Academic Journal of Medicine & Health Sciences
ISSN 2616-5791 Vol. 7, Issue 2: 19-26, DOI: 10.25236/AJMHS.2026.070204

A Study on the Relationship between Intrinsic Capacity and Quality of Life among Chinese Older Adults: Based on CHARLS Data

Tuonan Liu[1,a], Kena Liu[2,b], Songyang Wang[3,c], Jie Yao[1,d,*]

[1]School of Nursing, Shaanxi University of Chinese Medicine, Xianyang, Shaanxi, China
[2]Department of Obstetrics II, The Second Affiliated Hospital of Shaanxi University of Chinese Medicine, Xianyang, Shaanxi, China
[3]Department of Orthopaedics, the Second Affiliated Hospital of Air Force Medical University, Xi'an, Shaanxi, China
[a]liutuonan@qq.com, [b]1029812039@qq.com, [c]1227433244@qq.com, [d]344246303@qq.com
[*]Corresponding author

Abstract: *This study analyzed data from the 2015 China Health and Retirement Longitudinal Study (CHARLS), involving 6,506 older adults, to explore the association between intrinsic capacity (IC) and multiple dimensions of quality of life, including self-rated health, social participation, and life satisfaction. Among the participants, 30.2% reported poor self-rated health, 50.1% lacked social participation, and 7.7% expressed dissatisfaction with life. Multivariable logistic regression analysis showed that after adjusting for confounding factors including demographic characteristics, health behaviors, and health status, each 1-point increase in intrinsic capacity was associated with a 29.5% reduction in the risk of poor self-rated health, a 17.0% reduction in the risk of lack of social participation, and a 30.8% reduction in the risk of life dissatisfaction, indicating that IC is an independent protective factor against these adverse outcomes. Non-linear associations were observed between intrinsic capacity and self-rated health as well as life satisfaction, with more prominent benefits when the total intrinsic capacity score exceeded 7.5, whereas the association with social participation was linear. These findings demonstrate that intrinsic capacity is closely linked to quality of life in older Chinese adults, and improving intrinsic capacity may serve as an effective strategy to promote their overall well-being.*

Keywords: *Aged; Intrinsic Capacity; Self-Rated Health; Social Participation; Life Satisfaction; Quality of Life*

1. Introduction

As the most populous country in the world, China is facing rapid population aging [1], with 264 million people aged 60 years and older[2]. As the main group in an aging society, the health status of older adults is directly related to the national medical burden and sustainable social development. Intrinsic capacity (IC) of older adults, a core concept in the World Health Organization's framework of healthy aging, refers to the inherent physiological reserve capacity of older individuals[2], covering five domains: cognition, mobility, vitality, psychological, and sensory function[3]. IC serves as a key indicator that can well predict adverse health outcomes such as disability and mortality among older adults. Effective assessment and maintenance of intrinsic capacity are of great significance for promoting healthy aging[3]. Disability is usually observed only when functional decline is obvious, whereas IC decline begins early in life. Early identification of IC decline helps detect individuals with or at high risk of disability at an early stage, allowing timely intervention[4]. However, research on IC in China is still in its infancy. In particular, the mechanism underlying the association between IC and multidimensional indicators reflecting overall health and quality of life remains unclear, such as self-rated health, social participation, and life satisfaction. Quality of life (QoL), an important measure of health status, includes multiple dimensions such as physical, psychological, and social functioning. Previous studies have shown that IC decline increases the risk of reduced quality of life[5]. Traditional research has mostly focused on single health indicators such as cognitive function or disability, while neglecting the potential impact of IC, a comprehensive physiological reserve, on quality of life[6]. This study aims to explore the effects of IC on self-rated health, social participation, and life satisfaction

ISSN 2616-5791 Vol. 7, Issue 2: 19-26, DOI: 10.25236/AJMHS.2026.070204

among older adults, so as to provide empirical evidence and scientific references for early identification of high-risk populations, development of targeted interventions, improvement of health status, and enhancement of quality of life in the elderly population.

2. Materials and methods

2.1 Data source

Data for this study were obtained from the China Health and Retirement Longitudinal Study (CHARLS), a nationally representative large-scale cohort study jointly conducted by Peking University and Wuhan University. The project was approved by the Ethics Committee of Peking University (IRB0000105211015).

Given that the 2018 and 2020 surveys lacked physical measurements for IC, especially in the mobility and vitality domains including SPPB, grip strength, and lung function, the 2015 CHARLS database was used to ensure data integrity. Participants aged 60 years and above were included in this study. Respondents with missing data on IC, self-rated health, social participation, life satisfaction, and other covariates were excluded.

2.2 Methods

2.2.1 Collection of general information

Demographic characteristics were collected, including age, gender, marital status, educational level, and residence. Health-related behaviors such as smoking, alcohol consumption, and BMI, as well as health status indicators (presence or absence of pain, history of falls) were also obtained.

2.2.2 Assessment of intrinsic capacity

According to the integrated care for older people guidelines and previous studies[7-11], the total score of IC ranged from 0 to 10 points, covering 5 domains, with each domain scored 0–2 points. A higher score indicated better intrinsic capacity. Furthermore, intrinsic capacity was categorized into three levels: low level (score < 5), moderate level (score 5–8), and high level (score > 8).

Sensory function was assessed by self-reported vision and hearing. Vision was rated for distance and near sight, while hearing was rated overall. Responses of excellent, very good, or good scored 1 point, fair scored 0.5 point, and poor or blind scored 0. The composite vision score (0–1) was the average of distance and near scores. The total sensory score ranged from 0 to 2 as the sum of vision and hearing scores.

Psychological domain: assessed using the 10-item Center for Epidemiologic Studies Depression Scale (CES-D10), which reflects depressive symptoms over the previous week and has been verified for good reliability and validity[12]. The total score was 30 points, graded as 0 (21-30), 1 (11-20), and 2 (0-10).

Cognitive function was assessed using a telephone interview adapted from the U.S. Health and Retirement Study, covering intellectual ability (numeracy, temporal orientation, visuospatial ability) and episodic memory (immediate and delayed recall). Participants scored 0 if either domain score was below one standard deviation from the mean, and 1 otherwise. The total cognitive score ranged from 0 to 2 as the sum of the two items.

Vitality domain: assessed using grip strength and peak expiratory flow. For peak expiratory flow, three tests were performed and the maximum value recorded: men with ≥350 L/min scored 1 point, women with ≥220 L/min scored 1 point; otherwise 0 points. For grip strength, the highest value of two bilateral measurements was used: men with ≥28 kg scored 1 point, women with ≥18 kg scored 1 point; otherwise 0 points. The total vitality score was the sum of the two items, ranging from 0 to 2.

Physical mobility: assessed using the Short Physical Performance Battery (SPPB)[13], including walking speed, balance, and chair stand test. For walking speed, the average time of two 4-meter walks was scored: <4.82 s = 4, 4.82-6.20 s = 3, 6.21-8.70 s = 2, 8.70 s = 1, and inability to complete = 0. The balance test comprised side-by-side, semi-tandem, and tandem stance. Side-by-side and semi-tandem stance each scored 1 point if held for 10 s, otherwise 0. Tandem stance scored 2 points for ≥10 s, 1 point for 3–9.9 s, and 0 for <3 s or non-completion. The chair stand test measured time for five repeated sit-to-stand movements: <11.19 s = 4, 11.2-13.69 s = 3, 13.7-16.69 s = 2, 16.7-59.9 s = 1, and ≥60 s or

ISSN 2616-5791 Vol. 7, Issue 2: 19-26, DOI: 10.25236/AJMHS.2026.070204

inability = 0. SPPB scores were classified as 0 (0-2), 1 (3-9), and 2 (10-12).

2.2.3 Dependent variables

Self-rated health：The corresponding question in the CHARLS questionnaire was: “How would you rate your health? Excellent, very good, good, fair, poor, or very poor?” These responses were scored from 1 to 5 respectively. In this study, scores 1-2 were defined as “healthy”, and scores 3-5 as “unhealthy”.

Social participation: The corresponding question in the CHARLS questionnaire was: “In the past month, have you engaged in any of the following social activities? Respondents who participated in at least one activity were defined as having social participation; otherwise, they were defined as lacking social participation.

Life satisfaction: The corresponding question in the CHARLS questionnaire was: “Overall, how satisfied are you with your life?” The five options were extremely satisfied, very satisfied, somewhat satisfied, not very satisfied, and not satisfied at all, scored 1, 2, 3, 4, and 5 respectively. In this study, scores 1-3 were defined as “satisfied”, and scores 4-5 as “dissatisfied”.

2.3 Statistical analysis

Statistical analyses were performed using R and SPSS software. Normally distributed measurement data were presented as mean ± standard deviation. Enumeration data were reported as frequencies, and the chi-square test was used for between-group comparisons. Multivariate logistic regression models were applied to analyze the effects of intrinsic capacity on self-rated health, social participation, and life satisfaction in older adults. A significance level of α = 0.05 was adopted.

Table 1 Demographic Characteristics of 6,506 Participants Stratified by Health Status (n(%)/(M ± SD))

Variable	Self-rated Health				Social Participation				Life Satisfaction			
	Unhealthy	Healthy	F/χ^2	*P*-value	Lack of Social Participation	With Social Participation	F/χ^2	*P*-value	Dissatisfied	Satisfied	F/χ^2	*P*-value
Age	68.4 ± 6.4	67.9 ± 6.5	0.433	0.002	68.2 ± 6.5	67.9 ± 6.4	0.559	0.073	67.6 ± 6.4	68.1 ± 6.5	0.063	0.083
Gender			25.391	<0.001			0.353	0.552			15.038	<0.001
Male	880 (44.9)	2349 (51.7)			1604 (49.2)	1625 (50.0)			206 (41.2)	3023 (50.3)		
Female	1082 (55.1)	2195 (48.3)			1653 (50.8)	1624 (50.0)			294 (58.8)	2983 (49.7)		
Marital Status			20.749	<0.001			13.317	<0.001			16.460	<0.001
Unmarried	459 (23.4)	838 (18.4)			590 (18.1)	707 (21.8)			135 (27.0)	1162 (19.3)		
Married	15.3 (76.6)	3706 (81.6)			2667 (81.9)	2542 (78.2)			365 (73.0)	4844 (80.7)		
Educational Level			8.988	0.029			16.636	0.001			2.955	0.399
Illiterate	1568 (79.9)	3587 (78.9)			2621 (80.5)	2534 (78.0)			406 (81.2)	4749 (79.1)		
Primary School	315 (16.1)	694 (15.3)			499 (15.3)	510 (15.7)			75 (15.0)	934 (15.6)		
Secondary School	73 (3.7)	247 (5.4)			131 (4.0)	189 (5.8)			17 (3.4)	303 (5.0)		
College or Above	6 (0.3)	16 (0.4)			6 (0.2)	16 (0.5)			2 (0.4)	20 (0.3)		
Residence			48.927	<0.001			71.141	<0.001			10.245	0.001
Urban	312 (15.9)	1076 (23.7)			555 (17.0)	833 (25.6)			78 (15.6)	1310 (21.8)		
Rural	1650 (84.1)	3468 (76.3)			2702 (83.0)	2416 (74.4)			422 (84.4)	4696 (78.2)		
Alcohol Consumption			70.211	<0.001			23.796	<0.001			1.962	0.161

No	1466 (74.7)	2911 (64.1)			2284 (70.1)	2093 (64.4)			351 (70.2)	4026 (67.0)		
Yes	496 (25.3)	1633 (35.9)			973 (29.9)	1156 (35.6)			149 (29.8)	1980 (33.0)		
Smoking			7.733	0.005			1.995	0.158			0.069	0.793
No	1359 (69.3)	2985 (65.7)			2202 (67.6)	2142 (65.9)			337 (67.4)	4007 (66.7)		
Yes	603 (30.7)	1559 (34.3)			1055 (32.4)	1107 (34.1)			163 (32.6)	1999 (33.3)		

Variable	Self-rated Health				Social Participation				Life Satisfaction			
	Unhealthy	Healthy	F/χ^2	*P*-value	Lack of Social Participation	With Social Participation	F/χ^2	*P*-value	Dissatisfied	Satisfied	F/χ^2	*P*-value
BMI			33.355	<0.001			30.187	<0.001			9.409	0.024
Underweight	216 (11.0)	317 (7.0)			287 (8.8)	246 (7.6)			46 (9.2)	487 (8.1)		
Normal	969 (49.4)	2369 (52.1)			1759 (54.0)	1579 (48.6)			282 (56.4)	3056 (50.9)		
Overweight	550 (28.0)	1382 (30.4)			884 (27.1)	1048 (32.3)			120 (24.0)	1812 (30.2)		
Obese	227 (11.6)	476 (10.5)			327 (10.0)	376 (11.6)			52 (10.4)	651 (10.8)		
Falls			104.704	<0.001			0.582	0.446			41.876	<0.001
No	1418 (72.3)	3788 (83.4)			2619 (80.4)	2587 (79.6)			344 (68.8)	4862 (81.0)		
Yes	544 (27.7)	756 (16.6)			986 (303)	866 (26.7)			156 (31.2)	1144 (19.0)		
Pain			902.605	<0.001			11.907	0.003			197.866	<0.001
No Pain	799 (40.7)	3544 (78.0)			2109 (64.8)	2234 (68.8)			193 (38.6)	4150 (69.1)		
Single-site Pain	117 (6.0)	194 (4.3)			162 (5.0)	149 (4.6)			35 (7.0)	276 (4.6)		
Multi-site Pain	1046 (53.3)	806 (17.7)			986 (30.3)	866 (26.7)			272 (54.4)	1580 (26.3)		
IC	6.2 ±1.9	7.5 ±1.7	41.755	<0.001	6.8±1.9	7.4 ±1.7	32.445	<0.001	5.8±1.9	7.2±1.8	8.206	<0.001
IC Category												
Low	452 (23.0)	316 (7.0)	679.455	<0.001	483 (14.8)	285 (8.8)	121.288	<0.001	148 (29.6)	620 (10.3)	253.919	<0.001
Medium	1104 (56.3)	1876 (41.3)			1592 (48.9)	1388 (42.7)			278(55.6)	2702(45.0)		
High	406 (20.7)	2352 (51.8)			1182 (36.3)	1576 (48.5)			74 (14.8)	2684 (44.7)		

Table 2. Logistic regression analysis of IC on self-rated health in older adults

Variable	Model 1		Model 2		Model 3	
	OR(95%CI)	P-value	OR(95%CI)	P-value	OR(95%CI)	P-value
IC	0.664(0.643~0.685)	<0.001	0.637(0.615~0.660)	<0.001	0.705(0.679~0.733)	<0.001
IC Category						
High	1.000		1.000		1.000	
Medium	3.409(2.997~3.878)	<0.001	3.518(3.081~4.018)	<0.001	2.618(2.277~3.010)	<0.001
Low	8.286(6.934~9.903)	<0.001	9.451(7.764~11.506)	<0.001	5.584(4.531~6.882)	<0.001

Table 3. Logistic regression analysis of IC on social participation in older adults

Variable	Model 1		Model 2		Model 3	
	OR(95%CI)	P-value	OR(95%CI)	P-value	OR(95%CI)	P-value
IC	0.841(0.818~0.864)	<0.001	0.835(0.810~0.861)	<0.001	0.830(0.803~0.857)	<0.001
IC Category						
High	1.000		1.000		1.000	
Medium	1.529(1.378~1.697)	<0.001	1.507(1.353~1.680)	<0.001	1.505(1.345~1.684)	<0.001
Low	2.260(1.917~2.664)	<0.001	2.285(1.909~2.736)	<0.001	2.284(1.899~2.770)	<0.001

Table 4. Logistic regression analysis of IC on life satisfaction in older adults

Variable	Model 1		Model 2		Model 3	
	OR(95%CI)	P-value	OR(95%CI)	P-value	OR(95%CI)	P-value
IC	0.697(0.666~0.729)	<0.001	0.644(0.611~0.679)	<0.001	0.692(0.654~0.732)	<0.001
IC Category						
High	1.000		1.000		1.000	
Medium	3.732(2.872~4.849)	<0.001	4.057(3.107~5.298)	<0.001	3.194(2.428~4.201)	<0.001
Low	8.658(6.463~11.599)	<0.001	11.726(8.518~16.143)	<0.001	7.812(5.588~10.920)	<0.001

3. Results

3.1 Baseline characteristics of the study participants

A total of 6,506 participants were included, with a mean age of 68.06 ± 6.47 years; 49.6% were male and 50.4% female. The proportions of poor self-rated health, low social participation, and life dissatisfaction were 30.2%, 50.1%, and 7.7%, respectively.

Significant differences existed in poor self-rated health across age, gender, marital status, education, residence, alcohol, smoking, BMI, falls, pain, and IC ($P < 0.05$). For low social participation, significant differences were found in marital status, education, residence, alcohol, BMI, pain, and IC ($P < 0.05$). Life dissatisfaction differed significantly by gender, marital status, residence, BMI, falls, pain, and IC ($P < 0.05$). Details are shown in Table 1.

3.2 Logistic regression analysis of the effect of intrinsic capacity on quality of life among older adults

Three multivariate logistic regression models were established with IC as the independent variable and self-rated health, social participation, and life satisfaction as dependent variables. Model 1 was unadjusted; Model 2 adjusted for demographic variables; Model 3 further adjusted for health behaviors and status. IC was significantly associated with better self-rated health, social participation, and life satisfaction (all $P<0.001$), and the association remained stable after sequential adjustment. In the fully adjusted Model 3, each 1-point increase in IC was associated with a 29.5% lower risk of poor self-rated health (OR=0.705, 95%CI:0.679~0.733), a 17.0% lower risk of low social participation (OR=0.830, 95%CI:0.803~0.857), and a 30.8% lower risk of life dissatisfaction (OR=0.692, 95%CI:0.654~0.732), all $P<0.001$. Detailed results are shown in Tables 2–4.

ISSN 2616-5791 Vol. 7, Issue 2: 19-26, DOI: 10.25236/AJMHS.2026.070204

3.3 Restricted cubic spline model analysis

After adjusting for age, gender, marital status, education, residence, alcohol, smoking, BMI, falls and pain, IC showed nonlinear associations with self-rated health and life satisfaction in older adults (P < 0.05). Improvements became more prominent when IC exceeded 7.5. Restricted cubic spline analysis indicated a linear positive relationship between IC and social participation (P for nonlinear = 0.555) with no clear inflection point, and the OR for social participation rose steadily with higher IC. Details are shown in Figures 1–3.

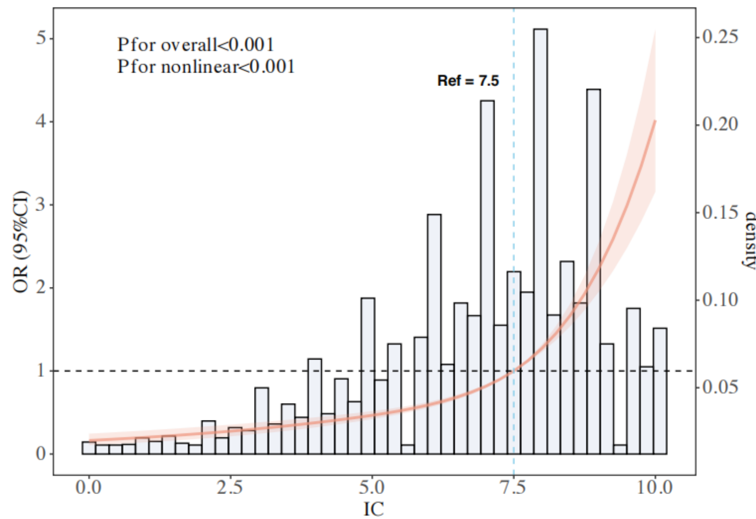

Figure 1 Dose-response relationship between IC and self-rated health in Older Adults

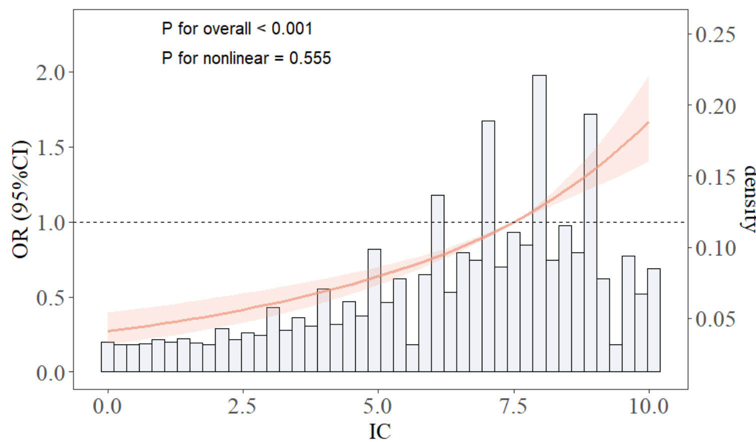

Figure 2 Dose-response relationship between IC and social participation in alder adults

ISSN 2616-5791 Vol. 7, Issue 2: 19-26, DOI: 10.25236/AJMHS.2026.070204

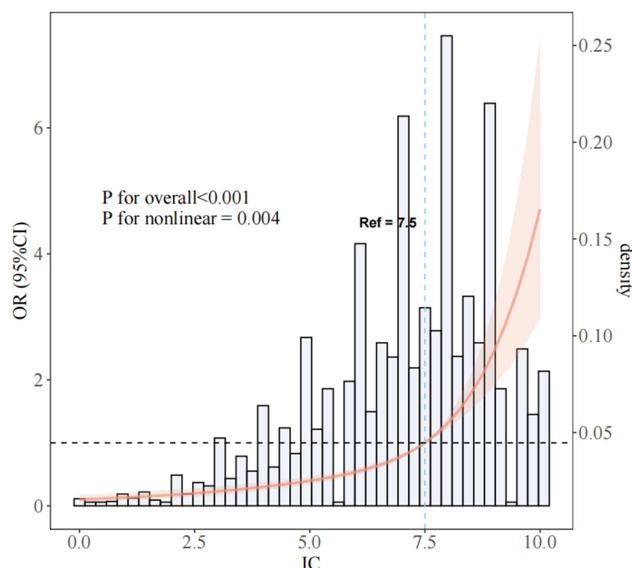

Figure 3 Dose-response relationship between IC and life satisfaction in older adults

4. Discussion

Using nationally representative CHARLS data, this study examined the association between intrinsic capacity (IC) and multidimensional quality of life among Chinese older adults. IC was positively associated with self-rated health, social participation, and life satisfaction. Nonlinear relationships with an inflection point at IC = 7.5 were observed for self-rated health and life satisfaction, whereas a linear trend was found for social participation. These findings enrich the literature on intrinsic capacity and support evidence for healthy aging.

While prior studies have linked IC to quality of life[14, 15], few have simultaneously investigated self-rated health, social participation, and life satisfaction. This study addresses this gap. Consistent with previous research[16, 17], higher IC predicted better health, higher life satisfaction, and greater social participation. Notably, a threshold effect was identified: self-rated health and life satisfaction improved significantly when IC exceeded 7.5, possibly because adequate physical and cognitive function enables better adaptation to daily life. In contrast, social participation increased steadily with improving intrinsic capacity, indicating that even with limited IC levels, creating appropriate opportunities for engagement may still encourage older adults to maintain social connections. This also aligns with the pathway by which IC promotes social participation through mediation of instrumental activities of daily living[18].

Graded interventions are therefore proposed: for older adults with IC ≤ 7.5, priority should be given to IC screening and multidimensional improvements; for those with higher IC, maintenance of functional reserve is key. Age-friendly environments and social opportunities should be promoted across all IC levels to support dignified aging.

This study provides new evidence on the multidimensional benefits of IC but has limitations. The cross-sectional design precludes causal inference. In addition, despite adjustment for confounders, unmeasured factors such as environmental and genetic influences may still bias the results.

References

[1] Jiang XY, Lin SY, Chen JY, et al. Study on the correlation between intrinsic capacity and frailty in community [J]. Guide of China Medicine, 2024, 22(36): 6-8.
[2] Wu TT, Wei XQ, Dong JH, et al. Concept analysis of the intrinsic capacity of the elderly[J]. Chinese Journal of Nursing, 2024, 59(16): 2037-2043.
[3] Liu WJ, Wang ZW, Yu YL, et al. Guideline for assessment and maintenance of intrinsic capacity in older adults[J]. Chinese Journal of Nursing, 2025, 60(3): 261-265.
[4] Liu MY, Zhang L, Zhang M, et al. Correlation between intrinsic capacity and activities of daily living for old adults in China:based on China Health and Retirement Longitudinal Study[J]. Chinese

ISSN 2616-5791 Vol. 7, Issue 2: 19-26, DOI: 10.25236/AJMHS.2026.070204

Journal of Rehabilitation Theory and Practice, 2023, 29(10): 1140-1146.
[5] Han MY, Zhao XY, Liu YH, et al. Scoping Review of Research on Variability Characteristics of Intrinsic Capacity in Older Adults[J]. Military Nursing, 2025, 42(7): 82-86.
[6] Zhang JB, Wang Z, Chen JQ, et al. Impact of spousal cognitive function on the quality of life among the elderly in China[J]. China Medical Herald, 2025, 22(2): 7-11.
[7] Wang X, Qiao TT. Mediating effects of activities of daily living and social participation on depressive symptoms and cognitive function among the elderly[J]. Preventive Medicine, 2025, 37(5): 438-442.
[8] Zhao B, Liu Z, Fu Y, et al. Social Determinants of Intrinsic Capacity: A National Cohort Study[J]. Am J Prev Med, 2024, 66(3): 559-567.
[9] Feng Z, Li Q, Zhou L, et al. The relationship between depressive symptoms and activity of daily living disability among the elderly: results from the China Health and Retirement Longitudinal Study (CHARLS)[J]. Public Health, 2021, 198: 75-81.
[10] Zeng J, Lai X, Wang S, et al. Association of depressive symptoms with chronic liver disease among middle-aged and older adults in China[J]. Front Psychiatry, 2023, 14: 1273754.
[11] Chen LK, Woo J, Assantachai P, et al. Asian Working Group for Sarcopenia: 2019 Consensus Update on Sarcopenia Diagnosis and Treatment[J]. J Am Med Dir Assoc, 2020, 21(3): 300-307.e2.
[12] Zhang J, Sun W, Kong Y, et al. Reliability and validity of the Center for Epidemiological Studies Depression Scale in 2 special adult samples from rural China[J]. Compr Psychiatry, 2012, 53(8): 1243-1251.
[13] Guralnik JM, Simonsick EM, Ferrucci L, et al. A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission[J]. J Gerontol, 1994, 49(2): M85-94.
[14] Salinas-Rodríguez A, González-Bautista E, Rivera-Almaraz A, et al. Longitudinal trajectories of intrinsic capacity and their association with quality of life and disability[J]. Maturitas, 2022, 161: 49-54.
[15] Zhao YX, Zhang L, Wu GL, et al. Impact of intrinsic capacity decline on quality of life in community-dwelling older adults[J]. Practical Geriatrics, 2023, 37(10): 1014-1018.
[16] Han MY, Zhao XY, Xu Y, et al. Latent profile analysis of intrinsic capacity characteristics in hospitalized older patients with related disability[J]. Chinese Journal of Nursing, 2025, 40(12): 84-89.
[17] Zhang S, Tange C, Huang ST, et al. Multi-trajectories of intrinsic capacity and their effect on higher-level functional capacity, life satisfaction, and self-esteem in community-dwelling older adults: the NILS-LSA[J]. J Nutr Health Aging, 2025, 29(1): 100432.
[18] Cheong G, Tov W, Choo RWM, et al. Exploring the relationship between intrinsic capacity and social participation in healthy ageing: Evidence from Singapore[J]. J Nutr Health Aging, 2025, 29(5): 100524.