Research Paper

Research on Spatial Planning Strategies for Community Integration of Healthcare and Physical Activity

From the Perspective of Proactive Health Interventions

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Abstract

Over the past 40 years, China's cities have experienced very rapid development, while rapid urbanization improves residents' material living standards and quality of life, it also brings a series of environmental issues, such as traffic congestion, uneven distribution of resources (e.g., healthcare, sports venues, parks), and air pollution. These changes have altered residents' lifestyles, with increased dependence on transportation and reduced physical activity posing new health challenges. Over the past 40 years, China's cities have experienced very rapid development.
Integrating sports and healthcare into the community to shift residents' health attitudes from passive treatment to proactive prevention is a proactive approach to addressing health threats. This study aims to establish an evaluation index system for the built environment's physical spatial elements. Using field research, resident interviews, and surveys, the study will assess the built environment across four objective dimensions—spatial layout, spatial form, spatial quality, and spatial security—and four subjective perception dimensions—convenience, comfort, safety, and cleanliness. Data on residents' behaviours and health status will be collected and analysed. Utilizing the Structural Equation Model (SEM), this research will explore the primary built environment factors affecting residents' health and investigate the mechanism of this impact. Based on these findings, spatial planning strategies will be proposed to promote the integration of sports and healthcare through spatial planning, ultimately improving residents' health.

Keywords

Community Environment, Residents' Health, Impact Mechanism, Proactive Interventions

1. Introduction

The World Cities Report 2022: Envisaging the Future of Cities notes that in 2021, more than 55% of the global population lived in urban areas, a figure projected to rise to 68% by 2050 (United Nations Human Settlements Programme, 2022). Urbanization has led to unhealthy living and working conditions, a lack of green spaces, pollution such as noise, water, and soil contamination, urban heat islands, and a scarcity of spaces for walking, cycling, and active living, contributing to an increase in non-communicable diseases (such as heart disease, asthma, cancer, and diabetes) (WHO, 2021).

The World Health Organization (WHO) and several developed countries launched the "Healthy Cities Movement" as early as the 1980s. The movement aims to improve residents' health by providing high-

quality, safe living environments, promoting active lifestyles, and addressing socio-economic factors that threaten public health (Cao, Y., 2023). In 2018, WHO released a Global Action Plan on Physical Activity, with the goal of ensuring that everyone has access to safe, enabling environments and a variety of opportunities to incorporate physical activity into their daily lives, thereby enhancing individual and community health. The specific target is to achieve a 15% relative reduction in the global prevalence of insufficient physical activity among adults and adolescents by 2030 (WHO, 2018).

To reverse the current trend of declining physical activity, effective, systematic national action is required. In response, WHO has launched a Global Action Plan on Physical Activity, proposing a universally applicable framework across more than twenty policy actions . This plan adopts a comprehensive, system-wide approach through four key areas: fostering vibrant societies, creating activity-friendly environments, building activity-oriented communities, and establishing supportive systems for physical activity.

Communities are the main settings for residents' daily lives, and achieving the "Healthy China" goal requires focusing on community environments where daily activities occur. China's urban development has entered a phase of stock adjustment, with public space construction shifting from new development to renovation and renewal. Unlike new constructions, public space renovations must carefully consider the demographics, activity needs, and exercise preferences of existing community residents. Current community public space renovation efforts primarily focus on comprehensive improvement, often following standards for newly built communities and lacking targeted recommendations. Creating a community environment conducive to exercise can help residents develop healthy habits and promote adequate physical activity levels. The second area is focused on spaces and places, which are also the focus of this research, emphasizes the need to strengthen the development of public facilities, schools, healthcare institutions, and sports and recreational facilities. It advocates for more sports fields and other open public spaces for community use, aiming to ensure that people of all ages and abilities in urban, suburban, and rural areas have convenient access to high-quality public green open spaces, green networks, leisure spaces (including rivers and coastal areas), and sports facilities.

By reviewing existing research on the impact of the built environment on health, this study finds that this field is still in its early stages. Current literature mainly comprises experiential summaries of foreign research methods and findings, with only limited exploration of impact mechanisms. This paper adopts a proactive health intervention perspective, using various communities in Nanshan District, Shenzhen, as research subjects to analyse and explore the mechanisms and influential factors of the built environment's impact on residents' health. This provides an empirical case study for further research in this field. Additionally, proactive health intervention studies focused on enhancing community residents' health are scarce, and the "sports-healthcare integration" service model is a key approach to achieving such interventions.

This study connects physical spatial data, residents' exercise data, and health data to associate community public space with residents' health. By analysing built environment features that impact health, this study integrates proactive health intervention ideas from sports and healthcare, proposing community-level public space renovation strategies. These strategies offer valuable references for future community development and renovation, enhance the feasibility of implementing sports-healthcare integration at the community level, and support healthier lifestyles for residents, contributing to the realization of the "Healthy China" strategy.

2. Theoretical analysis

2.1. Difficulties faced by the population's health

The global trend of insufficient physical activity is intensifying. In June 2024, the latest research on adult physical activity, conducted jointly by World Health Organization (WHO) researchers and the academic community, revealed that nearly one-third of adults globally (approximately 1.8 billion people) did not

meet the recommended levels of physical activity in 2022. From 2010 to 2022, the percentage of adults lacking sufficient physical activity increased by about 5 percentage points. This indicates that physical inactivity among adults has not improved, and if this trend continues, it is projected that by 2030, the percentage of physically inactive adults will further rise to 35%. Notably, China is part of this trend, with 28% of men and 19.5% of women experiencing insufficient physical activity in 2022 (Strain, T., Flaxman, S., et al., 2024).

Physical activity levels of residents in Shenzhen needs improvement. The 2023 Shenzhen National Fitness Report shows that the comprehensive fitness compliance rate among Shenzhen residents reached 91.5%, marking a 0.7 percentage point increase compared to the previous year and exceeding the national average compliance rate from the fifth National Physical Fitness Monitoring by 1.1 percentage points. The overall physical fitness of Shenzhen residents exceeds the national average, certain indicators reveal areas for improvement. For example, the average BMI for men aged 30-59 is above the overweight threshold, and the overall fitness compliance rate for older adults (60+) is 90.1%, 1.3 percentage points below the national level.

2.2. Progress of research in the disciplines

To promote public health, scholars in various countries have studied interdisciplinary frameworks (Tian, L., Li, J., Ouyang, W., et al., 2016), elements of the built environment that affect health (Wang, L., Liao, S., Zhao, X., 2016), and the promotion of physical activity (Chen, F., Zhou, S., Zhang, L., 2019), and an initial consensus has emerged on the relationship between the built environment and public health. The results are summarized in Figure 1, which shows that different disciplines have intervened in the health of the population in different ways, from the macro to the micro level.

However, research in the field of urban and rural planning on how the built environment positively intervenes in health is still in its infancy. This research will explore the mechanisms by which the environment affects health from the perspective of urban and rural planning and propose spatial intervention strategies.

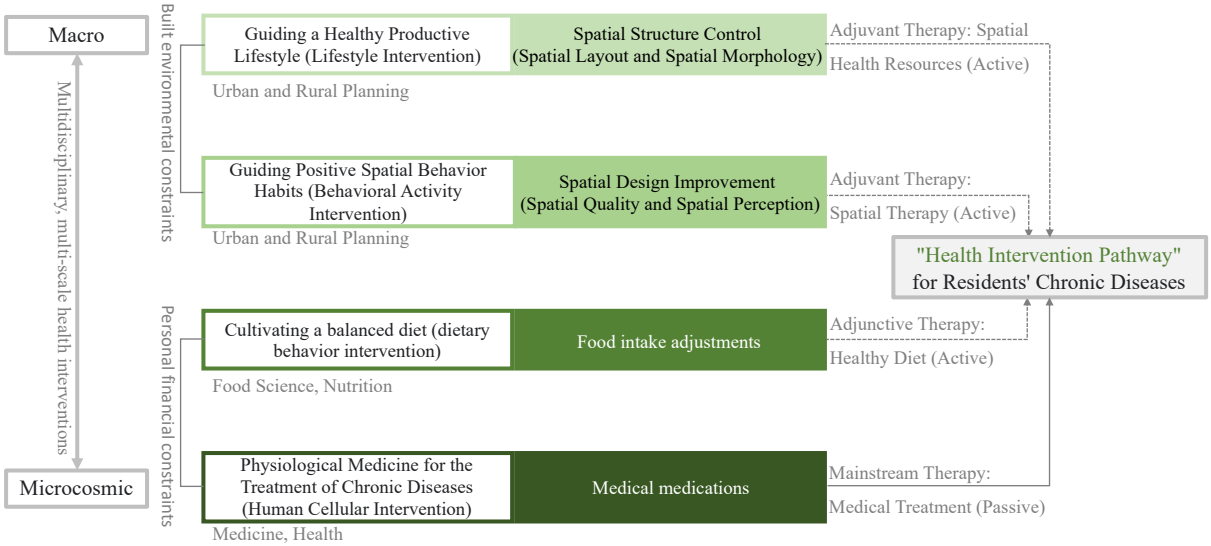

Figure 1. A multidisciplinary and multi-scale health intervention approach for residents' chronic diseases. Source: Self-drawn by the author.

2.3. Progress in the development of the sports-healthcare integration service model

Sports-healthcare integration refers to the fusion of sports and medical health resources, aiming to optimize health promotion and resource allocation. Specifically, it combines sports technology, medical techniques, and other health-promotion methods to support scientific fitness, disease prevention, treatment, and rehabilitation, creating a comprehensive approach to health across the entire lifecycle.

In Western countries, such as the United States, awareness of the negative health impacts of urbanization and motorization emerged in the late 20th century (DONALDSONA, Finch CF., 2012). Initiatives like the “Physical Activity and Public Health Guidelines” emphasized the importance of non-medical interventions to promote physical activity as a key component of health (R E Sallis., 2009). The German Government actively promotes the integration of physical medicine and health promotion through strategic planning, policy designation and human resource development (Kerr, R., 2016). Sweden's health promotion initiative “Sweden in Action” promotes the integration of physical activity into health care in primary health-care settings, the “Physical Activity Prescription” model of integrating physical and health services (Albert, F.A., Crowe, M.J., Malau, A., et al., 2020). Different countries have since established diverse sports-healthcare integration models tailored to their national needs, creating targeted services for various populations. Their construction and operational experiences offer valuable insights for further development in other regions.

The sports-healthcare integration model in China is still in its nascent stages, receiving academic attention primarily since 2016. In theoretical research, scholars have explored aspects such as implementation actors (Wang, Q., Chen, W., Wen, J., 2021), operational models (Yao, Z., Zhang, X., Fang, J., 2022), and institutional mechanisms (Huang, Li., He, H., Peng, Li., et al., 2024). Many researchers argue that embedding this model within communities, where residents’ daily activities take place, supports sustained effectiveness by enabling non-medical interventions for all ages and phases of life (Dong, F., Tang, L., 2024). This approach promotes healthy lifestyle changes and enhances public health. Pilot programs are underway in cities like Beijing and Shanghai, utilizing various models based on medical institutions, communities, and hybrid approaches (Li, F., Wang, J., Cui, B., 2023). These pilot projects demonstrate both benefits and challenges, highlighting the need for further refinement to optimize these models for broader regional implementation. Further improvements are necessary to establish effective, scalable models that can support a nationwide rollout, ultimately helping to foster healthier communities.

3. Materials and methods

3.1. Research design

Our study consists of three steps: first, on the basis of multidisciplinary active health intervention research, and in conjunction with the needs of community physical and medical integration model construction, we constructed the index system of the study, which is divided into three categories, including physical environment element indicators, residents' health indicators and residents' activity indicators; second, construct and refine the research framework, use structural equation modelling to analyse the influence path of physical environment factors on residents' health, and identify the most representative indicators; third: collect and analyse the data, collect as much data as possible by time period and region to ensure the objectivity of the data, and then calculate and draw conclusions after collection.

3.2. Influencing factors

The system of research indicators is constructed from three aspects: Community Built Environment, Resident Health Indicators, and Spatial Activity Behaviour.

Urban Built Environment: By reviewing and analysing existing literature and research findings, this study examines potential physical spatial indicators within the built environment that may affect community residents' physical health, focusing on the impact of community environments on residents' well-being from a planning perspective. The dimensions of physical spatial indicators are clarified to include spatial layout, spatial form, spatial quality, and spatial security, which are further refined.

The type and description of the variable			
Objective environmental measurements	Spatial layout	F01	Land-use diversity (Yin, C., 2020)
		F02	Convenience of event venues (Wang, L., Du, Y., 2020)
		F03	Public service facilities (Domenech-Abela, J., Switsers, L., Mundo, J., et al., 2020)
		F04	Public transport stops (Yin, C., 2020)
		F05	Density of medical service facilities
	Spatial morphology	F06	Building density (Dong, W., Zhu, J., Li, H., 2023)
		F07	Morphological diversity (Cheng, H., 2021)
		F08	The enclosed state of the open space (Cheng, H., 2021)
		F09	Pedestrian street density (Namgung, M., Gonzalez, B., Park, S., 2019)
		F10	Pedestrian street connectivity (Timmermans, E.J., Schaap, L.A., et al., 2016)
	The quality of the space	F11	Green space rate (Hawkesworth, S., Silverwood, R.J., Armstrg, B., et al., 2018)
		F12	Green coverage (Peng, K., Jia. Y., Liang Y., et al., 2024)
		F13	Integrity of sanitation facilities
		F14	Space design (Wang, L., Du, Y., 2020)
	Space security	F15	Community policing (Razieh, Z., Johannes, F., Javier, M., et al., 2017)
		F16	Completeness of emergency facilities
		F17	Urban renewal projects

Figure 2. Objective environmental measurements. Source: Self-drawn by the author.

The subjective environmental perception includes 8 indicators. This set of indicators primarily focuses on the residents' perspective, aiming to understand their satisfaction with the community environment in terms of comfort, aesthetics, and convenience.

The type and description of the variable		
Subjective perception of the environment	X01	Public space appeal
	X02	A sense of security in the security situation
	X03	The cleanliness of the built environment
	X04	Walking environment comfort
	X05	Convenience of hospital treatment
	X06	Convenience of bus and subway
	X07	Accessibility of sports facilities
	X08	Convenience of activities in the park

Figure 3. Subjective perception of the environment. Source: Self-drawn by the author.

Resident Physiological Indicators: These indicators are designed to evaluate residents' health status, encompassing both physiological metrics and self-assessed health evaluations. Data on residents' health self-assessments and sleep quality evaluations will be collected through interviews and questionnaires. Physiological data such as blood pressure, blood oxygen levels, heart rate, and BMI will be gathered using devices like blood pressure monitors, pulse oximeters, weight scales, and measuring tapes. Collected data will be calculated and graded according to health standards to reflect residents' health levels.

The type and description of the variable			Quantitative methods	Data source
Physiological indicators	N01	Blood pressure	mmHg	on-site measurements
	N02	Heart rate	times/min	
	N03	Blood oxygen	%	
	N04	BMI	Kg/m2	
Health self-assessment	N05	Sleep status	1-5 (Poor-Good)	Questionnaires
	N06	Health perception	1-5 (Poor-Good)	

Figure 4. Indicators of residents' health characteristics. Source: Self-drawn by the author.

Spatial Activity Characteristics: Questionnaires will gather individual demographic information, including age and gender, while interviews will capture community residents' exercise habits, covering exercise type, frequency, and duration. These data will be quantified, and residents' physical activity levels will be graded based on the "WHO Guidelines on Physical Activity and Sedentary Behaviour" recommendations for various populations to indicate exercise intensity.

The type and description of the variable			Quantitative methods	Data source
Athletic conditions	A01	The type of Exercise	Calculate the amount of exercise in a week, compare it with the amount of exercise recommended by the World Health Organization, and score it on a scale of 1-5 (poor-good)	Questionnaires
	A02	Exercise time		
	A03	Frequency of Exercise		
Commute travel	A04	How to get around		
	A05	Commute time		
	A06	Frequency of travel		

Figure 5. Indicators of residents' activity characteristics. Source: Self-drawn by the author.

3.3. Influence path

The community environment can have a direct or indirect impact on the health of residents. The community environment can directly affect the health of residents and can also indirectly affect the health of residents through residents' health behaviours, which together constitute the comprehensive impact of the community environment on residents' health.

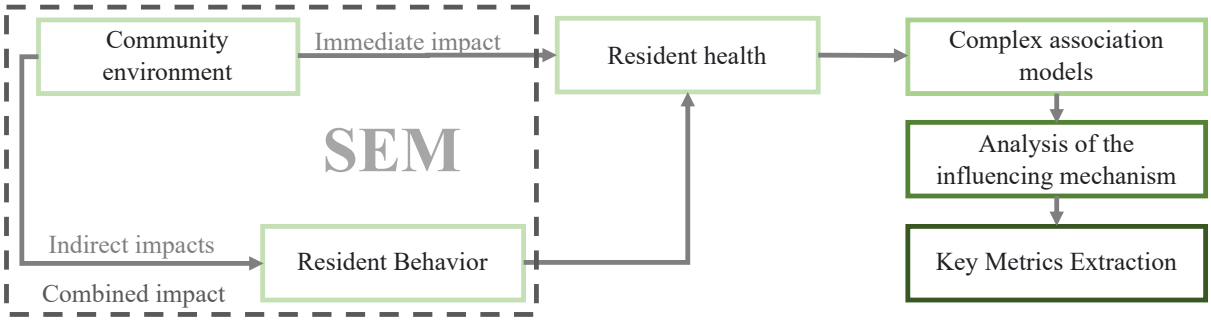

Figure 6. The comprehensive impact of community environment on residents' health. Source: Self-drawn by the author.

Based on the preliminary research route, the research method was further refined. Step 1: Explore the direct impact of community environments on residents' health and establish a structural equation model between community environments and residents' health to identify key influencing factors. Step 2: Incorporate physical activity into the model to determine if it affects the original conclusions. Step 3: If an impact is found, further explore the influence of residents' exercise and physical environmental factors on health. Finally, derive the pathways through which the environment affects health.

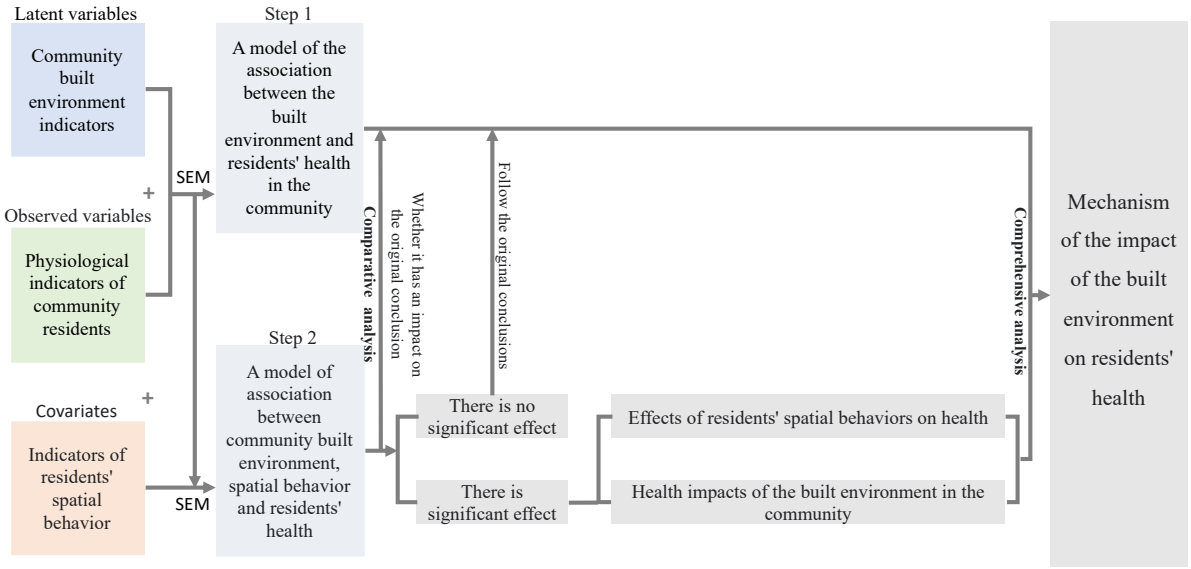

Figure 7. Research process on the mechanism of the impact of the built environment on residents' health. Source: Self-drawn by the author.

3.4. Data collection

The research location is in Shenzhen Nanshan District, Guangdong Province, China. Shenzhen covers an area of 1,997 square kilometres and has a population of 17.79 million, making it one of the largest cities in China. Nanshan District is in the central-western part of Shenzhen, Guangdong Province, bordering Yuen Long in Hong Kong across Shenzhen Bay to the southeast. By the end of 2023, the district had a permanent population of 1.8 million. Nanshan has experienced rapid urban development, excelling in cultural and ecological initiatives, with economic vitality ranking among the highest in China. In such a rapidly developing urban area, studying the impact of the community environment on residents' health is of great importance.

The research is conducted in conjunction with the "Community Health Outreach Program" organized by the *Nanshan District Private Medical Institutions Association in Shenzhen*. Suitable events are selected to facilitate in-depth community engagement, including interviews, questionnaire distribution, and physiological measurements. Based on the community's environmental quality, scale, and function, we have made a preliminary classification of the communities, which can be categorized into New Pattern Community, Comprehensive Community, and Traditional Community. This classification will aid in our subsequent research.

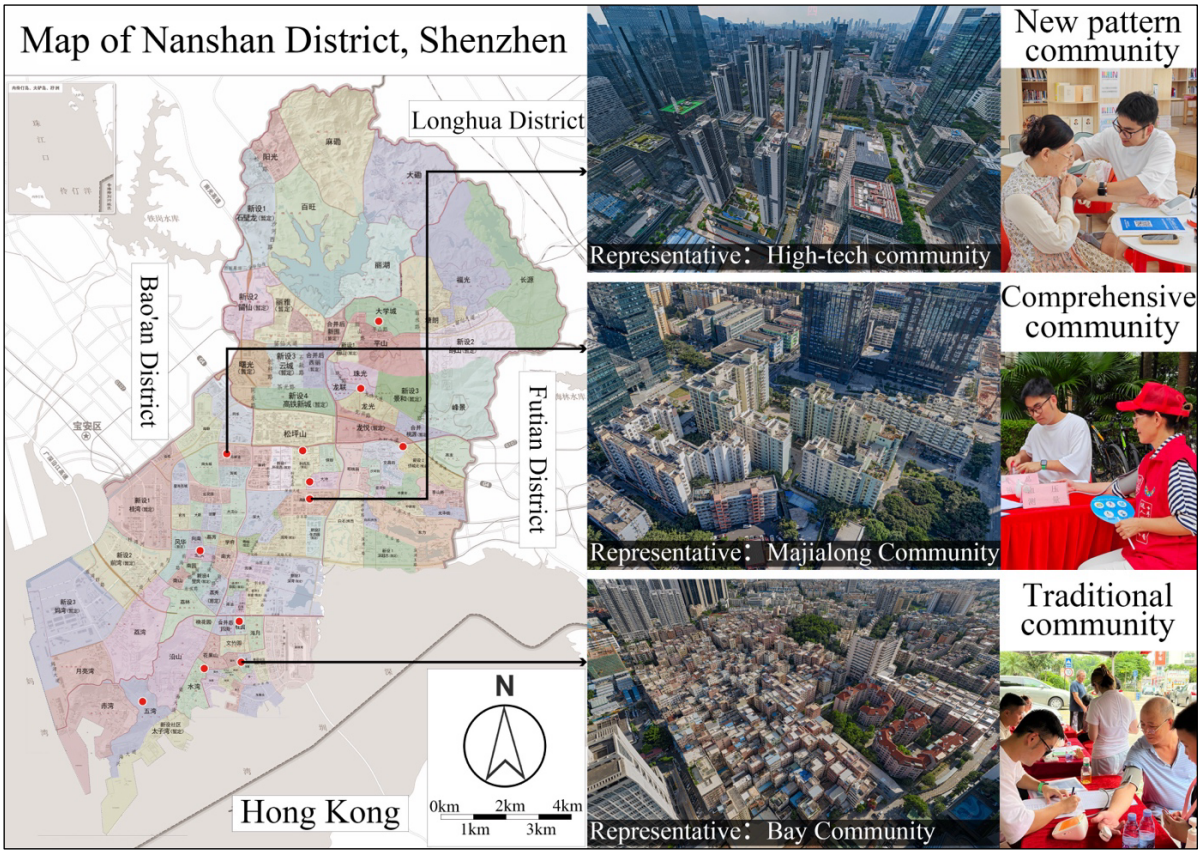

Figure 8. Results of community field research. Source: Self-drawn by the author.

4. Results and analysis

4.1. Survey results

Up to September, physiological data collection and questionnaire distribution have been completed in twelve communities (including a pilot community), resulting in approximately 580 completed questionnaires. According to the survey results, 23% of respondents are overweight, 30% rarely exercise, and 60% express a need for exercise guidance.

4.2. Calculation results

A structural equation model (SEM) was developed, incorporating detailed indicators of the objective built environment, resident health, and physical activity. This model explored the pathways by which specific aspects of the built environment influence residents' health outcomes and examined the mediating role of physical activity in linking the built environment to health. Through this analysis, the model clarified the mechanisms through which the built environment impacts health and identified how physical activity serves as an intermediary factor in this process.

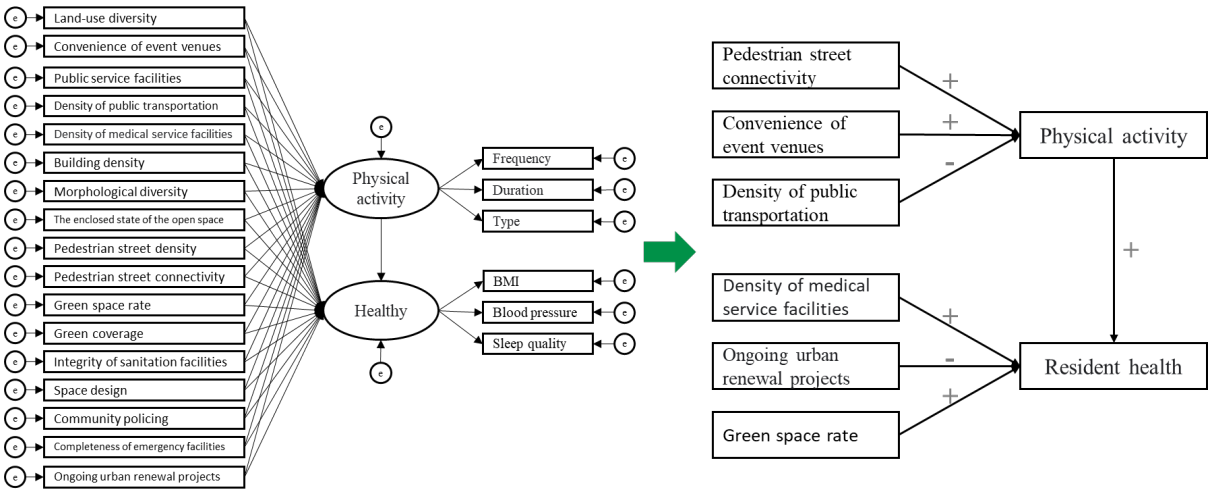

Figure 9. Use SEM to calculate the environmental factors that affect the health of residents. Source: Self-drawn by the author.

Based on the available data, we found that pedestrian street connectivity positively impacts residents' physical activity, while the density of public transportation has a negative impact on physical activity. The density of medical service facilities and the green space rate positively influence residents' health, while ongoing urban renewal projects negatively affect health. Physical activity has a positive effect on residents' health.

5. Discussion and planning strategies

5.1. Spatial layout

Optimize the layout of community sports space. The convenience of community activity spaces significantly impacts residents' willingness to exercise. Increasing the density and optimizing the layout of these spaces enhances accessibility, encouraging physical activity. To achieve this, grey spaces in the community can be utilized to create irregular, non-standardized sports areas. By strategically placing these areas, a five-minute walking coverage for activity spaces can be realized. Additionally, high-traffic parking lots can be designed as flexible spaces, serving as sports grounds during the day and as parking lots at night.

Improve the quality of community event space. The quality of community activity spaces also plays a critical role in residents' motivation to engage in physical activities. Improving the quality can involve diversifying available exercise options, strengthening facility maintenance, and ensuring adequate nighttime lighting. Enhancing comfort by providing sufficient amenities—such as seating, lockers, and washbasins—further supports use. Where feasible, adding retractable canopies can protect spaces from sun and rain, ensuring they remain usable under various weather conditions.

Integrate community medical and sports resources. Based on the study of existing cases, the practice process of sports and medicine integration in the community is summarized and designed, as shown in the figure below. It demonstrates the implementation of a community-based integrated sports and medicine service model, where the red line represents the movement flow of community residents participating in exercises, and the blue line represents the flow of fitness instructors. The exercise component can be carried out indoors or at public sports fields within the community.

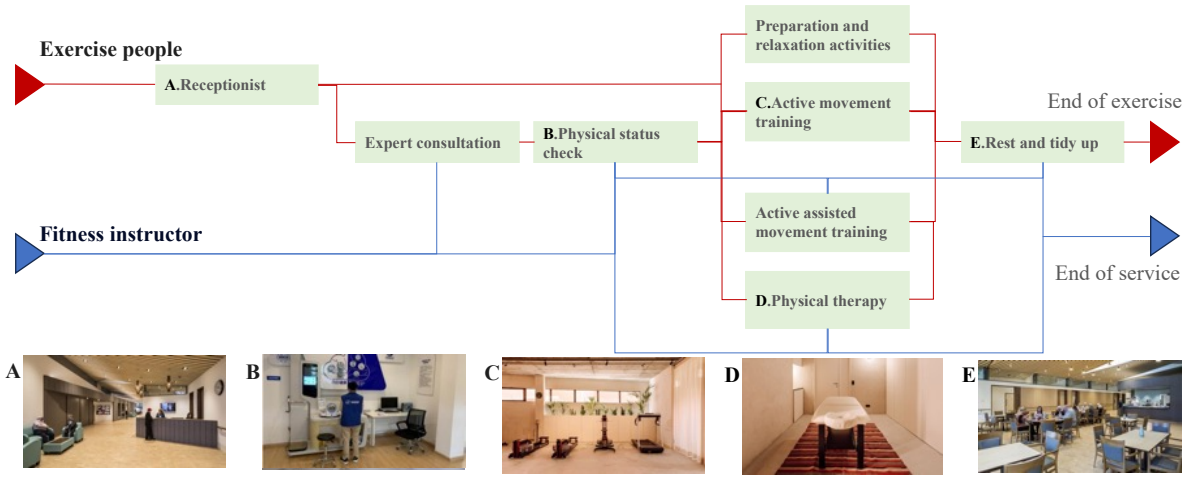

Figure 10. Main functional streamlines for the physical medicine crowd. Source: Self-drawn by the author.

5.2. Spatial morphology

Optimize the pedestrian street density. The density of streets has a significant positive effect on residents' physical activity. Higher density of walkable streets indicates greater street connectivity, pedestrian accessibility, and overall length of walkable paths, encouraging people to choose walking as a primary mode of transport. This increase in physical activity positively impacts health. Enhancing the density of pedestrian streets can effectively address issues related to insufficient physical activity while also expanding commercial space along the streets, diversifying land use, and enhancing street vitality.

5.3. Spatial quality

Increase the rate of green space. The natural environment in a community has a significant and positive direct impact on residents' health. Lush parks and tree-lined streets contribute to residents' mood, alleviating stress and anxiety. In high-density communities, grey spaces can be effectively utilized to create pocket parks, while rooftop gardens can be built on the tops of buildings. Additionally, vertical greening installations on the facades of public buildings—such as cafés and libraries—can further enhance greenery.

5.4. Spatial security

Improve emergency facilities. Providing comprehensive emergency facilities in communities can increase residents' sense of security, directly enhancing their happiness while also promoting physical activity. For instance, placing emergency medical facilities near sports areas allows for prompt first aid in case of sports injuries. Additionally, installing lighting in areas suitable for nighttime running helps ensure safety, encouraging more residents to engage in physical activities with confidence.

6. Conclusion

Based on a large amount of research, this study utilizes sufficient data to calculate the elements of the physical environment that affect the health of the residents, and then, on this basis, proposes spatial intervention strategies, which are more focused on the current situation of the city than the universal spatial planning methods, and thus more effective in promoting the health of the residents.

The data used in this paper satisfy the sampling requirements spatially, but temporally, they were collected centrally in the summer of 2024, and to avoid data bias, the data should come from different seasons. In the next step, we will continue to improve the sample data to make the results more reliable. In the long

run, we plan to implement these strategies in practice and build sample communities to validate the effectiveness of the strategies for wider implementation.

Acknowledgements

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8. References

United Nations Human Settlements Programme. (2022)Envisaging the Future of Cities. Kenya: United Nations Human Settlements Programme (UN-Habitat).

World Health Organization. (2021)Urban health. [online] World Health Organization. Available at: https://www.who.int/zh/news-room/fact-sheets/detail/urban-health (Accessed 10 July 2024).

Cao, Y. (2023)The Impact of the Built Environment of Towns on the Health of Patients with Chronic Diseases and Policy Recommendations - Based on the Patient Health Behavior Perspective, PhD, Nanjing University.

World Health Organization. (2018)'Global action plan on physical activity 2018-2030: more active people for a healthier world', Geneva: World Health Organization.

Strain, T., Flaxman, S., et al. (2024)'National, regional, and global trends in insufficient physical activity among adults from 2000 to 2022: a pooled analysis of 507 population-based surveys with 5·7 million participants', The Lancet Global Health, 12(8), p1232-1243.

Tian, L., Li, J., Ouyang, W., et al. (2016)'The relationship between urban and rural planning and public health and the conceptualization of an interdisciplinary research framework', Journal of Urban Planning, 2016(2), p111-116.

Wang, L., Liao, S., Zhao, X. (2016)'Healthy city planning path and elements discernment', International Urban Planning, 2016(4), p4-9.

Chen, F., Zhou, S., Zhang, L. (2019)'Influence of built environment on residents' leisure and physical activities under life cycle perspective'. World Geography Research, 2019(5), p106-117.

DONALDSONA, FINCH CF. (2012)'Sport as a setting for promoting health', Br J Sports M-ed, 46 (1), p4-5.

R E Sallis. (2009)'Exercise is medicine and physicians need to prescribe it!', Br J Sports Med, 43, p3-4.

Kang. T., Wang, M. (2022)'Historical evolution and realistic revelation of the integration of physical medicine', Chinese Journal of Frontiers of Medicine. 14(06), p1-5.

Feng, Z., Zhang, R., Han, L. (2018)'Synergistic governance of sports-medicine integration: U.S. experience and its inspiration', Journal of Wuhan Institute of Physical Education, 52(05), p16-22.

Kerr, R. (2016)'The integration of science and medicine into sports training', Transport Plan Techn, 2016(10), p23-26.

Gansen, FM. (2018)'Health economic evaluations based on routine data in Germany: a systematic review', BMC Health Serv Res, 2018(18), p268.

Albert, F.A., Crowe, M.J., Malau, A., et al. (2020)'Functionality of Physical Activity Referral Schemes (PARS): A Systematic Review', Front Public Health, 8, p257.

Liu, X., Che, L. (2024)'Experiences and insights of the integration service model of sports medicine in Sweden', Sports Culture Journal, (01), p48-55.

Wang, Q., Chen, W., Wen, J. (2021)'Effect of community physical and medical integration exercise intervention on cardiovascular disease risk factor aggregation in middle-aged and elderly people[J]. Journal of Jilin Institute of Physical Education and Sports', 37(01), p52-57.

Yao, Z., Zhang, X., Fang, J. (2022)'Research on the functional organization of community sports and health center under the integration of physical medicine[J]. Low Temperature Building Technology', 44(02), p58-62.

Huang, Li., He, H., Peng, Li., et al. (2024)'Realistic Dilemma and Practical Path of Community Physical and Medical Integration Based on Digital Grid Management[J]. Journal of Shenyang Sports Institute', 43(04), p66-72.

Dong, F., Tang, L. (2024)'Pilot Experiences and Prospects of Practice-Based Embedded Body-Medicine Integration in the Community', Journal of Sports Culture, (4), p53-59.

Li, F., Wang, J., Cui, B. (2023)'Overseas experience and insights of body-medicine integration service model', China Health Economics, 42(10), p85-91.

Yin, C. (2020). Research on the Impact of Urban Built Environment on Residents' Health and Its Path. PhD. East China Normal University.

Wang, L., Du, Y. (2020)'Research progress on the effect of built environment on physical activity', Science and Technology Herald, 38(07), p53-60.

Domenech-Abela, J., Switsers, L., Mundo, J., et al. (2020)'The association between perceived social and physical environment and mental health among older adults: mediating effects of loneliness', Aging Ment Health, p1-7.

Dong, W., Zhu, J., Li, H. (2023)'Progress and insights of international research on the impact of community built environment on residents' social health', Shanghai Urban Planning, (03), p1-7.

Cheng, H. (2021)Research on the Impact of Built Environment in Urban Communities on the Health of Migrant Population, PhD, Wuhan University.

Namgung, M., Gonzalez, B., Park, S. (2019)'The Role of Built Environment on Health of Older Adults in Korea: Obesity and Gender Differences', Int J Environ Res Public Health, 16(18).

Timmermans, E.J., Schaap, L.A., Visser, M., et al. (2016)'The association of the neighbourhood built environment with objectively measured physical activity in older adults with and without lower limb osteoarthritis', BMC Public Health, 15, p710.

Hawkesworth, S., Silverwood, R.J., Armstrg, B., et al. (2018)'Investigating associations between the built environment and physical activity among older people in 20 UK towns', J Epidemiol Community Health, 72(2), p121-131.

Peng, K., Jia. Y., Liang, Y., et al. (2024)'Mechanisms of built environment on obesity in residents', Science and Technology Bulletin, 42(03), p107-122.

Razieh, Z., Johannes, F., Javier, M., et al. (2017)'Do Inequalities in Neighbourhood Walkability Drive Disparities in Older Adults' Outdoor Walking? ' International Journal of Environmental Research & Public Health, 14(7), p740.