

Socio-Cultural-Environmental Factors and Physical Activity among Older Adults in Hong Kong: Integration of GIS and social survey research

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Background

- Rapidly ageing population in Hong Kong: a significant increase of 15.5 percentage points in the proportion of older adults over these 25 years from 2021 to 2046 (C&SD, 2023).
- Importance of physical activity for older adults: more satisfied with life and have stronger problem-solving abilities (Karr et al., 2021).
- Physically inactive in older age: a significant decline in regular leisure-time physical activity levels with age, dropping from around 30% for ages 45-64 to 25% for ages 65-74 and further down to only 11% for those aged 85 and above (NIH, 2011).
- The Elderly Commission recommends measures promoting healthy aging through **physical activity**, balanced diets, smoking cessation, and emphasizing psychosocial well-being's importance (Elderly Commissionn.d.).

Relevant Underpinning Theories



The **Socio-ecological Model** examines how environmental layers, from personal networks to societal structures, influence behavior, suggesting interventions need to address multiple levels of influence (Bronfenbrenner, 1979).



The **Person-Environment Fit Model** assesses how well individual and environmental characteristics match, especially in work contexts (Edwards et al., 1998).



These models share a holistic approach, emphasizing the complex interaction between personal and environmental factors in determining behavior. They stress the dynamic, reciprocal nature of individual-environment interactions.

Factors influence physical activity

Individual

- Physical limitation and mental health: pain/mobility issues and sensor impairment/cognitive issues
- Psychological barriers: fear of falling or injury discourage active lifestyles.

Socioeconomic

- Health Disparities: Lower socioeconomic status in older adults correlates with more health issues; ethnic minorities less likely to engage in physical activity.
- Income and education
- Housing and Physical Activity: Housing types influence the physical activities available to older people, affecting their well-being.
- Public housing residents value outdoor spaces and facilities, reflecting the Housing Authority's design principles.

Factors influence physical activity

Cultural

- Strict traditional gender roles limit older women's physical activity due to social expectations.
- Traditional Confucianism ideologies result in different physical activity trends between gender.
- Women tend to participate more in housework.

Society and Family

- Cohesive neighborhoods, where residents feel connected, contribute to higher participation rates in physical activities.
- Family, friends, and community networks provide various forms of emotional encouragement and practical assistance, fostering physical activity among older adults.
- Family functioning as a protective health factor for older adults, especially in low socioeconomic.

Factors influence physical activity

Neighborhood Design and Safety

- Well-planned neighborhoods with accessible facilities promote walking and other physical activities.
- Safety in neighborhoods is crucial for encouraging residents to engage in outdoor activities.
- The presence of parks and green areas positively impacts physical activity levels.
- The physical layout and topography can either facilitate or hinder physical activities, depending on whether the terrain is flat, hilly, etc.

Hong Kong

- Hong Kong Island: Is characterized by its rugged, mountainous terrain
- Kowloon: High population density: overcrowded public spaces, making it less appealing for physical activity.
- New Territories: The largest district in terms of land area and green space

Geographical Features

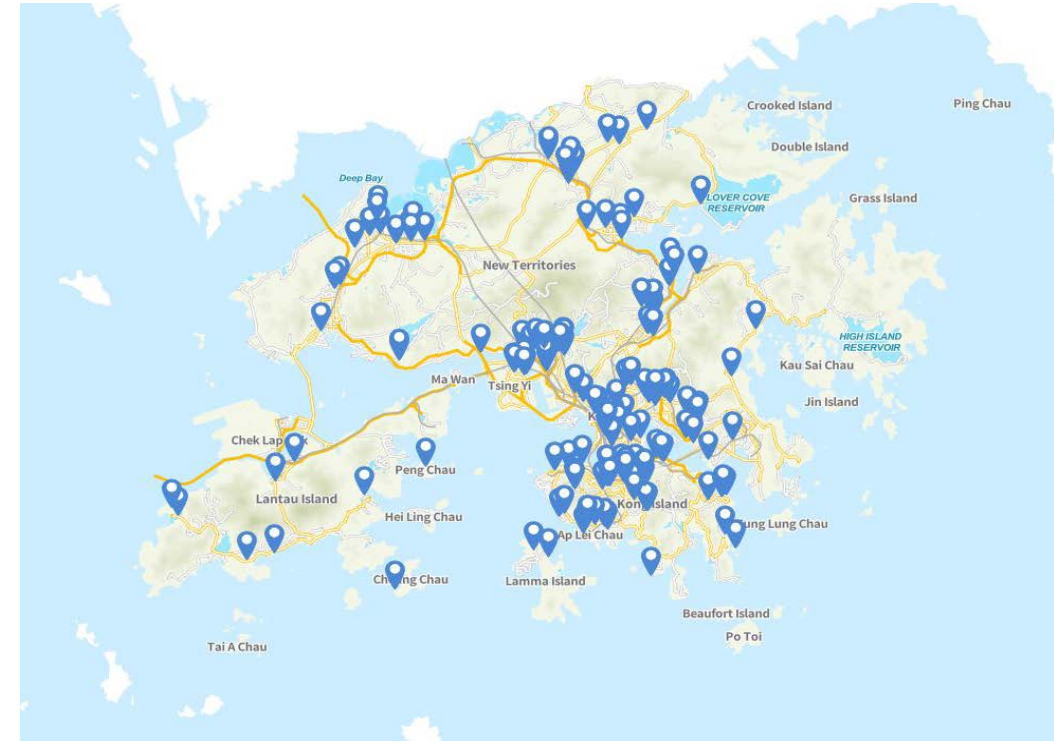
According to the definition by the World Health Organization, an age-friendly city dedicated to older adults aims to promote active and fulfilling aging, allowing older adults to maintain health, actively participate, and be protected, thereby enhancing their quality of life (WHO, 2007).

Outdoor spaces and buildings	<ul style="list-style-type: none">• A pleasant, clean, and secure environment• Availability of green spaces and rest areas• Well-developed and safe pedestrian crossings• Properly maintained building infrastructure
Transportation	<ul style="list-style-type: none">• Affordable public transport options• Safe public transportation systems• Provides access to health and social services
Housing	<ul style="list-style-type: none">• Affordable housing options• Well-designed and safe housing
Social participation	<ul style="list-style-type: none">• Refers to community attitudes, behaviors, and messages towards older people
Respect and social inclusion	<ul style="list-style-type: none">• Refers to the prevailing attitudes, behaviors, and messages directed towards older people by the community.
Civic participation and employment	<ul style="list-style-type: none">• An age-friendly city and community offer numerous opportunities for voluntary work and paid employment.• Enables older people to continue contributing to their communities post-retirement.
Communication and information	<ul style="list-style-type: none">• Ensures that information is distributed to older people promptly.• Aims to prevent the social exclusion of older adults.
Community support and health services	<ul style="list-style-type: none">• Offers a broad spectrum of health and support services.• Helps older adults maintain their independence.• Encourages older adults to stay active

Green Space and Other Recreation & Sports Facilities



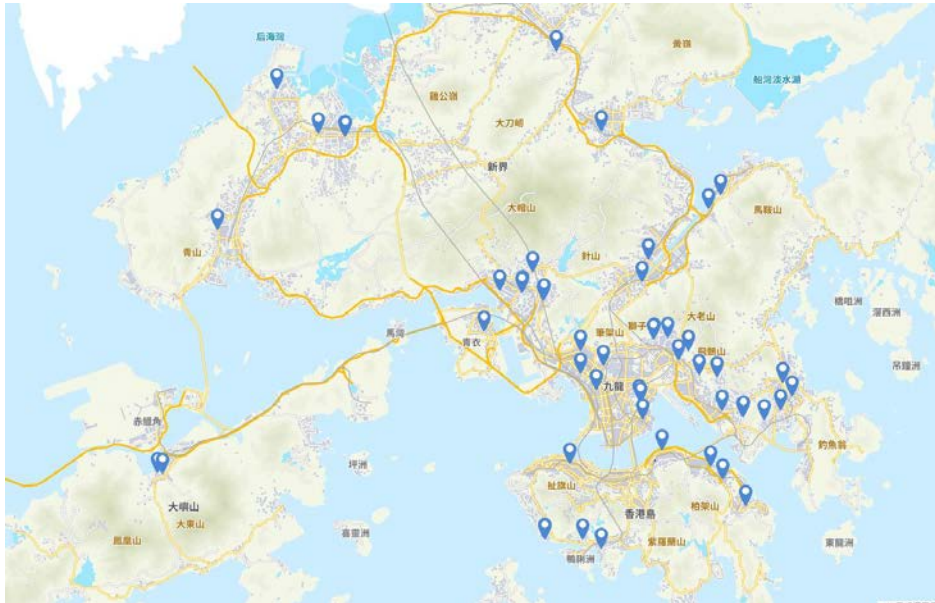
New Territories: green areas and country parks.



New Territories: orientated towards the natural environment.
Kowloon and Hong Kong Island: denser

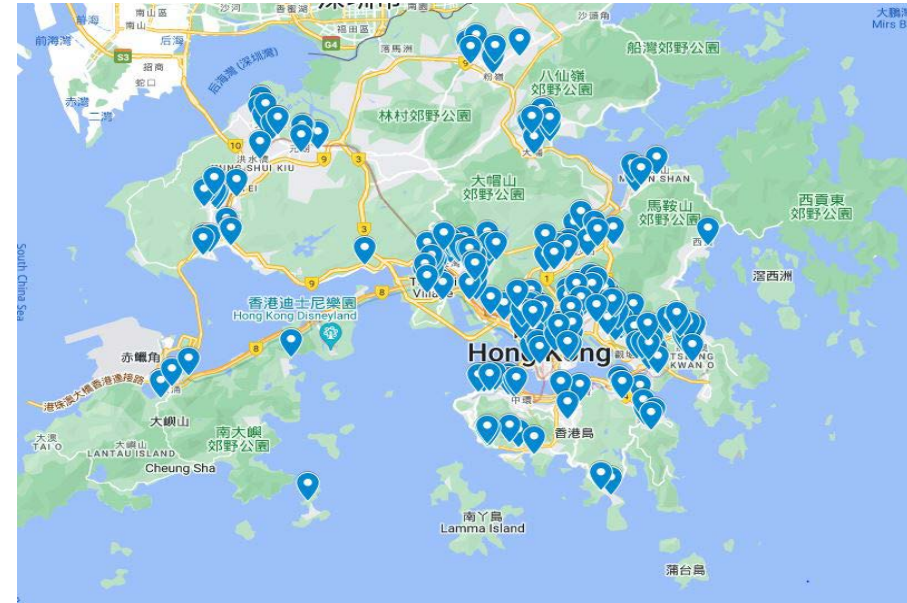
Social Services

DISTRICT ELDERLY COMMUNITY CENTRE (DECC)



New Territories: relatively sparse
Kowloon: the most intensive

NEIGHBOURHOOD ELDERLY CENTRES



Relatively fair for each residential area across three regions



Housing Density-Hong Kong Island

- Residential development on Hong Kong Island is predominantly along the coastline.
- High density of buildings, with many structures closely packed together.
- Most buildings are constructed on hillsides.
- The gradient on Hong Kong Island is relatively high due to its hilly terrain.



Housing Density-Kowloon

- Kowloon is the most densely populated of the three main regions in terms of living space.
- Kowloon has the least amount of green space compared to other districts.
- The terrain in Kowloon is predominantly flat with few hills.

Research Objectives

- Examine socio-cultural and environmental impacts on activity levels
- Identify barriers and facilitators to physical activity

Methodology

- Mix-method research
- Step 1: Quantitative Questionnaire
 - Purposive sampling
 - A total of 300 participants will be recruited, 100 from each district.
 - Chinese, aged 65 to 80, legal residents of Hong Kong, able to go out independently, normally live in Hong Kong for the past 12 months, and able to use a smartphone.
 - Physical ability, health condition, social support, family functioning, Objective Nature and Built Environment, physical activity level and demographic variables.
 - Physical activity Log and actigraph (Four days).

Methodology

- Step 2: Geographical Analysis
 - Application of a geographical systems approach.
 - Utilization of ArcGIS software to map and analyze the impact of geographical and natural environmental factors.

Data Analysis: Step one

- R program will be used.
- Exploratory and confirmatory factor analyses will validate the measurement instruments.
- Regressions will be used to test the influence of socio-cultural and environmental factors.
 - Hierarchical linear regression will be used for relationships with normally distributed outcomes.
 - Generalized additive mixed models will be applied for curvilinear relationships, regardless of distribution.

Data Analysis: Step two

➤ Geospatial Unification:

- The ArcGIS intersect tool is utilized to merge these environmental factors into the buffer and create a comprehensive point map representing the data.

➤ Model building:

- A 1 km buffer zone, as this refers to an acceptable 15 min walking distance based on participant's residential building.
- Exploratory Spatial Data Analysis (ESDA): To identify spatial patterns of physical activity and determine if spatial autocorrelation exists.
- Geographically Weighted Regression (GWR): To analyze relationships between geographic variables and the outcome variable varies across space.

Expected Outcomes

- Identify and quantify the differences in physical activity levels across Hong Kong's distinct regions—Hong Kong Island, Kowloon, and the New Territories.
- Uncover specific socio-cultural, economic, and environmental barriers that hinder physical activity among older adults. Conversely, it will also explore facilitators that encourage or could potentially encourage more active lifestyles within this demographic.
- Based on the findings, the study expects to recommend targeted strategies for urban planning and policy amendments that could enhance the physical activity environment for older adults.
- Generate actionable insights for policymakers to develop more effective health promotion strategies tailored to the needs of older adults.

Conclusion

- The study will enhance understanding of the factors influencing physical activity among older adults in urban areas.
- Utilizes GIS tools and detailed social surveys to provide a nuanced view of how environmental and social factors affect older people's lifestyles.
- Aims to deepen the understanding of the interactions between environment, culture, and health.
- Offers crucial insights for creating more inclusive, healthy, and active urban environments for the aging population.



Thank you.