and not all districts), relying on the survey and self-report method, and not taking into account some intervening variables (such as momentary climatic conditions). Nevertheless, the findings clearly show that contemporary collective spaces in Tehran have failed to strengthen deep and trust-based social

interactions. To improve this situation, prioritizing social components (increasing participation, security, and sense of belonging), improving physical quality (especially urban furniture and lighting), and strengthening the cultural and identity dimension of spaces are necessary. Urban planners and designers must, by adopting a holistic and people-centered approach, instead of merely emphasizing the quantity of presence, think about improving the quality of social relationships in collective spaces. This study provides a practical model for assessing and improving collective spaces in other metropolises of Iran. In the theoretical explanation of the research model, it should be emphasized that although the title "physical components" was chosen for the main independent variable, this term in the conceptual framework of this study is defined not in a limited and physicalist sense but as a combined and multidimensional concept that encompasses all objective, activity, semantic, economic, and environmental dimensions of the built environment. This broad definition draws on modern approaches in urban studies that believe that the impact of the environment on social interactions is the result of a network of intertwined factors and cannot be reduced merely to physical characteristics. Thus, using the term "physical components" in the title and research model does not mean ignoring other dimensions; rather, it expresses a holistic view of the built environment as a multilayered context of social interactions. The final research framework was formulated based on the findings of structural equation modeling. In this framework, physical components (in the general sense), including four categories of specific physical, economic, cultural, and environmental components, were identified as independent variables; social components (including participation, security, sense of belonging, identity, and diversity of groups) as mediating variables; and the quality of social interactions, with five indicators of diversity, frequency, quantity, trust, and depth, as the dependent variable. The results showed that physical components explain 64.2 percent of the variance in social interactions, and social components (as a mediating variable), with a share of 34.9 percent, have the greatest effect on social interactions. The practical achievements of the research are: 1) providing a quantitative model for measuring the quality of social interactions using five operational indicators; 2) identifying improvement priorities (social components as a mediator, specific physical, cultural, and economic

components); 3) determining the gap between the current and desired status (especially in urban furniture, lighting, trust, and depth of relationships); and 4) providing a model for prioritizing measures in different districts of Tehran based on regional differences.

Authors' Contributions

The first author contributed 35%, the second author 35%, and the third author 30%.

Acknowledgments

For language editing and organizing the English translation, ChatGPT (version 5.2) was used. We sincerely thank all who helped the researchers in this study. This study had no commercial interests and has not received any financial or moral support.

Conflict of Interest

The authors declared no conflicts of interest.

References

- Aelbrecht, P., & Stevens, Q. (Eds.). (2019). Public space design and social cohesion: An international comparison. Routledge. <https://doi.org/10.4324/9780429489150>
- Amini M., & Khademzade M. H. (2022). Collective life and city Shiraz in the Buyid era. *The Monthly Scientific Journal of Bagh-e Nazar*, 18(105): 49-60. <https://doi.org/10.22034/bagh.2021.278822.4844>. [In Persian]
- Alnaim, A. A., Dano, U. L., & AlQahtany, A. (2025). Factors influencing social interaction among neighborhood residents in public open spaces: A review. *Future Cities and Environment*, 11. DOI:10.70917/fce-2025-014
- Azizi M., & Pircar R. (2023). The role of public spaces within the neighborhood in the improvement of community participation: The case of Kooy-e Nasr District, Tehran. *Soffeh*, 33(3): 79-98. <https://doi.org/10.48308/sofeh.2023.229956.1222>. [In Persian]
- Blumer, H. (1969). *Symbolic interactionism: Perspective and method*. NJ: Prentice-Hall, Inc.
- Brekke, K. J., Filippidis, C., Vradis, A. (2018). *Athens and the war on public space: Tracing a city in crisis*. Punctum Books. DOI: 10.21983/P3.0199.1.00
- Carr, S. (1992). *Public space*. Cambridge University Press.
- Chambers, J. (2015). *Urban private-public spaces: A study of their uses* (Doctoral dissertation, University College London). <https://www.ucl.ac.uk/bartlett/sites/bartlett/files/chambers2015mres.pdf?>
- Dabiri H., & Zare L. (2021). Investigating the effect of effective security components on public spaces to attract citizens (case study: Student Park of Tehran). *Geography and Regional Planning*, 11(42): 741-753. <https://dor.isc.ac/dor/20.1001.1.22286462.1400.11.2.39.9>. [In Persian]
- Dehnad N., Mahdinejad J., & Karimi, B. (2021). Explaining the relationship between the components affecting the quality of collective open space in promoting the sociability of the en-

- vironment. *Motaleate Shahri*, 10(37): 45-56. <https://sid.ir/paper/413410/en>. [In Persian]
- El-Bardisy, N. (2024). Urban culture as a challenge of enhancing social interaction in public spaces. *Discover Cities*, 1(1), 27. DOI:10.1007/s44327-024-00030-6
- Ezzeldin, M., & Assem, A. (2019). *A GIS-based spatio-temporal analysis for social events carried out in urban public space*. AR-UP, Architecture & Urbanism, A Smart Outlook, Cairo, Egypt.
- Gehl, J. (2013). *Cities for people*. Island Press. <https://islandpress.org/books/cities-people#desc>
- Hanaei G., Mansouri B., Diba D., & Dabbagh A. (2020). Influence of the Safavid period on social issues and public space in Esfahan (case study: Allahverdi Khan and Khaju Bridges). *Naqshejahan- Basic Studies and New Technologies of Architecture and Planning*, 10(1): 1-9. <https://dor.isc.ac/dor/20.1001.1.23224991.1399.10.1.4.0>. [In Persian]
- Haghighbayan R., & Shokohibidhendi M. (2019). A systematic study of public life in urban space (case study: The 17th Shahrivar pedestrian way in Tehran city). *MANZAR, the Scientific Journal of Landscape*, 11(46): 40-49. <https://doi.org/10.22034/manzar.2019.84296>. [In Persian]
- Gehl, J. (2011). *Public spaces, public life*. Copenhagen Danish Architectural. <https://placesjournal.org/assets/legacy/pdfs/public-spaces-public-life.pdf>
- Goffman, E. (1959). *The presentation of self in everyday life*. Doubleday.
- Goffman, E. (1963). *Behavior in public places: Notes on the social organization of gathering*. New York: The Free Press.
- Gruosso, S., Del Signore, M., & Di Cinzio, A. (2025). The extended mind of public space: How urban design shapes human experience. *Frontiers in Built Environment*, 11, 1504549. doi.org/10.3389/fbuil.2025.1504549
- Guo, X., Yang, Y., Cheng, Z., Wu, Q., Li, C., Lo, T., & Chen, F. (2022). Spatial social interaction: An explanatory framework of urban space vitality and its preliminary verification. *Cities*, 121, 103487. DOI: 10.1016/j.cities.2021.103487
- Hall, E. T., & Hall, E. T. (1966). *The hidden dimension* (Vol. 609). Anchor.
- Humphreys, L. (2010). Mobile social networks and urban public space. *New Media & Society*, 12(5), 763-778.
- Jafari, E., Gholamalizadeh, H., & Modiri, M. (2020). Identification of factors affecting socialization in the educational environment of architecture and analyzing their interaction, via a Fuzzy Multiple Criteria Decision-Making approach. *Journal of Iranian Architecture & Urbanism (JIAU)*, 10(2), 5-18. <https://doi.org/10.30475/isau.2020.103673>
- Jennings, V., & Bamkole, O. (2019). The relationship between social cohesion and urban green space: An avenue for health promotion. *International journal of environmental research and public health*, 16(3), 452. DOI: 10.3390/ijerph16030452
- LaFarge, L. (2000). Interpretation and containment. *The International Journal of Psycho-Analysis*, 81(1), 67. DOI: 10.1516/0020757001599537
- Lai, Y., Wang, P., & Wen, K. (2024). Exploring the Impact of public spaces on social cohesion in resettlement communities from the perspective of experiential value: A case study of Fuzhou, China. *Buildings*, 14(10), 3141. <https://doi.org/10.3390/buildings14103141>

- Lang, J. (1987). *Creating architectural theory: The role of the behavioral sciences in environmental design*.
- Lashgari F., & Soheili J. (2023). The role of social interactions in creating environmental security in residential complexes (A case study of phase one of Ekbatan Town, Tehran). *Motaleate Shahri*, 15(59): 69–92. <https://doi.org/20.1001.1.2676783.1401.15.59.4.9>. [In Persian]
- Lofland, L. (1973). *A world of strangers*. New York: Basic Books Inc.
- Lofland, L. H. (1998). *The public realm: Exploring the city's quintessential social territory*. Routledge.
- Lorenzo, M., Ríos-Rodríguez, M. L., Suárez, E., Hernández, B., & Rosales, C. (2023). Quality analysis and categorization of public space. *Heliyon*, 9(3). DOI: [10.1016/j.heliyon.2023.e13861](https://doi.org/10.1016/j.heliyon.2023.e13861)
- Low, S. M. (2023). *Why public space matters*. Oxford University Press. <https://doi.org/10.1093/oso/9780197543733.001.0001>
- Madanipour, A. (2020). 10. Can the public space be a counterweight to social segregation? *Handbook of Urban Segregation*, 170. <https://doi.org/10.4337/9781788115605.00018>
- Malik, A. (2024). Psychological insights into social interaction: Unraveling human connections. *Social Science Review Archives*, 2(1), 20-29.
- Mead, G. H., & Moris, C. W. (1934). *Mind, self, and society*. Chicago: University of Chicago Press.
- Moskowitz, G. B. (2002). Preconscious effects of temporary goals on attention. *Journal of Experimental Social Psychology*, 38(4), 397-404. [https://doi.org/10.1016/S0022-1031\(02\)00001-X](https://doi.org/10.1016/S0022-1031(02)00001-X)
- Mouratidis, K., & Hassan, R. (2020). Contemporary versus traditional styles in architecture and public space: A virtual reality study with 360-degree videos. *Cities*, 97, 102499. DOI: [10.1016/j.cities.2019.102499](https://doi.org/10.1016/j.cities.2019.102499)
- Németh, J., & Schmidt, S. (2011). The privatization of public space: Modeling and measuring publicness. *Environment and Planning B: Planning and Design*, 38(1), 5-23. <https://doi.org/10.1068/b36057>
- Oldenburg, R. (2013). "The problem of place in America": From the great good place (1989). In *The urban design reader* (pp. 285-295). Routledge. <https://doi.org/10.2307/jj.9561417>
- Oliveira, V. (2016). *Urban morphology: An introduction to the study of the physical form of cities*. Springer. DOI: [10.1007/978-3-319-32083-0](https://doi.org/10.1007/978-3-319-32083-0)
- Qi, J., Mazumdar, S., & Vasconcelos, A. C. (2024). Understanding the relationship between urban public space and social cohesion: A systematic review. *International Journal of Community Well-Being*, 7(2), 155-212. <https://doi.org/10.1007/s42413-024-00204-5>
- Sadeghi, A. R., & Jangjoo, S. (2022). Women's preferences and urban space: Relationship between built environment and women's presence in urban public spaces in Iran. *Cities*, 126, 103694. DOI: [10.1016/j.cities.2022.103694](https://doi.org/10.1016/j.cities.2022.103694)
- Schwartzmann, S. (2022). Public space and new urban compromises. Comparative perspectives from the Mediterranean. *Méditerranée. Revue géographique des pays méditerranéens/Journal of Mediterranean Geography*, (134). <https://doi.org/10.4000/mediterranee.12980>
- Shahini, A., Javidnejad, M., & Naghshineh, R. (2020). The role of architectural fabric in promoting public life in communal spaces (case study: Baharestan Square). *Urban Management Studies*, 11(40), 43–56.
- Sharifi, A. (2019). Resilient urban forms: A review of literature on streets and street networks. *Building and Environment*, 147, 171-187.
- Siramkaya, S.B. Aydin, D. (2017). The effect of spatial configuration on social interaction: A syntactic evaluation of a faculty building. *Global Journal of Arts Education*, 7(3), 83-92. <https://doi.org/10.18844/gjae.v7i3.2893>
- Turgut, Y., & Lazarova-Molnar, S. (2025). Exploring urban segregation dynamics: A hub-based agent model integrating preferences, social interactions, and policy interventions. *Cities*, 156, 105576. DOI: [10.1016/j.cities.2024.105576](https://doi.org/10.1016/j.cities.2024.105576)
- Van Eck, E., Watson, S., van Melik, R., Breines, M., Dahinden, J., Jónsson, G., ... & Schapendonk, J. (2022). Moving marketplaces: Understanding public space from a relational mobility perspective. *Cities*, 127, 103721. DOI: [10.1016/j.cities.2022.103721](https://doi.org/10.1016/j.cities.2022.103721)
- Veranic, K., Bayliss, A. P., Zhao, M., Stephen, I. D., & Ewing, L. (2025). Close encounters: Interpersonal proximity amplifies social appraisals. *British Journal of Psychology*. <https://doi.org/10.1111/bjop.12781>
- Whyte, W. H. (1980). *The social life of small urban spaces*. Washington, DC: The Conservation Foundation.
- Zurko, E. R. D. (1960). Town and square: From the Agora to the Village Green by Paul Zucker. *The Journal of Aesthetics and Art Criticism*, 19(1), 103-104. <https://doi.org/10.2307/427422>

