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Age-friendly city at the neighborhood scale: A comparative assessment of age-friendly dimensions and residential satisfaction among older adults in Bushehr, Iran

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Abstract

The rapid growth of the older adult population has challenged urban planning to provide equitable and efficient services, infrastructure, and urban environments that meet this population's needs. In this context, identifying intra-urban differences in the realization of age-friendly city dimensions can provide evidence for neighborhood-based planning and prioritizing urban interventions. This study aimed to compare three neighborhoods – Sangi, Neidi, and Davas – in Bushehr, Iran, in terms of the eight dimensions of an age-friendly city and to examine their role in predicting older adults' residential satisfaction. This quantitative comparative study collected data from 300 adults aged 60 years and older using the World Health Organization's standardized Age-Friendly City questionnaire. Data were analyzed using one-way analysis of variance (ANOVA), Tukey's post hoc test, and multiple regression analysis in SPSS. The results revealed significant differences among the three neighborhoods in six dimensions: outdoor spaces and buildings, transportation, housing, social participation, respect and social inclusion, and community support and health services. Older adults in the Sangi neighborhood rated their neighborhood less favorably than those in the other two neighborhoods across most of these dimensions. Furthermore, among the eight dimensions of an age-friendly city, only community support and health services significantly and positively predicted residential satisfaction, although the model explained only a limited proportion of the variance. The findings indicate that the realization of age-friendly city dimensions is not uniform across Bushehr's neighborhoods and considering neighborhood-level differences can support urban planning and more targeted allocation of urban resources.

Keywords

Age friendly city
Bushehr
neighborhood
older adults
residential satisfaction

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1. Introduction

Population aging is one of the most significant demographic transformations of the twenty-first century. Driven by increasing life expectancy, declining fertility rates, and advances in medical and healthcare services, it is rapidly expanding worldwide. According to the World Health Organization, the global population aged 60 years and older is expected to reach approximately two billion by 2050, meaning that one in every five people worldwide will be an older adult. A substantial share of this growth will occur in developing countries, which are simultaneously facing population aging, limited financial resources, rising public services' costs, and increasing pressure on urban infrastructure (WHO, 2021). Under these circumstances, addressing the needs of older adults is no longer merely a social or health-related issue but has become a fundamental concern in urban economics, public resource management, and spatial planning.

Alongside population aging, urbanization is also expanding rapidly, and an increasing proportion of the world's older adults will live in urban environments. This trend has altered demand patterns for healthcare services, transportation, housing, public spaces, and welfare services, posing new challenges for urban planning (Steels, 2015). Under these circumstances, the need to prioritize urban investments, use resources efficiently, and plan for the equitable and accessible distribution of urban services has become increasingly evident (OECD, 2025).

In response to these transformations, the World Health Organization introduced the concept of the "age-friendly city" as a key approach to urban planning. This approach emphasizes creating environments in which older adults can maintain their independence, safety, and dignity while continuing to participate actively in social, economic, cultural, and civic life. Achieving such a city requires appropriate infrastructure in areas such as public spaces, transportation, housing, information and communication, health services, and social participation. However, studies show that realizing an age-friendly city depends not only on the availability of services but also on the spatial distribution of facilities, accessibility, and the quality of the urban environment (Ruza et al., 2015; WHO, 2007). Accordingly, the recent literature on age-friendly cities has gradually moved beyond the mere assessment of physical indicators and has become increasingly connected with concepts such as spatial justice, neighborhood-based planning, and urban governance (Steels, 2015; Ruza et al., 2015; Buffel et al., 2020).

In Iran, as the share of the elderly population increases, attention to the requirements of age-friendly cities has also become a priority in urban planning. However, most domestic studies have evaluated age-friendly city indicators at the city scale and adopted a descriptive approach, with relatively limited attention to intra-urban differences at the neighborhood level. This is even though neighborhoods within a city can differ considerably in physical characteristics, access to services, environmental quality, social and economic conditions, and social capital, and these differences may influence the experience of aging and satisfaction with the residential environment.

Accordingly, the present study seeks to answer two main questions. First, is there a statistically significant difference among Sangi, Neidi, and Davas neighborhoods in Bushehr in terms of the eight dimensions of an age-friendly city? Second, which of these dimensions are associated with older adults' residential satisfaction? Addressing these questions can clarify whether intra-urban differences in older adults' perceptions of their living environments are also linked to variations in residential satisfaction. Unlike many domestic studies that have evaluated age-friendly city indicators at the city-wide scale using a descriptive approach, the present study adopts a neighborhood-based approach to compare three neighborhoods with different physical characteristics within the same city while simultaneously examining the relationship between age-friendly city dimensions and older adults' residential satisfaction. This approach enables identification of intra-urban differences, prioritization of neighborhood-specific needs, and provision of evidence for targeted urban planning and resource allocation.

2. Theoretical foundations

In the literature on urban planning and aging studies, the urban environment is recognized as one of the important determinants of health, independence, social participation, and quality of life of older adults. Accordingly, by integrating three complementary theoretical frameworks, this study presents a theoretical framework to explain the relationship between the dimensions of an agefriendly city and residential satisfaction. These frameworks explain, respectively, the role of the environment in the aging experience, the characteristics of a favorable environment for older adults, and the outcomes

resulting from providing such an environment.

The first framework is the "environmental press–competence" theory, proposed by Lawton and Nahemow to explain the interaction between older adults and the living environment. This theory emphasizes the concept of person–environment fit and states that functioning and degree of adaptation of older adults result from the interaction between individual competencies and environmental pressures. Accordingly, the more the environmental characteristics are compatible with the abilities and needs of older adults, the greater the possibility of maintaining independence, performing daily activities, and participating in social life; in contrast, environments that create pressures beyond the individual's capacity can reduce the functioning and adaptation of older adults (Lawton & Nahemow, 1973). Subsequent studies have also shown that this theory remains a common framework for explaining the role of the urban environment in the health, independence, and wellbeing of older adults (Struckmeyer & GetzRice, 2025).

The "active aging" framework, also proposed by the World Health Organization, states that successful aging depends not only on individuals' health status, but requires the optimization of opportunities related to health, participation, and security throughout the life course, so that older adults can maintain their independence while actively participating in social, economic, cultural, and civic activities and enjoy a favorable quality of life (HijasGómez et al., 2020; WHO, 2002). This framework considers social participation, security, social support, and equal access to services as requirements for achieving active aging (Barbabella et al., 2022). Accordingly, the World Health Organization introduced the concept of the agefriendly city as an implementation strategy for achieving active aging in urban environments. It identified eight dimensions including outdoor spaces and buildings, transportation, housing, social participation, respect and social inclusion, civic participation and employment, communication and information, and social support and health services, as the most important environmental components affecting the health, participation, security, and quality of life of older adults (WHO, 2007). Thus, this framework provides the theoretical basis for selecting the eight dimensions of the agefriendly city as the independent variables of the present study, and indicates that assessing these dimensions can reveal the extent to which active aging is realized at the neighborhood level.

The "aging in place" approach also emphasizes older adults' ability to continue living in their own home and familiar neighborhood while maintaining independence, autonomy, and quality of life. This approach states that older adults prefer, even when facing physical or cognitive limitations, to remain as much as possible in the environment with which they have established social, emotional, and functional ties, as this environment provides them with a sense of identity, belonging, security, and continuity of life (Forsyth & Molinsky, 2021; Wiles et al., 2012). Realizing aging in place requires that the urban environment and neighborhood respond to the needs of older adults through appropriate accessibility, adaptable housing, safe public spaces, health services, and social support; otherwise, environmental limitations can reduce their independence and increase the likelihood of leaving the living environment or dependence on formal care (Chippendale & BearLehman, 2010; Fields & DabelkoSchoeny, 2015). From this perspective, residential satisfaction is not merely a reflection of the quality of the housing unit, but the result of older adults' perceptions of the quality of the neighborhood environment, access to services, social relationships, sense of security, and the possibility of continuing independent life in a familiar environment. Therefore, this framework provides the theoretical basis for selecting residential satisfaction as the dependent variable of the present study; we expect that improvement in the dimensions of the agefriendly city will be associated with increased residential satisfaction among older adults.

Together, these three theories form the theoretical framework of the present study, based on the assumption that the eight dimensions of the agefriendly city, as characteristics of the urban environment, determine the degree of person–environment fit at the neighborhood level. These characteristics provide the context for the realization of active aging, and ultimately, by improving the possibility of aging in place, affect older adults' residential satisfaction. Furthermore, given the physical, social, and servicerelated differences among neighborhoods, we expect that the extent to which these dimensions are realized will not be uniform across different neighborhoods.

3. Literature review

The literature on agefriendly cities has experienced a significant transformation over the past two decades.

Early studies were mainly focused on measuring the degree of conformity of cities with the eight domains proposed by the World Health Organization, but more recent research has adopted an approach beyond mere indicator assessment and analyzes the agefriendly city within the framework of concepts such as spatial justice, urban sustainability, social resilience, environmental health, and neighborhoodbased planning (Ruza et al., 2015; Steels, 2015). This evolution indicates that older adults' quality of life depends not only on the availability of urban services but also on neighborhoods' physical characteristics, the distribution of services, social capital, and opportunities for participation in shaping the aging experience.

Domestic studies have also followed a similar trajectory in recent years. The earliest studies mainly focused on assessing the status of cities based on the eight dimensions of the agefriendly city. For instance, Mousavi et al. (2025), in a study in Miandoab city, used the importance–satisfaction matrix and showed that "buildings and outdoor spaces" and "civic participation and employment" are among the most important dimensions of the agefriendly city from the perspective of older adults. Mahmoudzadeh et al. (2024), in District 4 of the Tabriz metropolitan area, reported that the mean scores for all dimensions of the age-friendly city were below the theoretical average, indicating the need for extensive interventions in urban environments. Subsequently, Safarnia et al. (2025), by examining the perspectives of older adults and urban managers in Gonabad, reported a significant gap between the assessments of these two groups; older adults evaluated the city's condition far more unfavorably than did the managers. These findings suggest that the lived experience of older adults has still not been sufficiently reflected in urban policymaking.

In recent years, domestic studies have moved beyond merely assessing the status of cities and have turned attention to the role of spatial and social characteristics of neighborhoods. Ebrahimpour et al. (2025), in a study on Mashhad city, showed that the realization of agefriendly city indicators, in addition to its direct effect, is also associated with the quality of life of older adults through spatial justice and the right to the city. Also, Rahmati et al. (2024), using an interpretivestructural modeling approach, identified "nonstandard living environment" and "discrimination in service provision" as key challenges to realizing the agefriendly city. In this regard, Ghanbari et al. (2025) reported significant differences between formal and informal settlements in terms of agefriendly city indicators. Mohammadpour et al. (2024), in a neighborhoodbased study in Rasht city, showed that, in addition to physical factors, social capital, cultural characteristics, and local interactions also play an effective role in the aging experience and social participation of older adults. Together, these studies indicate that intraurban differences and the specific characteristics of each neighborhood can affect older adults' perception of the quality of the living environment.

International research has shifted from descriptive assessment of agefriendly city indicators to analyzing relationships between the urban environment, health, quality of life, and sustainability. Steels (2015) showed in a review study that the most important features of an agefriendly city include accessibility, social participation, safety, appropriate transportation, adaptable housing, and the participation of older adults in decisionmaking. Also, Ruza et al. (2015), by presenting a framework for evaluating sustainable agefriendly cities, emphasized the need to attend to environmental, social, and economic dimensions in urban planning simultaneously.

Many international studies have focused on the role of physical environmental quality in promoting older adults' health and participation. For example, Onose et al. (2020) showed that the quality of urban park design, the safety of pedestrian paths, amenities, and ease of access increase older adults' use of public spaces. Rehal et al. (2021) also reported that older adults' daily mobility is influenced above all by the quality of the pedestrian environment, the transportation network, and the accessibility of local services. Furthermore, Rao and Nandineni (2026) demonstrated that the sense of comfort, convenience, and visual quality of pedestrian paths play an important role in enhancing the walkability for older adults.

In contrast, a group of studies has emphasized the role of service distribution and spatial differences among different parts of the city. Komasi et al. (2023) identified access to health services as one of the most important components of the agefriendly city. Yoon and Park (2022) also showed that older adults' equitable access to primary care services largely depends on the public transportation system. Buffel et al. (2020) concluded that successful agefriendly city policies require simultaneous attention to improving the physical environment and reducing social exclusion. Also, Khare and Bedarkar (2026), Ren et al. (2025), Wang et al.

(2026), and Lu et al. (2025) showed that differences in infrastructural capacity, service quality, and environmental characteristics across different parts of the city mean that uniform urban policies cannot address the diverse needs of older adults, and planning must be based on the characteristics of each neighborhood.

A review of domestic and international studies indicates that the literature on agefriendly cities has gradually moved from descriptive assessments at the cityscaletowardplacebasedandneighborhoodoriented analyses. Nevertheless, three research gaps remain in the domestic literature. First, most studies have examined the city as an integrated unit, and comparative research among neighborhoods within a single city is limited; as a result, intraurban differences in the realization of agefriendly city dimensions have received less attention. Second, most research has focused on describing the status of agefriendly city dimensions, and the relationship of these dimensions with outcomes such as older adults' residential satisfaction has been less examined. Third, no study in Bushehr city has yet been conducted that simultaneously examines neighborhood differences from the perspective of agefriendly city dimensions and the relationship of these dimensions with older adults' residential satisfaction. Given the theoretical foundations and the review of previous research, it is expected that the realization of agefriendly city dimensions will affect older adults' residential satisfaction. In this study, the eight dimensions of the agefriendly city are considered as independent variables and older adults' residential satisfaction as the dependent variable. Furthermore, given the placebased nature of the study, differences among neighborhoods have been considered as the context for analyzing these relationships. Accordingly, the conceptual model of the research is presented in Figure 1.

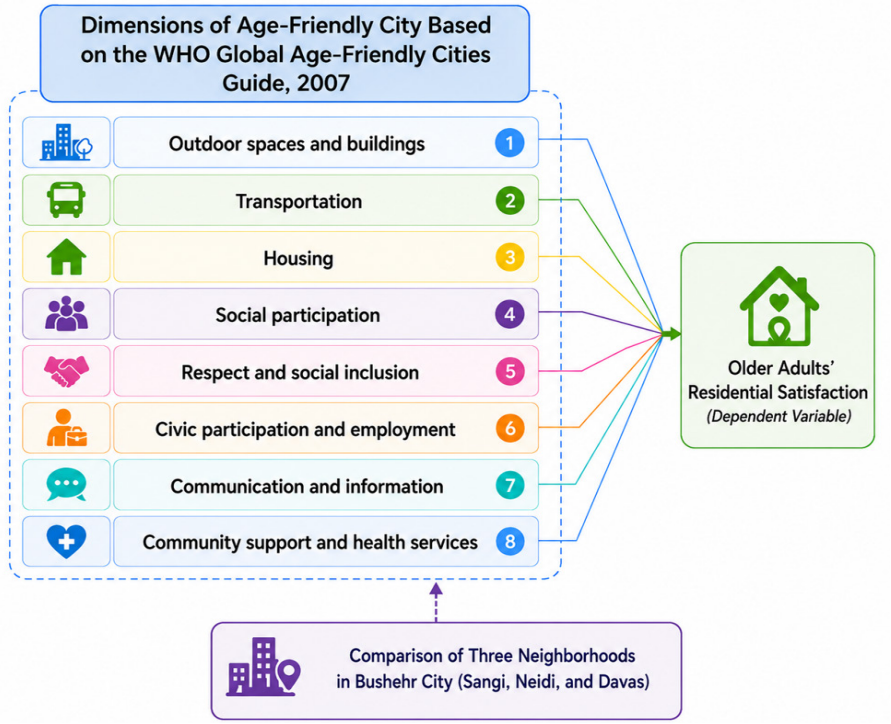

Figure 1. Conceptual model of the study

4. Study area

The study area includes three neighborhoods of Sangi, Neidi, and Davas in Bushehr city (Figure 2). These neighborhoods were purposefully selected based on three criteria: 1) location in different parts of the city to examine intraurban differences, 2) sufficient older adult population for sampling and statistical comparisons, and 3) differences in physical characteristics and spatial structure that allowed for the examination of the dimensions of the agefriendly city in different urban contexts.

The Sangi neighborhood, with an area of approximately 143 hectares and a population of 20,770 (including 1,828 older adults), is the largest studied. Neidi, with

an area of 58.7 hectares, includes a population of 10,139, of whom 830 are older adults. Because of physical continuity, functional similarities, and the limited older adult population, the two neighborhoods of MokhBoland and Davas were considered a single analytical unit, henceforth referred to as the Davas neighborhood. This area covers about 42 hectares and has a population of 6,257, of whom 456 are older adults. These three neighborhoods differ in location, spatial structure, and environmental characteristics, and therefore provide a suitable context for comparing older adults' perceptions of the dimensions of the agefriendly city at the neighborhood scale.

Figure 2. Location of the studied neighborhoods in Bushehr city

5. Research method

This study used a quantitative and comparative approach to compare older adults' perceptions of the dimensions of an age-friendly city across three neighborhoods in Bushehr and to examine the statistical relationship between these dimensions and residential satisfaction. The statistical population comprised all older adults aged 60 years and above residing in the three neighborhoods of Sangi, Neidi, and Davas in Bushehr. Participants were selected from eligible older adults present in public spaces within each neighborhood, including parks, squares, and shopping centers. The inclusion criteria were being at least 60 years of age, having resided in the neighborhood for at least one year, and being willing to participate in the study.

The sample size was estimated at 270 participants using G*Power, assuming a medium effect size (f = 0.25), a statistical power of 0.95, and a significance level of 0.05. To increase the precision of the estimates, a total of 300 questionnaires were completed and analyzed. The sample was proportionally distributed across the three neighborhoods according to each neighborhood's older adult population, with 176 participants from Sangi, 79 from Neidi, and 45 from Davas.

The data collection instrument consisted of two parts. The first part was the standard agefriendly city questionnaire based on the World Health Organization's eightdimensional framework, including items on buildings and outdoor spaces, transportation, housing, social participation, respect and social inclusion, civic participation and employment, communication and information, and social support and health services. Responses were scored on a fivepoint Likert scale ranging from "strongly disagree" to "strongly agree," and a higher score indicated a more favorable assessment of each dimension. Residential satisfaction was also measured with a single overall item – "Overall, I am satisfied with residing in this neighborhood" – on a fivepoint Likert scale from "strongly disagree" to "strongly agree."

The content validity of the agefriendly city questionnaire was reviewed and confirmed by 10 faculty members and experts in urban planning and gerontology. Additionally, the reliability of the

questionnaire's dimensions was assessed using Cronbach's alpha, ranging from 0.79 to 0.89, indicating desirable internal consistency. Data collection was conducted after receiving informed consent from participants while ensuring confidentiality. Given the possibility of visual limitations or literacy issues among some older adults, the questionnaires were completed through facetoface interviews when necessary.

Data were analyzed using SPSS software. To compare mean scores of the age-friendly city dimensions across the three neighborhoods, a one-way analysis of variance (ANOVA) was used, and Tukey's post hoc test was employed for pairwise comparisons. In addition, multiple linear regression analysis using the enter method was conducted to examine the statistical relationship and predictive power of the age-friendly city dimensions with respect to residential satisfaction. Before conducting the parametric tests, the assumptions of normality of the data distribution, homogeneity of variances, independence of errors, absence of multicollinearity, and normality of residuals were examined. The results indicated that the necessary assumptions for conducting the analyses were satisfied.

6. Research findings

6.1. Characteristics of the respondents

A total of 300 older adults participated in the study, including 176 from Sangi Neighborhood, 79 from Neidi Neighborhood, and 45 from Davas Neighborhood. Demographic characteristics showed that, in all three neighborhoods, most participants were in the 60–74 age group (67.0%, 84.8%, and 77.8%, respectively), and the proportion of men was higher than that of women in all neighborhoods. Regarding marital status, the majority of older adults were married, with this proportion higher in Davas Neighborhood (80%) than in the other two neighborhoods.

Educational attainment varied significantly in different neighborhoods. In Sangi Neighborhood, over half of older adults (55.1%) did not possess a high school diploma. In contrast, in Davas Neighborhood, the highest proportion of older adults (48.9%) held either a high school diploma or an associate degree. Older adults in Neidi Neighborhood also had a relatively higher level of educational attainment compared with those in Sangi Neighborhood. In addition, the proportion of older adults with an income of more than 150 million rials per month was higher in Neidi Neighborhood (36.7%) than in the other two neighborhoods.

6.2. Physical characteristics of the neighborhoods and land use

To understand the physical context of the study neighborhoods, the land uses of Sangi, Neidi, and Davas were examined (Figure 3). In all three neighborhoods, residential land use is predominant; however, considerable differences are observed in land-use diversity, the spatial distribution of services, and spatial organization. Sangi Neighborhood has a more diverse functional structure than the other two neighborhoods in terms of land-use diversity. In addition to residential uses, healthcare, educational, administrative, commercial, religious, sports, and green-space uses are distributed across different parts of the neighborhood. The considerable concentration of healthcare, educational, and administrative uses has made this neighborhood one of the main centers for providing urban services in Bushehr. In contrast, Neidi Neighborhood is characterized by a greater dominance of residential land use, with a more limited number of service and public uses. Green space is mainly provided as a relatively large parcel within the neighborhood, while other public services are primarily located along the main streets. In Davas Neighborhood, although residential land use accounts for the largest share, the presence of educational and religious uses, green spaces, and some public services has created a relatively appropriate level of functional diversity. Nevertheless, as in the other two neighborhoods, services are not evenly distributed throughout the neighborhood, and some land uses are concentrated at specific locations. Overall, a comparison of the land-use maps and the per capita provision of selected land uses (Table 1) indicates that the three study neighborhoods differ in terms of land-use diversity, access to services, and the spatial organization of urban activities. These differences may influence older adults' perceptions of the dimensions of an age-friendly city.

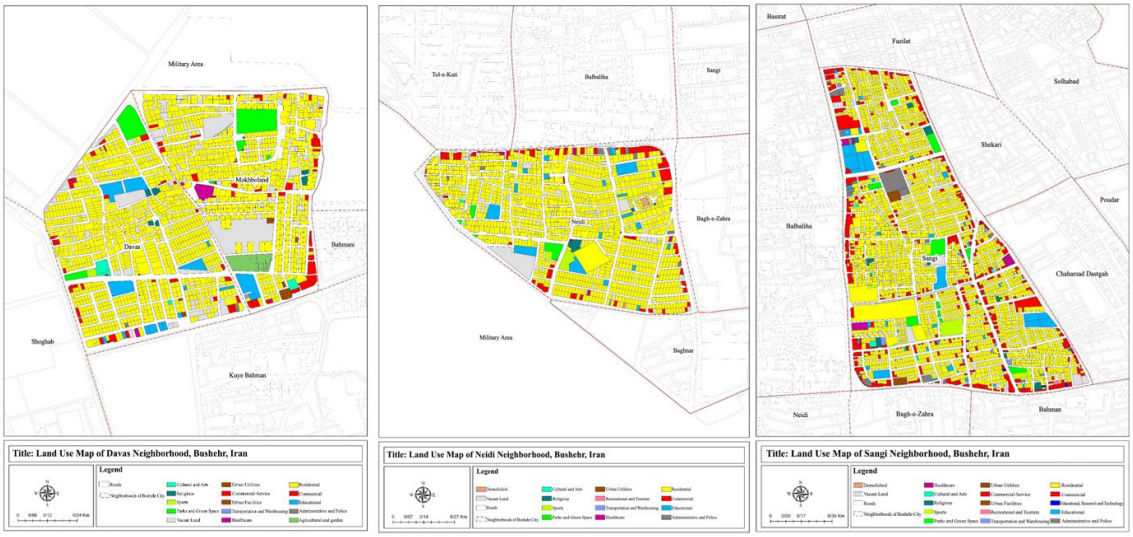

Figure 3. Land use maps of the neighborhoods

Table 1. Per capita provision of selected land uses within the study neighborhoods (m² per person)

Land use	Sangi	Neidi	Davas
Green space	0.48	0.47	0.61
Healthcare and medical services	0.52	0.05	0.45
Commercialservice	1.11	0.37	0.38
Religious	0.26	0.21	0.46
Sportsrecreational	0.96	0.19	1.43
Administrativesecurity	0.98	0.33	0.53

6.3. Comparison of the neighborhoods in terms of age-friendly city dimensions

A one-way analysis of variance (One-way ANOVA) was used to compare older adults' perceptions of the age-friendly city dimensions across the three neighborhoods. The results showed statistically significant differences among the three neighborhoods in six of the eight age-friendly city dimensions (Table 2). These differences were observed in the dimensions of outdoor spaces and buildings ($F = 9.054$, $P < 0.001$), transportation ($F = 5.816$, $P = 0.003$), housing ($F = 11.132$, $P < 0.001$), social participation ($F = 3.849$, $P = 0.022$), respect and social inclusion ($F = 14.414$, $P < 0.001$), and social support and health services ($F = 10.763$, $P < 0.001$). In contrast, differences in mean scores of the three neighborhoods for civic participation and employment ($F = 0.910$, $P = 0.404$) and communication and information ($F = 0.317$, $P = 0.729$) were not statistically significant.

The results of Tukey's post hoc test showed that, for the outdoor spaces and buildings dimension, the mean score for Sangi Neighborhood (2.70) was significantly lower than those for Neidi (3.03) and Davas (3.01) ($P < 0.05$), whereas no significant difference was observed between Neidi and Davas. For transportation, the mean score for Sangi (2.53) was significantly lower than that for Neidi (2.82) ($P = 0.002$); however, the differences between Sangi and Davas and between Neidi and Davas were not statistically significant. For housing, the mean score for Sangi (2.46) was significantly lower than those for Neidi (2.94) and Davas (2.77) ($P < 0.05$), while no significant difference was observed between Neidi and Davas. For social participation, the only significant difference was observed between Neidi (2.60) and Davas (2.31) ($P = 0.018$). The mean score for Sangi (2.46) did not differ significantly from either of the other two neighborhoods. For respect and social inclusion, the mean score for Sangi (2.49) was significantly lower than those for Neidi (2.96) and Davas (2.88) ($P < 0.01$), whereas the difference between Neidi and Davas was not significant. For

social support and health services, the mean score for Sangi (2.74) was significantly lower than those for Neidi (3.17) and Davas (3.24) (P < 0.001); however, no significant difference was observed between Neidi and Davas. For the two dimensions of civic participation and employment and communication and information, Tukey's test revealed no significant differences between any pair of neighborhoods, indicating relatively similar conditions across the three neighborhoods in these two dimensions.

Table 2. Comparison of mean scores of agefriendly city dimensions among Sangi, Neidi, and Davas neighborhoods

Dimension	Sangi	Neidi	Davas	F	Significance level
Buildings and outdoor spaces	2.70	3.03	3.01	9.054	<0.001
Transportation	2.53	2.82	2.67	5.816	0.003
Housing	2.46	2.94	2.77	11.132	<0.001
Social participation	2.46	2.60	2.31	3.849	0.022
Respect and social inclusion	2.49	2.96	2.88	14.414	<0.001
Civic participation and employment	2.73	2.90	2.76	0.910	0.404
Communication and information	2.89	2.96	2.93	0.317	0.729
Social support and health services	2.74	3.17	3.24	10.763	<0.001

6.4. Relationship between age-friendly city dimensions and residential satisfaction

To examine the statistical relationship and predictive power of the eight age-friendly city dimensions with respect to older adults' residential satisfaction, multiple regression analysis using the enter method was conducted. Before the analysis, the regression assumptions, including normality of residuals, independence of errors, absence of multicollinearity, linearity of relationships, and absence of influential outliers, were examined. Tolerance values for all variables were greater than 0.20, and variance inflation factor (VIF) values were below 5, indicating the absence of multicollinearity among the independent variables. In addition, the Durbin–Watson statistic was 1.90, indicating the independence of errors. Examination of standardized residuals and scatterplots also indicated that the assumptions of normality of errors, homoscedasticity of residuals, and absence of influential outliers were satisfied. Therefore, the data met the necessary conditions for conducting the regression analysis.

The analysis of variance (ANOVA) of the regression model showed that the model was statistically significant (F = 3.264, P = 0.001). The coefficient of determination (R^2 = 0.082) indicated that the eight age-friendly city dimensions collectively explained 8.2% of the variance in older adults' residential satisfaction, while the adjusted coefficient of determination was 0.057. These results indicate that although the model was statistically significant, its explanatory power was limited, and a substantial proportion of the variation in residential satisfaction was likely attributable to other factors not examined in this study.

The regression coefficients showed that, among the eight dimensions entered into the model, only social support and health services significantly and positively predicted residential satisfaction (β = 0.222, P = 0.015). Compared with the other dimensions, this dimension made the greatest contribution to predicting residential satisfaction in the present model. In contrast, the dimensions of outdoor spaces and buildings (P = 0.446), transportation (P = 0.657), housing (P = 0.669), social participation (P = 0.283), respect and social inclusion (P = 0.230), civic participation and employment (P = 0.592), and communication and information (P = 0.061) did not show an independent effect on residential satisfaction after simultaneously controlling for the other variables in the model. Therefore, despite the statistically significant contribution of social support and health services, given the low coefficient of determination, this finding merely indicates a limited statistical association and should not be interpreted as evidence that this dimension is the primary or sole factor influencing older adults' residential satisfaction (Tables 3 and 4).

Table 3. Results of analysis of variance for the regression model predicting older adults' residential satisfaction

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	53.577	8	6.697	3.264	0.001
	Residual (error)	597.090	291	2.052	—	—
	Total	650.667	299	—	—	—

Table 4. Standardized and unstandardized coefficients of the multiple regression model predicting older adults' residential satisfaction

Model	Predictor variables	Unstandardized coefficient (B)	Std. error	Standardized coefficient (Beta)	t	Sig.	Tolerance	VIF
1	Constant	2.557	0.483	—	5.292	0.000	—	—
	Buildings and outdoor spaces	0.158	0.207	0.071	0.764	0.446	0.362	2.765
	Transportation	-0.111	0.249	-0.048	-0.444	0.657	0.273	3.661
	Housing	0.082	0.192	0.044	0.427	0.669	0.294	3.406
	Social participation	-0.194	0.180	-0.075	-1.076	0.283	0.655	1.527
	Respect and social inclusion	0.250	0.207	0.124	1.204	0.230	0.298	3.353
	Civic participation and employment	-0.062	0.115	-0.038	-0.537	0.592	0.634	1.577
	Communication and information	-0.338	0.179	-0.141	-1.883	0.061	0.561	1.783
	Social support and health services	0.377	0.153	0.222	2.459	0.015	0.388	2.578

7. Discussion

The findings showed that older adults' perceptions of the age-friendly city dimensions were not consistent across Sangi, Neidi, and Davas neighborhoods, with statistically significant differences among the neighborhoods in six of the eight dimensions examined. This finding is consistent with studies emphasizing the importance of examining intra-urban differences and the role of neighborhoods in shaping the experience of aging (Buffel et al., 2020; Lu et al., 2025; Wang et al., 2026). Accordingly, the experience of aging, even within a single city, appears to be influenced by the physical, social, and functional characteristics of neighborhoods, and evaluating the city as an integrated unit does not necessarily reveal differences among neighborhoods.

In the outdoor spaces and buildings dimension, older adults in Sangi Neighborhood reported lower evaluations than those in the other two neighborhoods. Previous studies have also identified the quality of pedestrian pathways, safety of public spaces, environmental accessibility, and access to open spaces as among the most important components of an age-friendly environment (Rehal et al., 2021; Mousavi et al., 2025). In the present study, the land-use analysis showed that Sangi Neighborhood had a greater concentration of service activities and a lower proportion of open spaces. Such a pattern may be associated with a higher concentration of daily activities, limited availability of public spaces usable by older adults, and a different experience of the neighborhood environment. However, because the social and economic characteristics of the neighborhoods were not measured in this study, the observed differences cannot be attributed solely to physical characteristics.

Regarding transportation, older adults in Sangi Neighborhood reported lower evaluations than those in Neidi Neighborhood, although the difference between Sangi and Davas was not statistically significant. Similarly, in the housing dimension, older adults in Sangi reported less favorable conditions than those in the other two neighborhoods. Previous studies have shown that transportation quality, ease of movement, street safety, and residential environmental conditions are among the key components of an age-friendly environment (Rehal et al., 2021; WHO, 2007). One possible explanation is the service-oriented functional structure of Sangi Neighborhood. The concentration of healthcare,

administrative, and educational facilities in this neighborhood may increase daily trips, traffic density, and street congestion, conditions that may in turn affect older adults' experiences of mobility and use of their residential environment.

In the social participation dimension, the mean score for Neidi Neighborhood was higher than that for Davas Neighborhood. The World Health Organization considers social participation one of the pillars of active aging and emphasizes the availability of opportunities for social interaction among older adults (WHO, 2002; WHO, 2007). This difference may be associated with the quality of social relationships, opportunities for everyday interaction, or the characteristics of public spaces within the neighborhoods.

In the respect and social inclusion dimension, older adults in Sangi Neighborhood also reported lower evaluations than those in the other two neighborhoods. This dimension reflects older adults' feelings of respect, acceptance, and being valued within society (WHO, 2007). The observed difference may be associated not only with physical characteristics but also with the neighborhood's social conditions. For example, higher concentrations of urban activities, the presence of non-resident visitors, and reduced neighborhood interactions are among the factors identified in previous studies as potentially influencing older adults' sense of belonging and social inclusion. However, these variables were not directly measured in the present study.

One notable finding of the present study concerned the social support and health services dimension. Although Sangi Neighborhood had a more favorable situation than the other two neighborhoods in terms of the location of healthcare centers and medical offices, older adults in this neighborhood provided the lowest evaluation of this dimension. This inconsistency suggests that older adults' evaluations of health services do not necessarily correspond to the number or spatial distribution of healthcare facilities. One possible explanation is that the high concentration of healthcare facilities in this neighborhood may be accompanied by consequences such as greater congestion, longer waiting times, and difficulties in using some healthcare buildings. Barriers such as stairs, the absence of elevators, or other accessibility facilities may also reduce the quality of older adults' experiences when accessing services. This interpretation is consistent with the World Health Organization's approach, which emphasizes not only the physical presence of services but also their quality, accessibility, and usability in an age-friendly city (WHO, 2007). Therefore, this finding highlights the importance of considering both objective indicators and older adults' perceptions when evaluating healthcare services.

In contrast, no statistically significant differences were observed among the three neighborhoods in the dimensions of civic participation and employment and communication and information. This indicates that older adults' perceptions of these two dimensions did not differ substantially across the study neighborhoods and that these dimensions may be less influenced by neighborhood-level characteristics than the other dimensions.

Nevertheless, interpreting the observed differences among neighborhoods requires caution. Older adults were sampled from public spaces, and the composition of the samples across the neighborhoods may not have been entirely comparable in terms of characteristics such as health status, mobility capacity, or level of social participation. Therefore, some observed differences may have been influenced not only by neighborhood environmental conditions but also by participants' characteristics.

The regression analysis further showed that, among the eight age-friendly city dimensions, only social support and health services statistically significantly relate to older adults' residential satisfaction. This finding aligns with the "aging in place" approach, which argues that older adults' continuous lives in familiar environments require access to supportive networks and appropriate services (Wiles et al., 2012). At the same time, the low coefficient of determination ($R^2 = 0.082$) indicates that the age-friendly city dimensions explained only a limited proportion of the variation in residential satisfaction. Therefore, other factors, such as individual characteristics, economic status, physical and psychological health, family relationships, and other environmental characteristics, may also contribute to residential satisfaction but were not examined in the present study.

Overall, the findings demonstrate that examining age-friendliness at the neighborhood scale can reveal differences that may be less visible when the city is assessed as a whole. Furthermore, the eight age-friendly city dimensions were not equally associated with older adults' residential satisfaction. In the present model, only the social support and health services dimension showed a statistically significant relationship with residential satisfaction. These

findings can help identify planning priorities for different neighborhoods of Bushehr; however, their interpretation should consider the study's limitations.

8. Conclusion

The present study aimed to compare the conditions of three neighborhoods – Sangi, Neidi, and Davas – in Bushehr in terms of the eight dimensions of an age-friendly city and to examine the relationship between these dimensions and older adults' residential satisfaction. The results showed statistically significant differences among the three neighborhoods in six of the eight age-friendly city dimensions. In particular, older adults in Sangi Neighborhood reported lower evaluations of outdoor spaces and buildings, housing, respect and social inclusion, and social support and health services. In the transportation dimension, the mean evaluation for Sangi was also lower than that for Neidi, although the difference between Sangi and Davas was not statistically significant. These findings indicate that older adults' evaluations of their living environments are not uniform across neighborhoods and that neighborhood-level differences may be reflected in their experience of an age-friendly city.

The regression analysis also showed that, in the current model, only the social support and health services dimension was statistically significantly related to older adults' residential satisfaction. However, the low coefficient of determination (R^2 = 0.082) indicated that the age-friendly city dimensions explained only a limited proportion of the variation in residential satisfaction. Therefore, other factors that were not examined in this study are also likely to contribute to older adults' residential satisfaction.

From an urban planning perspective, the findings highlight the importance of considering neighborhood-level differences when evaluating age-friendliness. Accordingly, rather than implementing uniform interventions across all neighborhoods, planning priorities can be determined according to the characteristics and needs of each neighborhood. For example, in Sangi Neighborhood, where older adults reported lower evaluations for several age-friendly city dimensions, measures such as improving pedestrian routes, adapting public spaces to older adults' needs, reducing environmental barriers, and improving the accessibility and usability of healthcare services could be prioritized. However, given the cross-sectional nature of the study and its limitations, these recommendations should be considered alongside other evidence and complementary studies.

This study also had several limitations. First, the data were collected using self-reported questionnaires; therefore, the findings may have been influenced to some extent by respondents' subjective perceptions and interpretations. Second, the sample was drawn from older adults present in public spaces. Consequently, homebound older adults, individuals with severe mobility limitations, and those who are less frequently present in public spaces were not adequately represented in the sample. This may also have affected the comparison among neighborhoods, as the composition of the samples in each neighborhood may not have been comparable in terms of characteristics such as health status, mobility capacity, and level of social participation. Third, residential satisfaction was measured using a single general item. Although this approach was also used in some previous studies, it may not capture all dimensions of the construct. In addition, the research model did not include variables such as economic status, physical and psychological health, household structure, social capital, objective indicators of the urban environment, and spatial equity. Therefore, the findings should be interpreted with these limitations in mind.

Given these limitations, future studies should combine perceptual and objective indicators of the urban environment, including GIS-based spatial data, accessibility indicators, and the distribution of urban services, to enable the simultaneous comparison of older adults' subjective evaluations and the physical characteristics of neighborhoods. In addition, multilevel statistical models could more accurately determine the respective contributions of individual-level factors and neighborhood characteristics to older adults' perceptions and residential satisfaction. Examining variables such as economic status, physical and psychological health, social capital, family relationships, and actual utilization of healthcare services could also contribute to a more comprehensive explanation of the differences observed among neighborhoods. Furthermore, qualitative studies involving older adults could provide a deeper understanding of their lived experiences and generate more practically relevant evidence for neighborhood-based age-friendly city planning.

Authors' Contributions

Both authors contributed equally to all stages of the research and manuscript writing, and each author contributed 50 percent.

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Conflict of Interest

The authors declare no conflict of interest regarding the conduct, writing, or publication of this article.

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