The important role of activity engagement in the association between multiple environment and health among older adults in China

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Part 1

Background

Demographic worldwide

Proportion of population aged 60 years or older 2015

Proportion of population aged 60 years or older 2050 projections
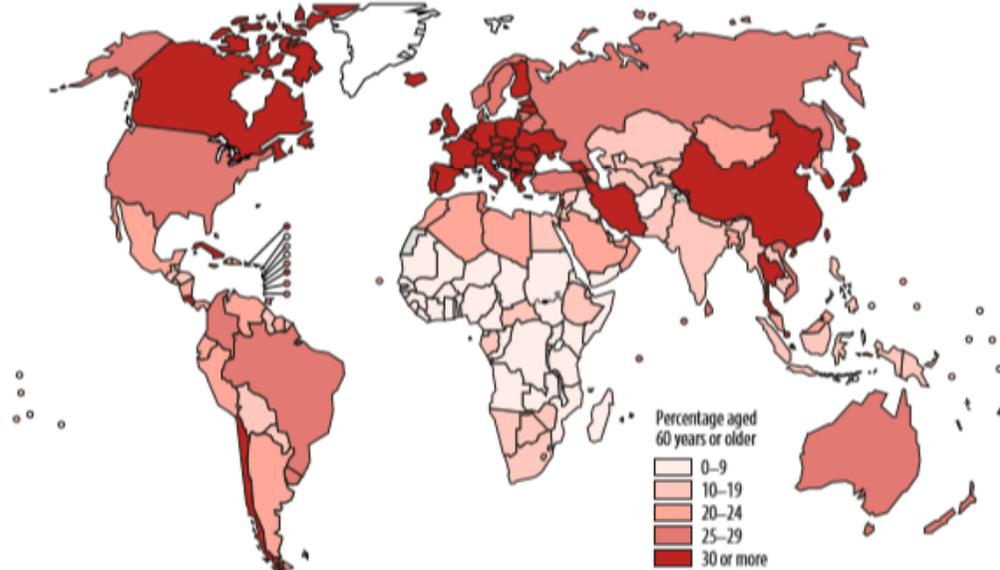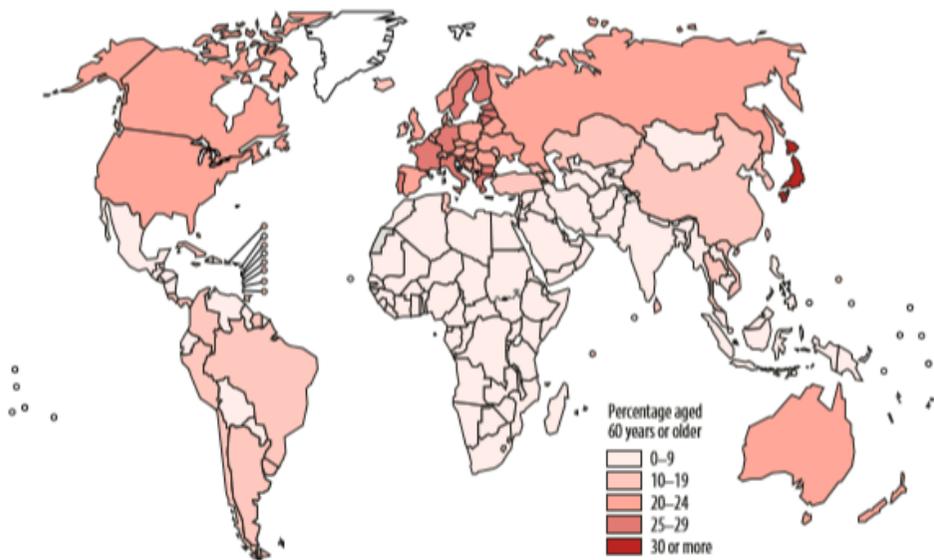
Aging population in China
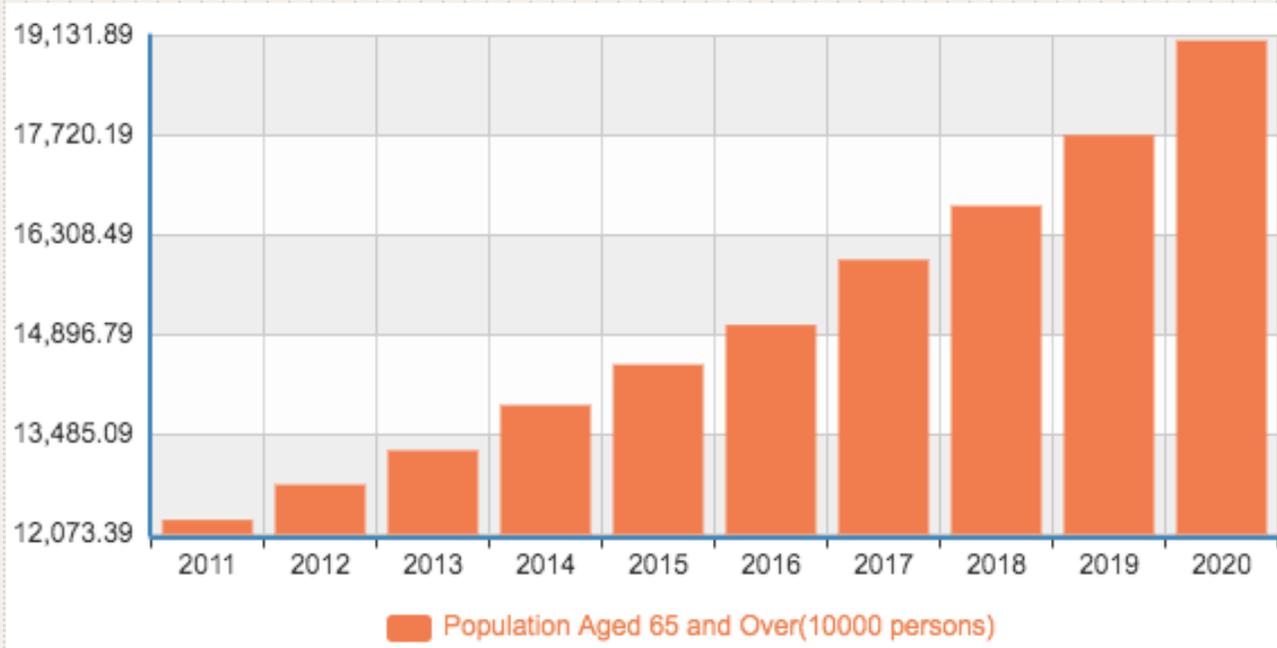
- Population Aged 65 and Over(10000 persons) in 2020: 19,064

- Old Dependency Ratio in 2020: 19.7%

- Life expectancy at 1990: 68.55

- Life expectancy at 2015: 76.34

Part 2

The mechanism among multiple environment, activity engagement and health: evidence from China

Successful Aging — John W. Rowe, M.D. and Robert L. Kahn, Ph.D.

Achieving a Productive Aging Society — Edited by Scott A. Bass, Francis G. Caro, and Yung-Ping Chen

Active Ageing: A Policy Framework — World Health Organization

World Report on Ageing and Health — World Health Organization
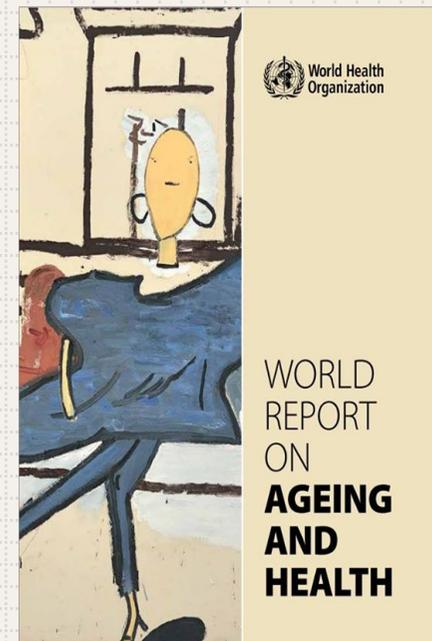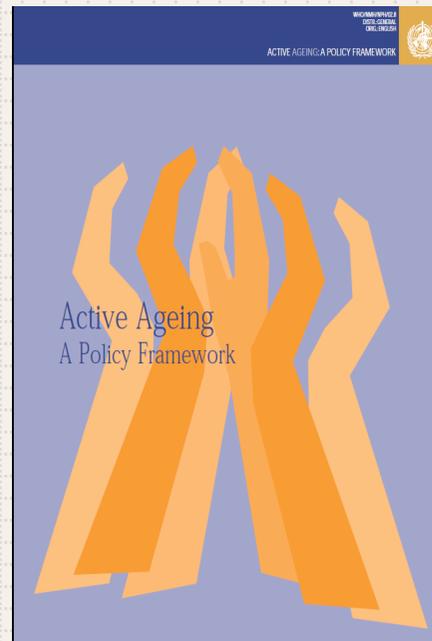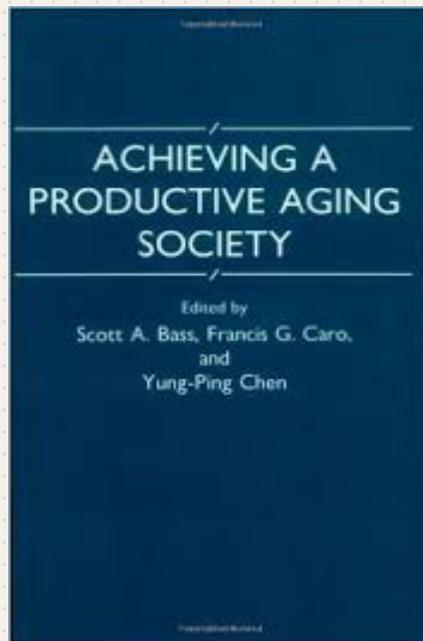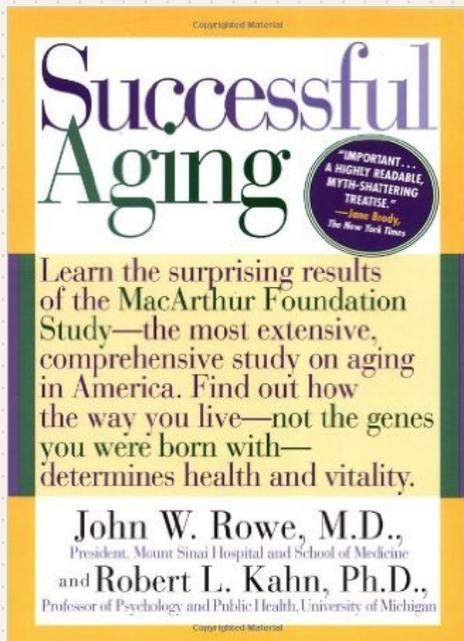
Social environment and activity engagement: evidence from China
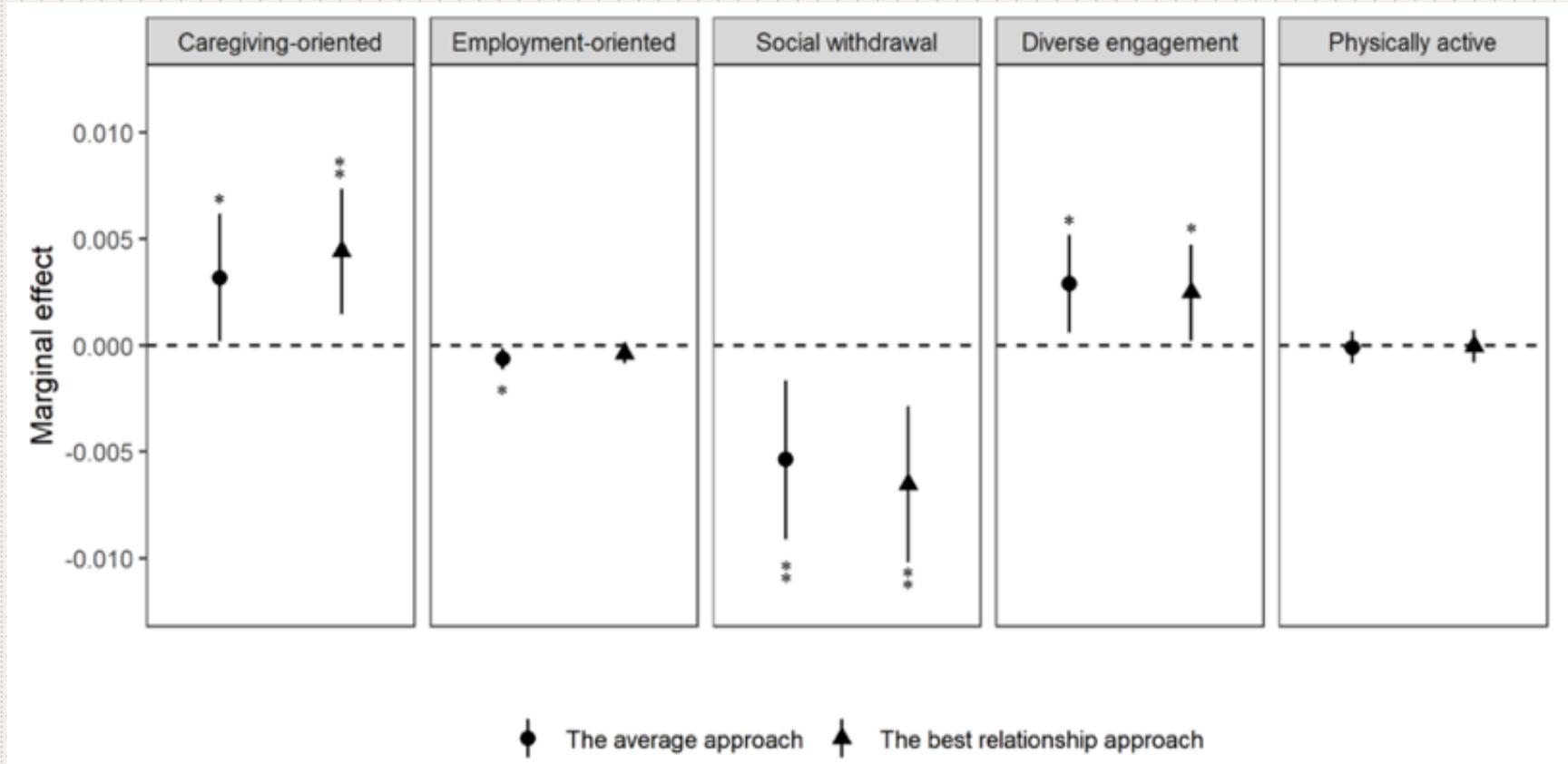
Marginal effect (with 95% confidence interval) of total score of IRQ on the probability of activity profiles among older adults

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Neighborhood environment and activity engagement: evidence from China

Effect of objective and satisfaction with neighborhood environment, and their interactive effect on older adults' leisure-time physical activity

| [a] Length of leisure-time physical activity	Coefficient	S.E.	P-value	R-square
[b] Overall satisfaction	0.008	0.022	0.243	0.047
[b] Objective neighborhood walkability	0.034	0.032	0.047*	0.051
[b] Objective neighborhood accessibility of recreational resources	0.017	0.027	0.112	0.050
[b] Satisfaction with neighborhood path/road/street condition	0.027	0.026	0.044*	0.050
[b] Satisfaction with neighborhood recreational resources	0.119	0.087	0.027*	0.052
[c] Overall satisfaction *objective neighborhood walkability	0.001	0.002	0.198	0.051
[d] Objective neighborhood walkability (lower overall satisfaction)	0.031	0.024	0.049*	0.047
[d] Objective neighborhood walkability (higher overall satisfaction)	0.027	0.027	0.050*	0.049
[c] Overall satisfaction* objective neighborhood accessibility of recreational resources	0.003	0.005	0.211	0.051
[d] Objective neighborhood accessibility of recreational resources (lower overall satisfaction)	0.011	0.026	0.134	0.043
[d] Objective neighborhood accessibility of recreational resources (higher overall satisfaction)	0.012	0.023	0.137	0.046
[c] Satisfaction with neighborhood path/road/street condition * objective neighborhood walkability	0.004	0.004	0.097	0.052
[d] Objective neighborhood walkability (lower satisfaction with neighborhood path/road/street condition)	0.027	0.027	0.049*	0.042
[d] Objective neighborhood walkability (higher satisfaction with neighborhood path/road/street condition)	0.029	0.027	0.048*	0.044
[c] Satisfaction with neighborhood recreational resources * objective neighborhood accessibility of recreational resources	0.009	0.007	0.040*	0.052
[d] Objective neighborhood accessibility of recreational resources (lower satisfaction with neighborhood recreational resources)	0.004	0.007	0.219	0.045
[d] Objective neighborhood accessibility of recreational resources (higher satisfaction with neighborhood recreational resources)	0.012	0.005	0.029*	0.049

Activity engagement and health: evidence from China
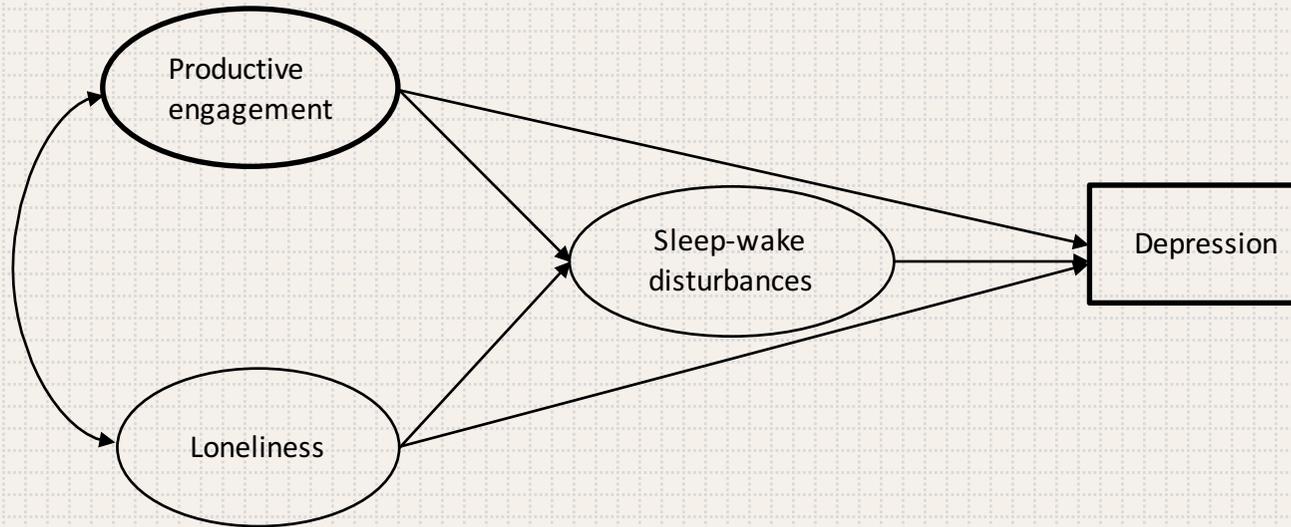
		Indirect effect			Total effect		
		Std.all	p	Std.Err	Std.all	p	Std.Err
Model 1:	Leisure activities → Depression (CESD9)	-0.10	<0.001	0.04	-0.27	<0.001	0.05
	Loneliness → Depression (CESD9)	0.16	<0.001	0.04	0.37	<0.001	0.04
Model 2:	Paid works → Depression (CESD9)	0.01	0.36	0.04	0.06	<0.001	0.04
	Loneliness → Depression (CESD9)	0.20	<0.001	0.05	0.44	<0.001	0.04
Model 3:	Volunteering → Depression (CESD9)	-0.02	0.06	0.03	-0.02	0.07	0.04
	Loneliness → Depression (CESD9)	0.20	<0.001	0.05	0.44	<0.001	0.04
Model 4:	Family Caregiving → Depression (CESD9)	-0.003	0.83	0.02	-0.07	<0.001	0.03
	Loneliness → Depression (CESD9)	0.20	<0.001	0.05	0.44	<0.001	0.04

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Table 3. Multilevel Models of the Predictors of Depressive Symptoms Among Chinese Older Adults

Fixed effect	Model 1 b	Model 1 SE	Model 2 b	Model 2 SE	Model 3 B	Model 3 SE	Model 4a (Rural) b	Model 4a (Rural) SE	Model 4b (Urban) b	Model 4b (Urban) SE
Control variables										
Intercept	18.31***	0.22	20.75***	1.35	20.34***	1.35	19.97***	1.43	4.97	16.39
Age	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	−0.01	0.02
Female	−0.19	0.16	−0.10	0.17	−0.09	0.17	0.12	0.20	−0.88**	0.32
Married	0.22	0.21	0.21	0.22	0.29	0.22	0.41	0.26	−0.21	0.40
Education (ref: below middle school)	−0.78***	0.18	−0.60**	0.19	−0.57**	0.19	−0.53*	0.24	−0.57	0.32
Self-rated SoL 2011	−0.71***	0.11	−0.72***	0.12	−0.73***	0.12	−0.88***	0.14	−0.21	0.22
Self-rated health 2011	−0.75***	0.10	−0.72***	0.11	−0.71***	0.11	−0.73***	0.13	−0.62**	0.20
CESD 2011	0.41***	0.01	0.41***	0.02	0.41***	0.02	0.39***	0.02	0.47***	0.03
Physical environment stressors										
Outdoor space and buildings										
Type of roads (ref: nonpaved road)			0.31	0.24	0.30	0.24	0.41	0.27	−0.10	0.70
Days of roads that were not passable			0.003*	0.001	0.003*	0.001	0.003**	0.001	−0.002	0.003
Tidiness of the roads			−0.004	0.08	0.02	0.09	0.03	0.11	0.04	0.13
Public restroom			−0.11	0.23	−0.13	0.24	−0.06	0.31	−0.14	0.38
Handicapped access			0.02	0.02	0.02	0.02	0.003	0.04	0.04	0.03
Transportation										
Number of bus lines			−0.02	0.08	0.001	0.08	0.04	0.10	−0.06	0.12
Distance to bus stop			0.02*	0.01	0.03*	0.01	0.03*	0.01	0.02	0.07
Housing										
Sewer system			−0.64*	0.28	−0.64*	0.30	−0.76*	0.39	0.49	0.51
Waste management			0.01	0.25	0.07	0.26	0.18	0.29	−0.31	0.77
Toilet type (ref: outdoor toilet)			−0.11	0.24	−0.01	0.25	0.09	0.30	−0.30	0.46
Days with electricity			−0.01*	0.004	−0.007	0.004	−0.007	0.004	0.04	0.04
Social environment stressors										
Amenities					0.07	0.07	0.12	0.08	0.01	0.10
Outdoor exercise facilities					−0.55*	0.27	−0.93**	0.38	0.08	0.36
Social organization					0.16	0.12	0.10	0.16	0.28	0.17
Health center					−0.79*	0.31	−0.50	0.55	−0.82*	0.36
Health post					−0.20	0.31	−0.22	0.57	−0.21	0.34
Community SES					−0.02	0.09	0.02	0.11	−0.21	0.16
Model statistics										
−2 Log Likelihood	23,651.5		21,952.3		21,394.9		16,351.1		4,890.1	
AIC	23,671.5		21,994.3		21,448.9		16,405.1		4,942.1	
BIC	23,712.3		22,078.5		21,556.3		16,501.7		5,016.7	

The mechanism among multiple environment, activity engagement and health

Evidence from mainland China	Evidence from Hong Kong	Evidence from Taiwan

Evidence from mainland China

- Only **green space (park)** has direct effect on loneliness, while other built environment factors do not have direct effect on loneliness.
- **Residential density and green space (park)** have indirect effect on loneliness through **volunteering**.
- **Number of recreational services** have indirect effect on loneliness through **recreational activities** and **sportive activities** but distance to nearest recreations services not.
- All the significant results were only found within 300- rather than 500- meter buffers.

Evidence from Hong Kong

- More **urban greenness** within both buffers and more **commercial facilities** within a 500-m buffer were directly associated with fewer depressive symptoms.
- **SA** mediated the relationship between the **number of community facilities** and depressive symptoms within a 200-m buffer.
- **Neighborhood urban greenness** and the **number of commercial facilities** had indirect associations on depressive symptoms within a 500-m buffer, which were mediated by **FA**.

Evidence from Taiwan

- Compared to the Low-Support class, older adults in the **Moderate- and High-Support Environment** classes had better mental health.
- Older residents in those two classes were more likely to be in the "**High Activity Participation**" class, which in turn, exhibited better mental health.

Cultural-specific knowledge of activity engagement among older adults

Rate and Intensity	China (CHARLS)	United States (HRS)	South Korea (KLoSA)
Rate of caregiving (%)	13.03%	10.76% (Parental); 6.36% (spousal)	2.79%
Intensity of caregiving (M±SD)	35.4±42.5 hrs/week (in last year)	551.4±1346.9 hrs/past two yrs (Parental); 2846.39 + 4392.01 Harmonized hrs/past 2 yrs (spousal)	44.3±48.1 hrs/week (in last year)
Rate of working (%)	59.20%	38.51%	37.92%
Intensity of working (M±SD)	53.35±27.17 hrs/week	36.68±14.79 hrs/week	48.82±18.32 hrs/week
Rate of volunteering (%)	0.58%	34.47%	2.83%
Intensity of volunteering (%)	Almost daily: 4.90%; Almost every week: 16.67%; Not regularly: 78.43%	200 hr and more:14.21%; 100-200 hr:17.18%; 50-100 hr:29.67% < 50 hr: 38.38%	Almost every day: 5.52%; Once a week:19.66%; 2-3 times/ week: 11.03%; Once a month: 27.24%; Twice a month: 10.69%; 1-2 times/ yr:9.66%; 3-4 times/ yr:7.24% 5-6 times/ yr: 7.59%; Almost never/yr: 0%; Almost never:1.38%

Cultural-specific knowledge of activity engagement among Chinese older adults

Cluster	Cluster size	Percentage	Domains of activities					
			志愿活动 Volunteering	有偿劳动 Paid work	家庭照顾 Family caregiving	文化与学习活动 Group artistic and learning activities	娱乐活动 Recreational activities	体育活动 Sportive activities
照料为主 Caregiving-oriented	1526	36.2%	0.21	-0.36	0.61	-0.25	0.40	-0.23
有偿劳动为主 Employment-oriented	600	14.2%	0.11	2.15	0.24	-0.21	-0.48	-0.18
低参与 Social withdrawal	1525	36.2%	-0.33	-0.38	-0.82	-0.28	-0.48	-0.23
多样化参与 Diverse engagement	325	7.7%	0.19	-0.33	0.42	2.93	0.83	0.22
身体活动 Physically active	235	5.6%	0.28	-0.19	0.28	-0.09	0.58	3.28

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More evidence on the mechanism in China

Environmental correlates of activity engagement
- Objective neighbourhood walkability and recreational resources
- Five environmental domains (physical environment; information, transportation,& medical care; attitude & help family; attribute & help community; programs & policies).
- Subjective and objective neighbourhood environment.

BASIC
DOCUMENTS

Forty-ninth edition
2020

World Health
Organization

The uneven development of active aging in China
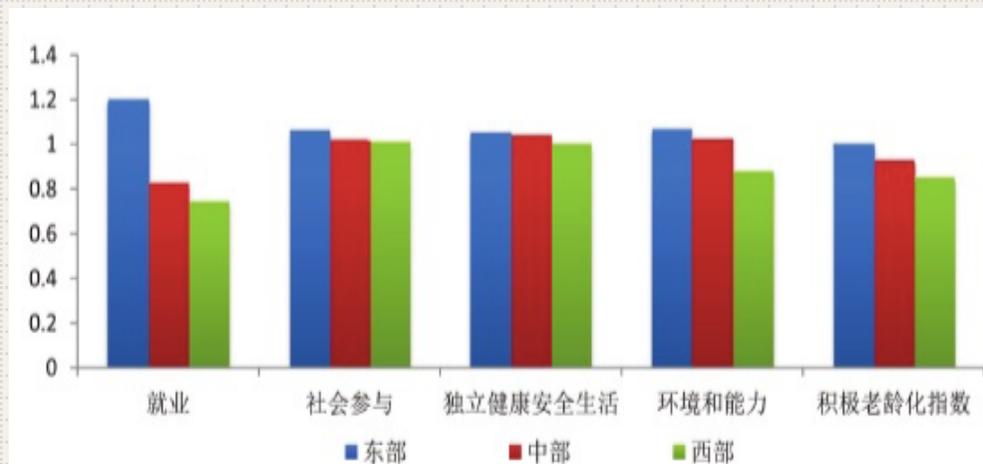
图1　三大区域积极老龄化水平

图2　28个省市积极老龄化发展水平

(Liu & Yang, 2019)
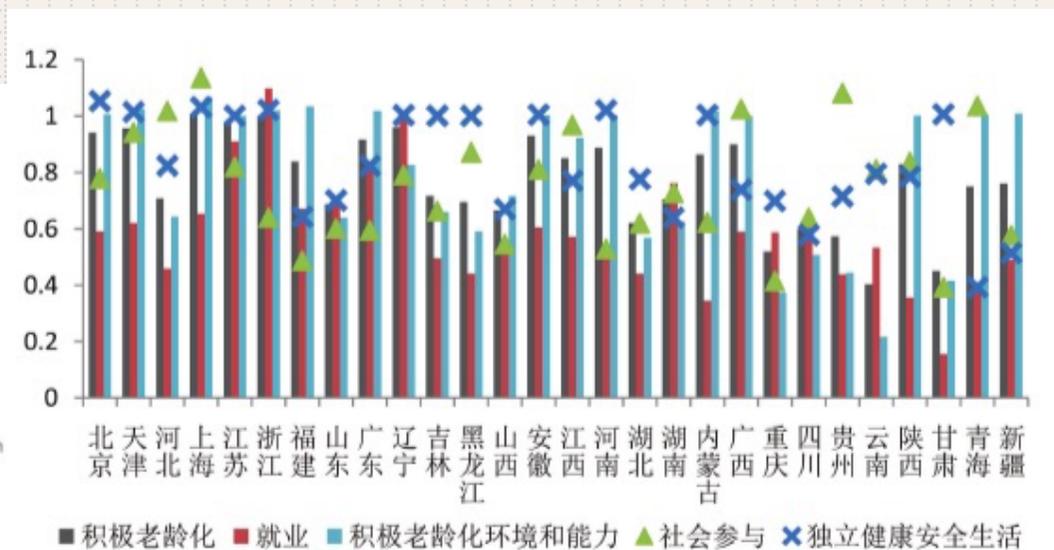
Policies and practices for activity engagement

- From "aging" to "optimizing"

- Theory-driven and evidence-based when designing activity engagement programs

- Continually improving productive/active aging policy, age-friendly city etc.

- The important role of social organizations in the construction of the productive/active aging mechanism

Thank you