MENTAL HEALTH AS MEDIATOR LINKING AGE-FRIENDLY COMMUNITIES TO CARDIOVASCULAR MULTIMORBIDITY: EVIDENCE FROM A LARGE NATIONAL COHORT STUDY
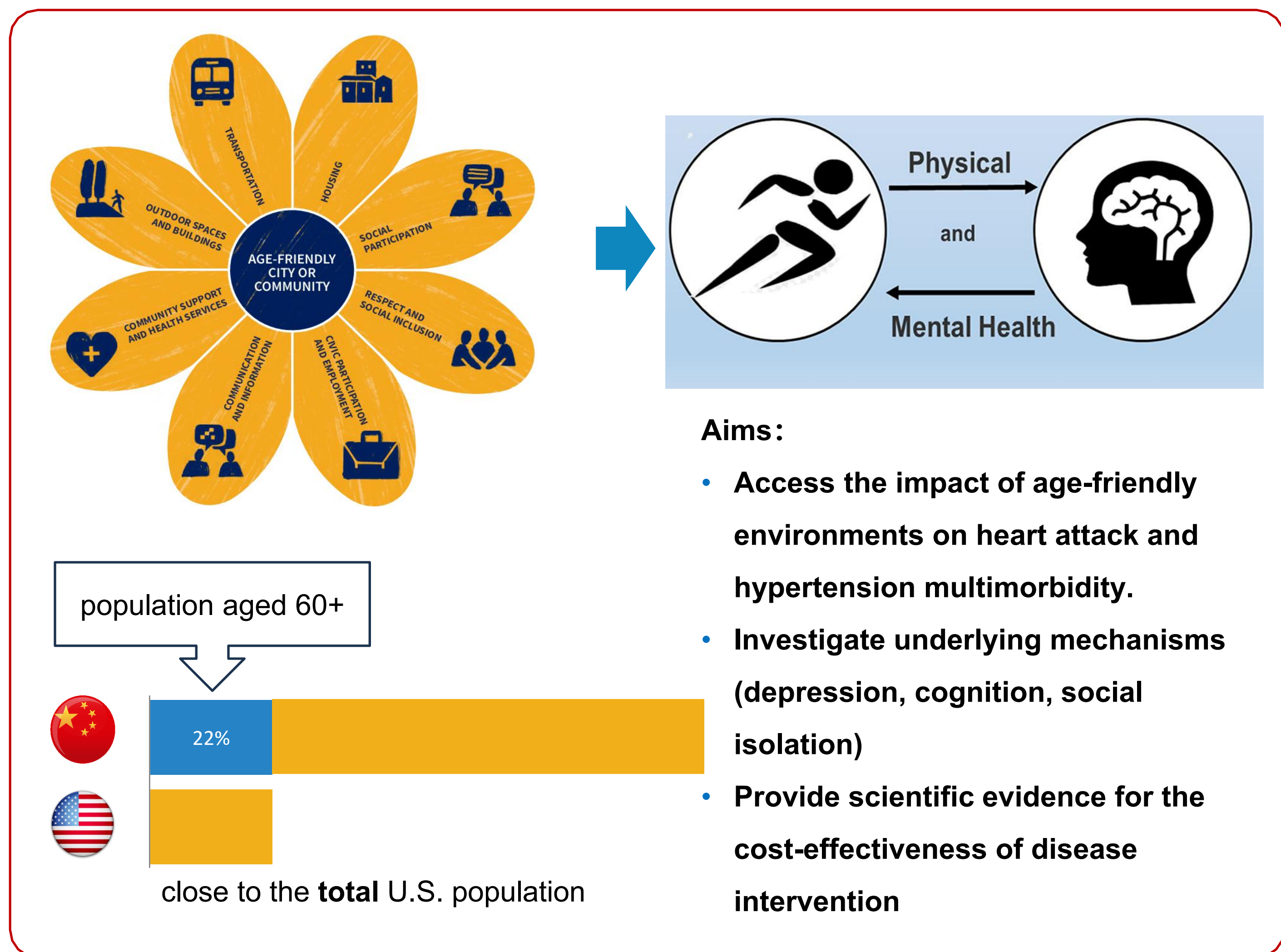
Xuanbi Fang[1], Wai-kit Ming[1]

[1] Department of Infectious Diseases and Public Health, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong

CityU
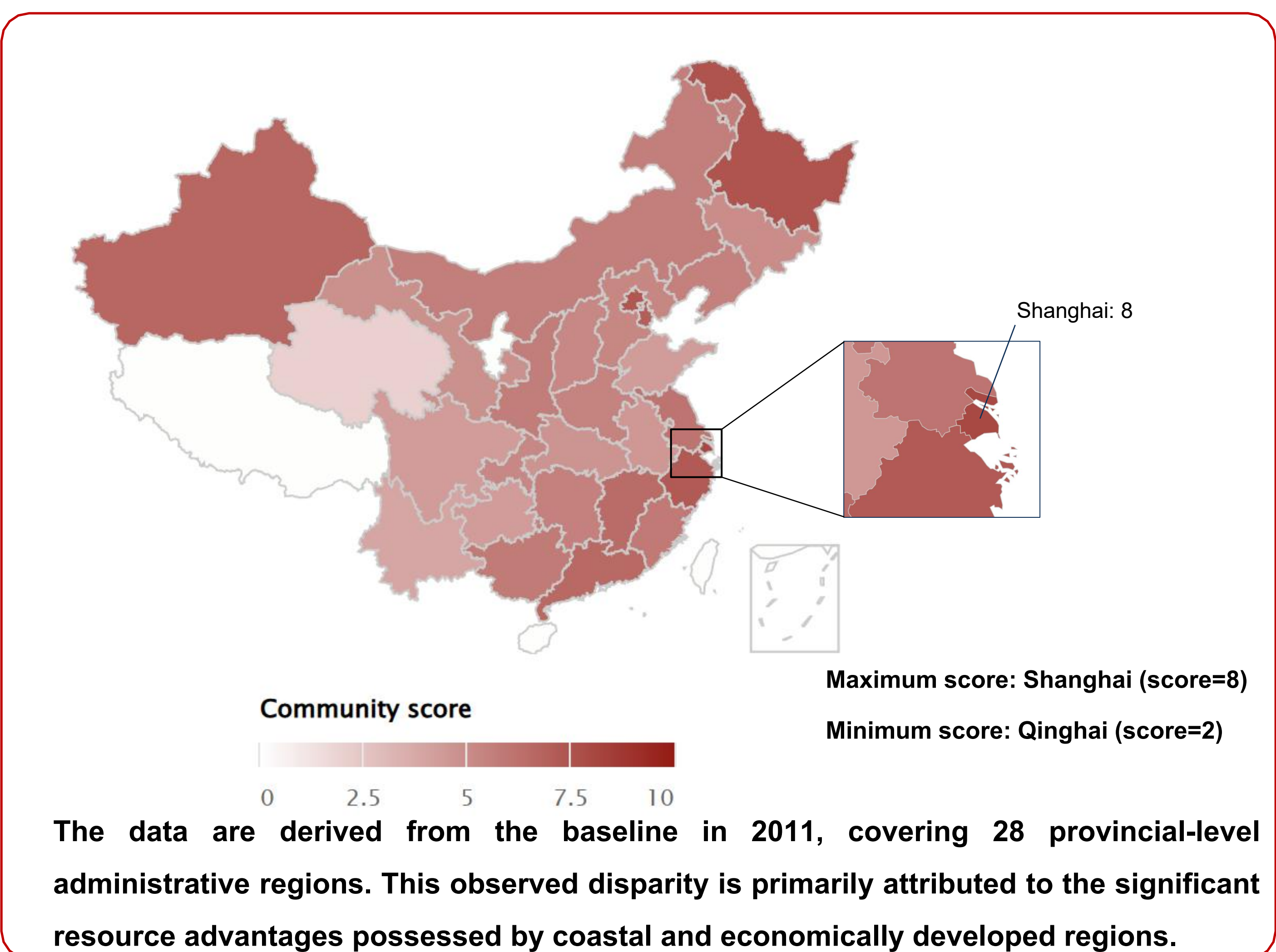香港城市大學
City University of Hong Kong

Introduction

Amidst the accelerating global demographic shift towards aging populations, creating age-friendly communities is vital for public health. While existing research highlights the associations between environmental factors and cardiovascular diseases, evidence gaps persist regarding insufficient longitudinal evidence constraining causal inference, unquantified health disparities, and underexplored mediators. This study employs a comprehensive analysis on nationwide data to investigate the role of social isolation, cognition and depression in the relationship between age-friendly community environment and cardiovascular comorbidities among older adults, providing insights for integrated care interventions.
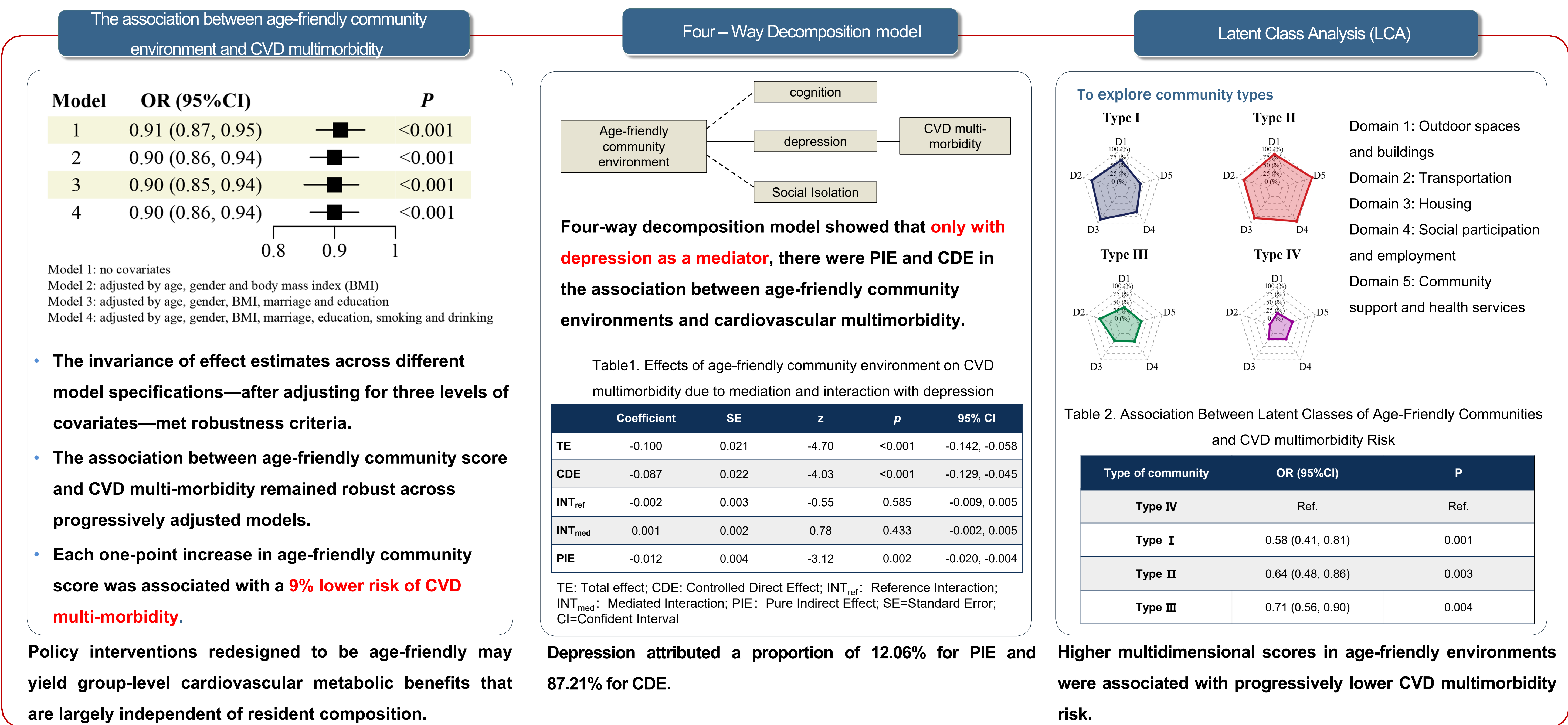
Background

Aims:
- Access the impact of age-friendly environments on heart attack and hypertension multimorbidity.
- Investigate underlying mechanisms (depression, cognition, social isolation)
- Provide scientific evidence for the cost-effectiveness of disease intervention

population aged 60+

22%

close to the **total** U.S. population

A heat map of Regional Disparities in Age-Friendly Community Environment

Shanghai: 8

Community score
0   2.5   5   7.5   10

Maximum score: Shanghai (score=8)
Minimum score: Qinghai (score=2)

The data are derived from the baseline in 2011, covering 28 provincial-level administrative regions. This observed disparity is primarily attributed to the significant resource advantages possessed by coastal and economically developed regions.

Age-Friendly Communities: A Pathway to Reducing Cardiovascular Multimorbidity?

The association between age-friendly community environment and CVD multimorbidity

Model	OR (95%CI)		P
1	0.91 (0.87, 0.95)		<0.001
2	0.90 (0.86, 0.94)		<0.001
3	0.90 (0.85, 0.94)		<0.001
4	0.90 (0.86, 0.94)		<0.001

0.8   0.9   1

Model 1: no covariates
Model 2: adjusted by age, gender and body mass index (BMI)
Model 3: adjusted by age, gender, BMI, marriage and education
Model 4: adjusted by age, gender, BMI, marriage, education, smoking and drinking

- The invariance of effect estimates across different model specifications—after adjusting for three levels of covariates—met robustness criteria.
- The association between age-friendly community score and CVD multi-morbidity remained robust across progressively adjusted models.
- Each one-point increase in age-friendly community score was associated with a **9% lower risk of CVD multi-morbidity**.

Policy interventions redesigned to be age-friendly may yield group-level cardiovascular metabolic benefits that are largely independent of resident composition.

Four – Way Decomposition model

Four-way decomposition model showed that **only with depression as a mediator**, there were PIE and CDE in the association between age-friendly community environments and cardiovascular multimorbidity.

Table1. Effects of age-friendly community environment on CVD multimorbidity due to mediation and interaction with depression

	Coefficient	SE	z	p	95% CI
TE	-0.100	0.021	-4.70	<0.001	-0.142, -0.058
CDE	-0.087	0.022	-4.03	<0.001	-0.129, -0.045
INT_{ref}	-0.002	0.003	-0.55	0.585	-0.009, 0.005
INT_{med}	0.001	0.002	0.78	0.433	-0.002, 0.005
PIE	-0.012	0.004	-3.12	0.002	-0.020, -0.004

TE: Total effect; CDE: Controlled Direct Effect; INT_{ref}: Reference Interaction; INT_{med}: Mediated Interaction; PIE: Pure Indirect Effect; SE=Standard Error; CI=Confident Interval

Depression attributed a proportion of 12.06% for PIE and 87.21% for CDE.

Latent Class Analysis (LCA)

To explore community types

Type I   Type II   Type III   Type IV

Domain 1: Outdoor spaces and buildings
Domain 2: Transportation
Domain 3: Housing
Domain 4: Social participation and employment
Domain 5: Community support and health services

Table 2. Association Between Latent Classes of Age-Friendly Communities and CVD multimorbidity Risk

Type of community	OR (95%CI)	P
Type IV	Ref.	Ref.
Type I	0.58 (0.41, 0.81)	0.001
Type II	0.64 (0.48, 0.86)	0.003
Type III	0.71 (0.56, 0.90)	0.004

Higher multidimensional scores in age-friendly environments were associated with progressively lower CVD multimorbidity risk.

Conclusions

Age-friendly community environments had a protect effect on CVD multimorbidity mediated by reducing depression. Current community types can be classified into four categories, among which the dimensions of housing and transportation serve as important factors for reducing the risk of CVD multimorbidity.

References

1. Liu J, Yu M, Zhang T. Age-friendly Neighborhood Environment and Trajectories of Multimorbidity: The Moderating Effect of Life-course Socioeconomic Status. Innovation in Aging. 2025;9(6).
2. Shi J, Liu X, Feng Z. Age-friendly cities and communities and cognitive health among Chinese older adults: Evidence from the China Health and Retirement Longitudinal Studies. Cities. 2023;132:104072.
3. World Health Organization. Understanding 'ageing in place'. Manila: WHO Regional Office for the Western Pacific; 2018.
4. Rugel EJ, Chow CK, Corsi DJ, Hystad P, Rangarajan S, Yusuf S, et al. Developing indicators of age-friendly neighbourhood environments for urban and rural communities across 20 low-, middle-, and high-income countries. BMC Public Health. 2022;22(1):87.