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ORIGINAL ARTICLE

The Impact of Age-Friendly City Components on Physical Activity Levels of Urban Older Adults: A Case Study of Tabriz

Ataollah Zarafshan

Assistant Professor, Department of Geography and Urban Planning, Payame Noor University, Tehran, Iran.

Correspondence
Ataollah Zarafshan
E-mail: Ata.Zarafshan@pnu.ac.ir

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EXTENDED A B S T R A C T

Introduction

The convergence of global urbanization and population aging represents one of the most significant demographic transformations of the twenty-first century, with profound implications for public health and urban planning. By 2050, the proportion of the global population aged 65 years and older is projected to increase from 9.4% to approximately 16.0%, with individuals aged 80 and above expected to more than double by 2030 (Vynohradova, 2022). This shift is particularly pronounced in urban areas, where 70% of the population will reside by 2050, with most urban residents being 60 years or older (Kort, 2022). Notably, the number of people over 65 worldwide now exceeds those under 5 years of age (Cagney, 2019).

The implications extend beyond population statistics, presenting complex challenges for elderly health and well-being. Older adults in cities are more vulnerable to climate and socio-economic changes, as most urban environments primarily support working-age populations (Premaratna et al., 2023). Elderly individuals exhibit distinctive travel behaviors related to age and physical capacity (Sha, 2023), necessitating inclusive infrastructure planning. This demographic shift places increasing pressure on healthcare and welfare systems, making age-friendly cities an urgent priority for urban planners and policymakers worldwide (van Hoof & Marston, 2021).

Population aging has generated growing interest in understanding how urban environments influence physical activity and health outcomes among elderly residents. The built environment plays a vital role in promoting active aging and physical health (Xu et al., 2024), with factors such as access to supermarkets, metro systems, green spaces, street cleanliness, and fitness facilities showing positive correlations with physical activity intensity among urban elderly populations (Guo, Xia & Yu, 2024; Shen et al., 2025).

Despite significant advances in identifying age-friendly city dimensions and mounting evidence regarding the built environment's impact on elderly health, comprehensive understanding of how various components of this approach influence urban elderly physical activity remains incomplete. Therefore, this research seeks to address the fundamental question: What impact do age-friendly city components have on physical activity levels among urban elderly, and which of these components play the most significant role in promoting physical activity in this age group?

Mothodology

This applied research employed a descriptive-survey methodology targeting elderly individuals aged 65 and above in Tabriz, Iran. Inclusion criteria included urban residency, absence of severe cognitive impairments, and questionnaire completion ability. Data were collected through convenience sampling from parks, cultural centers, nursing homes, and social networks using both in-person and online surveys.

Two standardized instruments were utilized: the Age-Friendly Cities and Communities Questionnaire (AFCCQ) and the Physical Activity Scale for the Elderly (PASE). Following

content validity assessment and expert panel consultation, the AFCCQ was adapted from its original 9-domain version, with items exhibiting low Content Validity Ratio (CVR) or lacking relevance to Iranian contexts being removed. PASE was reduced from 10 to 5 key questions after localization. The final questionnaire contained 32 items with overall Content Validity Index (CVI) exceeding 0.80.

Based on Hooman's (2005) recommendation of 5-15 observations per variable for structural equation modeling, minimum sample size was estimated at 160 participants. Ultimately, 350 complete questionnaires were obtained from participants with a mean age of 71 years representing diverse backgrounds.

Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed using SmartPLS 3 software, as data violated normality assumptions. Reliability and validity were assessed through factor loadings, Average Variance Extracted (AVE), composite reliability, and Cronbach's alpha.

Findings

The measurement model evaluation demonstrated strong psychometric properties across all constructs. Table 1 presents the Average Variance Extracted (AVE), composite reliability, and Cronbach's alpha coefficients.

Table 1. Average Variance Extracted, Composite Reliability, and Cronbach's Alpha Indices

Research Variables	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Social Respect	0.837	0.902	0.756
Communication and Information	0.844	0.906	0.763
Community Support and Health Services	0.892	0.933	0.822
Transportation	0.918	0.948	0.859
Open Spaces and Buildings	0.911	0.944	0.849
Elderly Physical Activity	0.891	0.920	0.700
Housing	0.859	0.914	0.781
Social Participation	0.886	0.929	0.815
Civic Participation	0.778	0.871	0.693
Financial Status	0.834	0.902	0.757

All composite reliability values ranged from 0.871 to 0.948, exceeding the threshold of 0.70, while Cronbach's alpha coefficients varied between 0.778 and 0.918, confirming internal consistency. AVE values ranged from 0.693 to 0.859, all surpassing the minimum criterion of 0.50, thus establishing convergent validity.

Table 2 presents the path coefficients and t-test results for the structural model examining the impact of age-friendly city components on elderly physical activity.

Table 2. Path Coefficients and t-Test of the Structural Model

Research Variables	Path Coefficient	Standard Deviation	t-Statistic	Significance Level
Social Respect → Elderly Physical Activity	0.190	0.043	4.394	0.001
Communication and Information → Elderly Physical Activity	0.077	0.036	2.111	0.035
Community Support and Health Services → Elderly Physical Activity	0.071	0.032	2.202	0.028
Transportation → Elderly Physical Activity	0.190	0.032	5.900	0.001
Open Spaces and Buildings → Elderly Physical Activity	0.192	0.027	6.942	0.001
Housing → Elderly Physical Activity	0.036	0.037	0.975	0.330
Social Participation → Elderly Physical Activity	0.196	0.033	5.833	0.001
Civic Participation → Elderly Physical Activity	0.080	0.030	2.649	0.001
Financial Status → Elderly Physical Activity	0.088	0.032	2.755	0.006

The structural model revealed significant relationships between age-friendly city components and elderly physical activity. Social participation exhibited the strongest influence (β=0.196, t=5.833, $p<0.001$), followed closely by open spaces and buildings

(β=0.192, t=6.942, p<0.001), transportation (β=0.190, t=5.900, p<0.001), and social respect (β=0.190, t=4.394, p<0.001). These four components demonstrated the most substantial impact on physical activity levels. Moderate but significant effects were observed for financial status (β=0.088, t=2.755, p=0.006), civic participation (β=0.080, t=2.649, p=0.008), communication and information (β=0.077, t=2.111, p=0.035), and community support and health services (β=0.071, t=2.202, p=0.028). Notably, housing showed no significant relationship with physical activity (β=0.036, t=0.975, p=0.330). The results indicate that social engagement opportunities combined with physical infrastructure (open spaces, transportation) constitute the primary drivers of physical activity among urban elderly, while economic security and information access play supportive roles. The non-significant housing effect suggests that dwelling characteristics alone may be insufficient without broader environmental and social supports.

Discussion and Conclusion

This study examined the impact of age-friendly city components on physical activity among urban elderly, revealing that eight of nine domains significantly influence elderly physical activity, underscoring the necessity of comprehensive, multidimensional urban planning for this demographic.

Social participation demonstrated the strongest influence (β=0.196), highlighting that elderly individuals require both intrinsic motivation and external social factors to sustain physical activity. Group activities and social gatherings strengthen feelings of belonging while facilitating peer support and collective healthy habits. Open spaces and buildings showed nearly equal impact (β=0.192), emphasizing the fundamental importance of physical infrastructure. This domain provides the necessary substrate for activity while creating opportunities for social interaction and nature engagement. Transportation and social respect also showed substantial impacts (β=0.190 each) as facilitators and motivators. Accessible public transportation maintains elderly independence and connects them to activity destinations, while social respect addresses psychological-social dimensions, reducing barriers to public space participation. Civic participation, financial status, communication and information, along with community support and health services, played supportive roles by providing necessary awareness, economic enablement, and professional guidance. Notably, housing showed no significant direct relationship with physical activity, likely because the study focused on activities in public urban spaces rather than domestic environments. This does not diminish housing's importance for overall elderly health but suggests its indirect influence through enabling outdoor participation.

These findings emphasize that age-friendly cities must integrate social opportunities, physical infrastructure, economic support, and cultural attitudes simultaneously. Policymakers, urban planners, health professionals, and social advocates must collaborate to design cities that not only extend lifespan but also ensure quality of life and health during aging. This research provides a foundation for targeted interventions and resource prioritization to promote urban elderly health comprehensively.

K E Y W O R D S

Age-Friendly City, Elderly Physical Activity, Elderly Health, Structural Equation Modeling, Tabriz.

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