

# Trajectories of intrinsic capacity and their effect on instrumental activities of daily living, life satisfaction, and self-esteem in older community-dwellers

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# Background and Objectives

*This study explores diverse intrinsic capacity (IC) trajectories and investigates their effect on Instrumental Activities of Daily Living (IADL), life satisfaction, and self-esteem.*

1

## What is intrinsic capacity (IC)

IC encourages a strength-based perspective that identifies the residual physical and mental capabilities of older individuals

The trajectory of overall IC decline varies across different populations <sup>1-3</sup>. However, the multi-trajectories of specific IC domains are rarely discussed

2

## Functional capacity, life satisfaction, and self-esteem

Life satisfaction and functional capacity → intertwined <sup>5</sup>

Self-esteem can change in accordance with alterations in one's capacities (such as locomotion, vision, hearing, and communication) <sup>6, 7</sup>

3

## Declining IC & physical and mental health

Association between IC domains ↔ higher-level functional capacity → well-established <sup>4</sup>

Association between IC ↔ mental health → warrants further investigation

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**To explore diverse IC trajectories and investigate their effect on Instrumental Activities of Daily Living (IADL), life satisfaction, and self-esteem**

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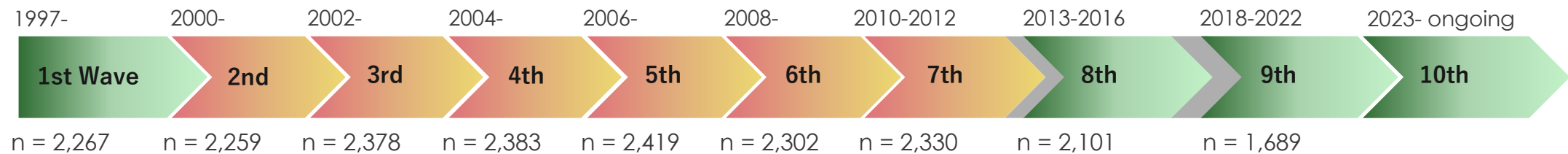
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# Methodology: Data Source and Participants

Settings: *The National Institute for Longevity Sciences-Longitudinal Study of Aging (NILS-LSA) project (2000–2012)*<sup>8</sup>. It included 875 community-dwelling adults aged 60 and above.



A minimum participation of 3 times, no missing IC data, no history of dementia or cancer at the baseline

934 participants, aged  $\geq 60$  years

Group-based multi-trajectory modeling analysis

IC trajectories

875 participants with complete data for IADL, life satisfaction, and self-esteem

# Methodology: IC Assessment (six domains)

*Cognitive function, physical function, vitality/nutrition, vision, hearing, and psychological well-being (Referring to the WHO integrated care for older people (ICOPE) guidelines).*

IC domains	Assessment method	Categories
<b>Cognitive function</b>	Mini-Mental State Examination: 4 for time and place orientation, 3 for memory	0: impairment in any of the 7 items 1: no impairment
<b>Physical function</b>	10-meters comfortable gait speed	0: <1 m/s 1: ≥1 m/s
<b>Vitality/nutrition</b>	Weight loss over a two-year period and whether have appetite during the past week	0: weight loss ≥5% or had a lack of appetite 1: otherwise
<b>Vision</b>	Self-rated visual acuity	0: “poor” or “very poor” 1: otherwise
<b>Hearing</b>	Average threshold level at frequencies of 0.5, 1, 2, and 4 kHz of air-conduction pure-tone thresholds for both ears	0: >35 dB in the better ear 1: otherwise
<b>Psychological well-being</b>	Center for Epidemiologic Studies Depression (CES-D) Scale	0: a score ≥16 1: a score <16

**Total IC score: 0 to 6**



# Methodology: Outcome Assessment

*Instrumental Activities of Daily Living (IADL), life satisfaction, and self-esteem.*

Outcomes	Assessment method	Definition of decline
<b>Instrumental Activities of Daily Living (IADL)</b>	Tokyo Metropolitan Institute of Gerontology Index of Competence (TMIG-IC; total score range: 0–13) <sup>9</sup>	<i>Dichotomous variable</i> Baseline score - follow-up score $\geq 2$
<b>Life satisfaction</b>	Life Satisfaction Index-K (LSI-K; total score range: 0–9) <sup>10</sup>	<i>Continuous variable</i> A higher score indicates greater life satisfaction
<b>Self-esteem</b>	Rosenberg Self-Esteem Scale (RSES; total score range: 10–40) <sup>11</sup>	<i>Continuous variable</i> A higher score indicates greater self-esteem



# Methodology: Analysis Techniques

1

## Group-based multi-trajectory modeling analysis

Used to identify distinct IC trajectories among participants.

2

## Logistic regression model & linear mixed model

Applied to analyze relationships between trajectories and outcomes.

3

## Adjustment Items

Baseline information on age (years), sex, medical history (stroke, hypertension, heart disease, dyslipidemia, diabetes, osteoporosis; categorized as yes or no for each item), smoking habits (current or not), alcohol consumption (current or not), total physical activity (METs-hours/day), years of education ( $\leq 9$ , 10–12, and  $\geq 13$  years), marital status (married or not), and living arrangements (alone, with others), and follow-up duration (in years) and the corresponding score at baseline.

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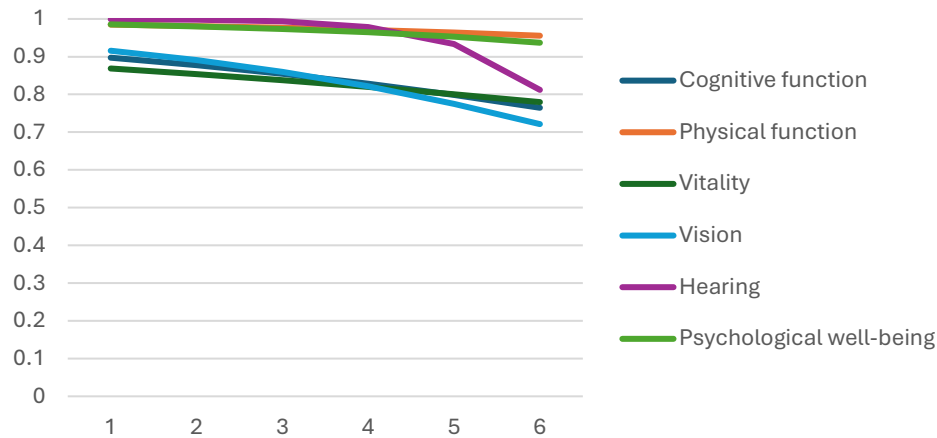
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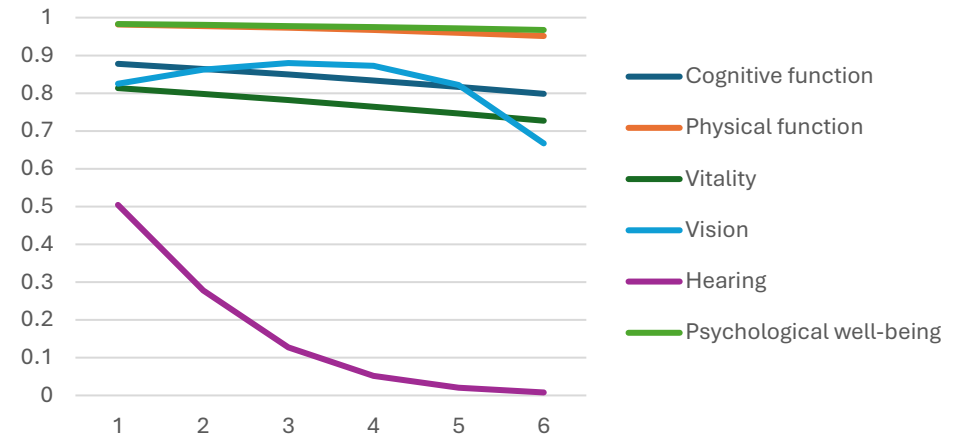
# Results: IC Trajectories

The probability of being in an unimpaired state in each domain

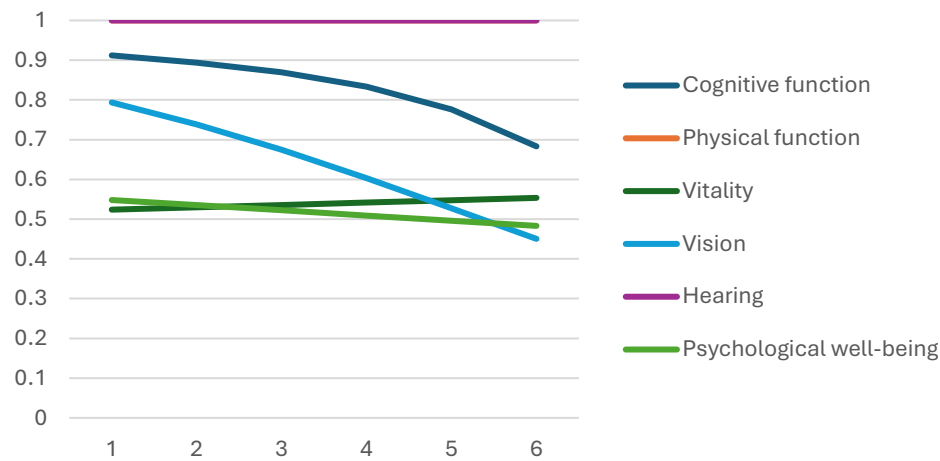
## Healthy aging group (63.7%)



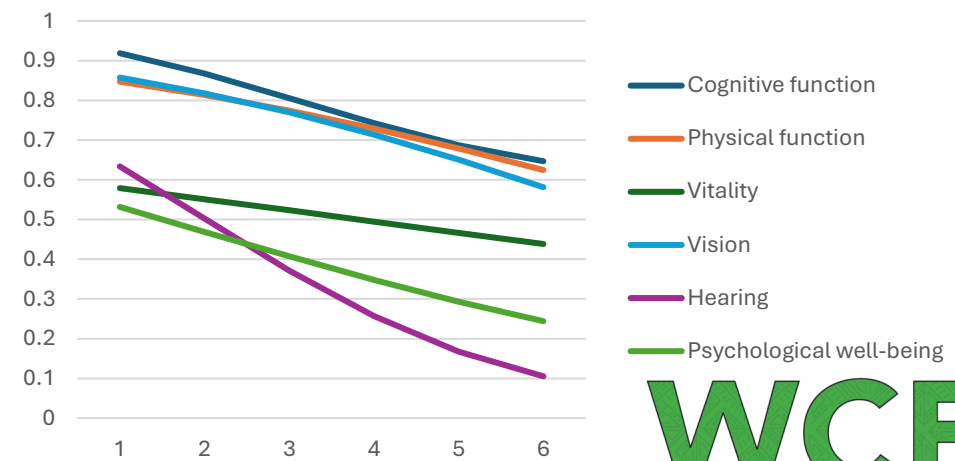
## Hearing decline group (15.1%)



## Vision and cognitive decline group (12.7%)



## Comprehensive deterioration group (8.5%)





# Results: Baseline characteristics

**Table 1.** Baseline characteristics of participants with different IC trajectories (n = 875)

		Healthy aging group	Hearing decline group	Vision and cognitive decline group	Comprehensive deterioration group	P value
No. of participants	n	568	131	106	70	
Age (year)	mean (SD)	65.5 (4.8)	70.0 (5.7)	66.5 (5.9)	71.1 (5.2)	< 0.001 <sup>a</sup>
Men	%	48.4%	59.5%	44.3%	54.3%	0.065 <sup>b</sup>
Body mass index (kg/m <sup>2</sup> )	mean (SD)	23.0 (2.8)	22.8 (2.7)	22.9 (2.9)	22.8 (3.0)	0.922 <sup>a</sup>
Relative skeletal muscle mass index (kg/m <sup>2</sup> )	mean (SD)	6.7 (1.0)	6.7 (0.9)	6.6 (0.9)	6.6 (0.9)	0.755 <sup>a</sup>
Current smoker	%	11.8%	19.1%	16.0%	25.7%	0.005 <sup>b</sup>
Current drinker	%	53.3%	59.5%	50.9%	44.3%	0.206 <sup>b</sup>
Total physical activities (METs-h/day)	mean (SD)	32.1 (2.8)	32.0 (4.3)	32.3 (3.5)	31.5 (3.3)	0.044 <sup>a</sup>
Education level (year)						
≤ 9	%	27.8%	41.2%	25.5%	48.6%	< 0.001 <sup>b</sup>
10–12	%	43.7%	36.6%	49.1%	37.1%	
≥ 13	%	28.5%	22.1%	25.5%	14.3%	
Married	%	86.4%	80.9%	81.1%	74.3%	0.029 <sup>b</sup>
Alone	%	7.2%	11.5%	13.2%	12.9%	0.082 <sup>b</sup>
Medical history						
Stroke	%	3.5%	3.1%	5.7%	5.7%	0.506 <sup>b</sup>
Hypertension	%	33.1%	38.2%	37.7%	44.3%	0.219 <sup>b</sup>
Heart disease	%	5.6%	7.6%	7.5%	17.1%	0.012 <sup>b</sup>
Dyslipidemia	%	24.5%	15.3%	27.4%	30.0%	0.055 <sup>b</sup>
Diabetes	%	9.9%	7.6%	8.5%	10.0%	0.860 <sup>b</sup>
Osteoporosis	%	7.0%	7.6%	9.4%	7.1%	0.859 <sup>b</sup>
<b>Total IC score ↓</b>	mean (SD)	5.6 (0.6)	5.0 (0.9)	4.8 (0.9)	4.2 (1.1)	< 0.001 <sup>a</sup>

<sup>a</sup> For continuous variables, the Kruskal-Wallis rank sum test was used.

<sup>b</sup> For categorical variables, the Pearson's chi-squared test or the Fisher's exact test was used.

# Results: IC trajectories & IADL, life satisfaction, self-esteem

**Table 2.** Association between IC trajectories and changes in instrumental activities of daily living, life satisfaction, and self-esteem (n = 875)

Healthy aging group was the Ref. group	OR <sup>a, c</sup>	95% CI		P value
<b>Instrumental Activities of Daily Living (TMIG-IC) decline</b>				
Hearing decline group	0.96	0.49	1.86	0.901
Vision and cognitive decline group	1.28	0.62	2.61	0.505
<b>Comprehensive deterioration group</b>	<b>2.43</b>	<b>1.22</b>	<b>4.86</b>	<b>0.012</b>
Healthy aging group was the Ref. group	Estimate <sup>b, c</sup>	Std. Error		P value
<b>Life satisfaction (LSI-K)</b>				
Hearing decline group	0.14	0.09		0.123
<b>Vision and cognitive decline group</b>	<b>-0.56</b>	<b>0.10</b>		<b>&lt; 0.001</b>
<b>Comprehensive deterioration group</b>	<b>-0.62</b>	<b>0.12</b>		<b>&lt; 0.001</b>
<b>Self-esteem (RSES)</b>				
Hearing decline group	0.08	0.18		0.664
<b>Vision and cognitive decline group</b>	<b>-0.79</b>	<b>0.19</b>		<b>&lt; 0.001</b>
<b>Comprehensive deterioration group</b>	<b>-0.69</b>	<b>0.24</b>		<b>0.004</b>

a Analyzed by logistic regression model.

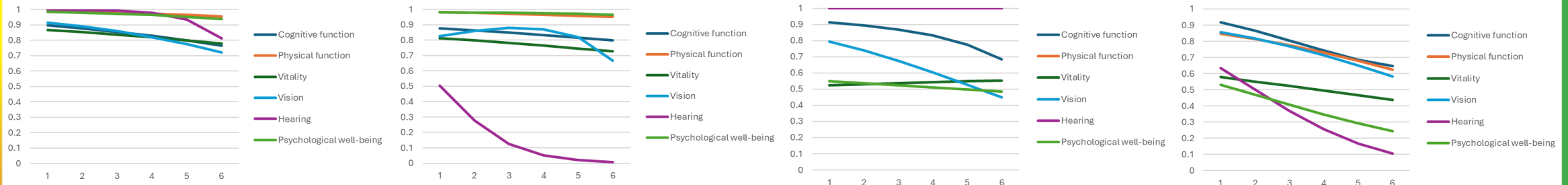
b Analyzed by linear mixed model.

c Adjusted for baseline information on age, sex, medical history, smoking habits, alcohol consumption, total physical activity, years of education, marital status, and living arrangements, and follow-up duration and the corresponding score at baseline.



# Discussion

- ◆ Four distinct IC trajectories were identified: the healthy aging group, the hearing decline group, the vision and cognitive decline group, and the comprehensive deterioration group.



- ◆ Participants in the comprehensive deterioration group had a higher risk of declining IADL.
- ◆ Participants in the vision and cognitive decline group & the comprehensive deterioration group faced a higher risk of experiencing greater reduction in life satisfaction & self-esteem.

Visual impairment, cognitive function impairment, physical function impairment, hearing loss: a lower level of life satisfaction <sup>14-17</sup>

Visual impairment & hearing impairment: risk factors in declining self-esteem <sup>7</sup>

# Conclusion

- ◆ By analyzing long-term longitudinal follow-up data, we summarized **four different trajectories of IC** and found that compared to older adults experiencing healthy aging, those who exhibited **visual impairment and cognitive decline showed greater declines in life satisfaction and self-esteem**. In addition, older individuals who experienced **decline across all six domains showed greater declines in IADL, life satisfaction, and self-esteem**.
- ◆ Our findings suggest that when screening for and intervening in IC impairments among community-dwelling older adults, attention should be paid to their psychological and mental health to comprehensively maintain and improve their functional abilities and promote healthy aging in society.

# Thanks

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