



## Original article

# Association between intrinsic capacity and urinary incontinence in community-dwelling octogenarians: Results from the ilSIRENTE study

Stefano Cacciatore<sup>a,b,c,\*</sup>, Mathias Schlögl<sup>d</sup>, Riccardo Calvani<sup>a,b</sup>, Andrea Russo<sup>b</sup>, Matteo Tosato<sup>b</sup>, Adrian Wagg<sup>e</sup>, Emanuele Marzetti<sup>a,b</sup>, Francesco Landi<sup>a,b</sup>

<sup>a</sup> Department of Geriatrics, Orthopedics and Rheumatology, Università Cattolica del Sacro Cuore, Rome, Italy

<sup>b</sup> Fondazione Policlinico Universitario "Agostino Gemelli" IRCCS, Rome, Italy

<sup>c</sup> Department of Physiology and Aging, College of Medicine, University of Florida, Gainesville, FL, USA

<sup>d</sup> Division of Geriatric Medicine, Clinic Barmelweid, Barmelweid, Switzerland

<sup>e</sup> Division of Geriatric Medicine, Department of Medicine, Faculty of Medicine & Dentistry, College of Health Sciences, University of Alberta, Edmonton, Alberta, Canada



## ARTICLE INFO

## Keywords:

ICOPE  
Geriatric syndromes  
Healthy ageing  
Activities of daily living  
Disability

## ABSTRACT

**Background:** Urinary incontinence (UI) is common in older adults. The construct of intrinsic capacity (IC) provides a multidimensional framework to assess functional reserves. This cross-sectional study examined the association between IC and UI in community-dwelling octogenarians from the Ageing and Longevity in the Sirente (ilSIRENTE) study.

**Methods:** IC was computed as the mean of standardized (0–100) scores across five domains (locomotion, cognition, vitality, psychological well-being, and sensory function) derived from Minimum Data Set for Home Care (MDS-HC) instruments and supplementary tests. UI was defined as a score of 3 or more on MDS-HC item I1. Associations between IC and UI were examined using logistic regression models adjusted for sociodemographic and clinical covariates. Restricted cubic splines tested linearity.

**Results:** Among 320 participants (median age 83.9 years [81.7–88.5]; 67.2% women), 35 (10.9%) had UI. Incontinent individuals had a lower total IC score (60.2 [51.5–69.7] vs. 85.2 [76.1–92.7];  $p < 0.001$ ) and lower scores in the locomotion, cognition, vitality, psychological well-being, and sensory domains. In fully adjusted models, higher IC score was associated with lower odds of UI (per 10-point increase: OR 0.34, 95% CI 0.24–0.48). High IC score was associated with markedly lower odds of UI compared with low IC score (OR 0.07, 95% CI 0.02–0.20). Restricted cubic spline analyses supported linearity ( $p$  for non-linearity = 0.701).

**Conclusions:** Lower IC scores were associated with higher odds of UI, particularly in locomotion, cognition, vitality, and sensory domains. These findings support UI as a marker of multidimensional vulnerability and highlight the value of IC-oriented assessment to guide multidomain interventions in geriatric care.

## 1. Introduction

Urinary incontinence (UI) is one of the most frequent geriatric syndromes among community-dwelling older adults. Meta-analyses estimate a pooled prevalence up to approximately 37% in women aged  $\geq 55$  years, with rates increasing with age and in those with chronic conditions [1,2]. Despite this high burden, UI is often underreported and undertreated due to stigma and misconceptions that it is a normal part of ageing, leading to low help-seeking rates [3–5]. The condition is multifactorial, resulting from age-related alterations in the lower urinary tract and central nervous system, comorbidities, polypharmacy,

and declines in mobility and cognition [6]. Beyond its physical manifestations, UI is associated with depression, social isolation, institutionalisation, and decreased quality of life for both patients and caregivers [7,8].

Within the World Health Organization's (WHO) framework for healthy ageing, the construct of intrinsic capacity (IC) provides an integrative measure of the physical and mental reserves that sustain functional ability in older age. IC encompasses five domains, i.e. locomotion, cognition, vitality, psychological well-being, and sensory function (hearing and vision), and its decline predicts subsequent disability, dependence, hospitalization, and mortality [9,10]. While IC

\* Corresponding author at: Università Cattolica del Sacro Cuore, Largo F. Vito 1, 00168, Rome, Italy.  
@stecacMD (S. Cacciatore)

<https://doi.org/10.1016/j.maturitas.2026.108871>

Received 17 October 2025; Received in revised form 15 January 2026; Accepted 3 February 2026

Available online 5 February 2026

0378-5122/© 2026 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

and frailty describe complementary aspects of ageing, reserve and vulnerability, respectively, IC offers a proactive, person-centred framework for assessing and promoting healthy ageing [11]. Recent guidance from the WHO Integrated Care for Older People (ICOPE) handbook, second edition [12], explicitly includes UI within the core assessment of older patients in primary care settings. Chapter 13 provides a structured care pathway for UI screening and management, recognizing it as both a determinant and a consequence of declining functional reserves. This inclusion reflects a paradigm shift from disease-centered management toward integrated care focused on maintaining capacity and independence at the community level.

However, despite the clinical relevance of UI and the growing application of IC in research and policy, evidence on their quantitative relationship remains limited. Previous consensus documents, including reports from the International Consultation on Incontinence, have long recognized UI in older adults as a systemic manifestation of age-related decline rather than a single-organ failure [13]. While prior work has linked UI to frailty and functional decline, including isolated domains of IC, and to subjective perceptions of ageing [14], our study examined UI within the integrated multidimensional framework of IC, allowing a holistic view of continence as an expression of functional reserve rather than a single system failure. Specifically, we analysed both composite and domain-specific IC scores to assess their associations with UI.

## 2. Material and methods

### 2.1. Study design

The ilSIRENTE study is a population-based observational study of community-dwelling octogenarians conducted in the Sirente geographic region (L'Aquila, Abruzzo, Italy) to explore determinants and outcomes of ageing. It was conducted by the Department of Geriatrics at the Università Cattolica del Sacro Cuore (Rome, Italy) in partnership with local health authorities and general practitioners serving the Sirente Mountain Community. The study design and baseline procedures have been described in detail in the first publication of the cohort [15]; briefly, participants underwent standardized home-based assessments including interviews, physical examinations, and performance tests. The

cohort was designed to include all eligible residents of the area aged 80 years or older, irrespective of health status or functional level. All procedures complied with the Declaration of Helsinki and were approved by the Ethics Committee of the Università Cattolica del Sacro Cuore. Written informed consent was obtained from all participants or their legal representatives.

### 2.2. Study sample

Eligible participants were individuals all individuals aged 80 years and older (born before 1 January 1924) and residing in the Sirente area at the time of recruitment, as identified through municipal population registries, ensuring complete population coverage of the target area. Of 429 persons identified, 65 declined participation, yielding an initial cohort of 364 participants. After excluding 44 participants with missing data in multiple domains, the final analytical sample comprised 320 individuals (Fig. 1).

### 2.3. Data collection

Baseline data were collected between December 2003 and September 2004 using the Minimum Data Set for Home Care (MDS-HC), following standardized procedures described in the corresponding manual [16]. This instrument includes over 350 items covering socio-demographic, functional, cognitive, and clinical characteristics, as well as medication use and geriatric syndromes [17]. Additional information on lifestyle and physical performance was obtained through questionnaires and tests adapted from the Invecchiare in Chianti (InCHIANTI) study [18]. Excessive alcohol intake was defined as >500 mL of wine (or equivalent) per day, and current smoking as tobacco use at least once weekly. Physical activity was defined as engagement in moderate-intensity occupational or leisure activity for at least 2 h per week during the previous year [19], although this definition may underestimate domestic or caregiving activity, particularly among older women [20]. Clinical diagnoses were obtained from section J (“Disease diagnoses”) of the MDS-HC and validated by study physicians through interviews, information from primary care practitioners, physical examination, and review of medical records. Multimorbidity was defined as the presence

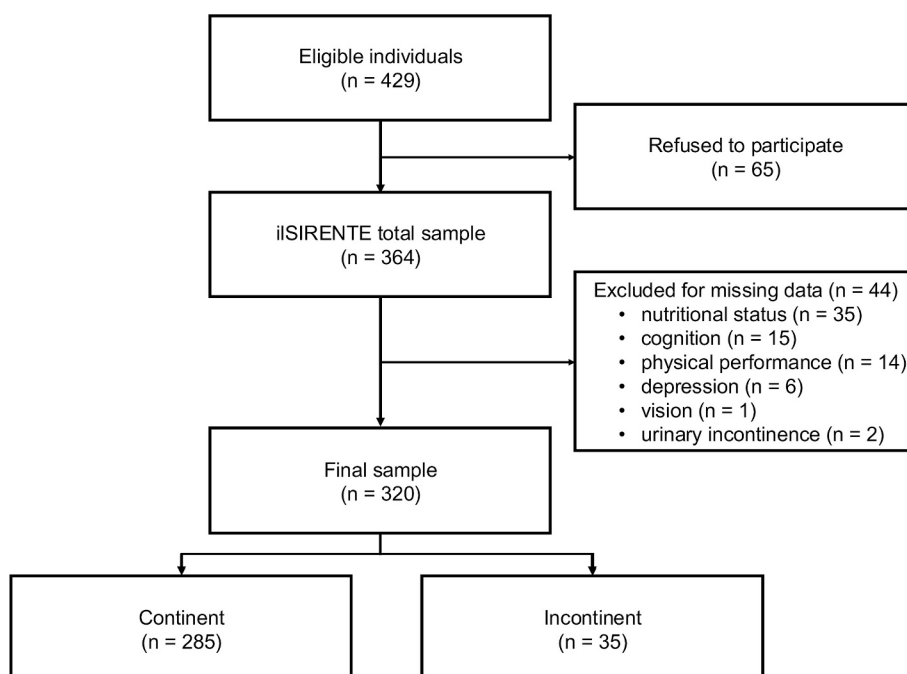


Fig. 1. Flowchart of sample selection.

of two or more chronic conditions, and polypharmacy as the regular use of five or more medications. Body mass index (BMI) was calculated as weight (kg) divided by height squared ( $m^2$ ). Functional status was assessed using MDS-derived scales for activities of daily living (ADL) and instrumental activities of daily living (IADL). The ADL scale evaluated basic self-care abilities, while the IADL scale assessed more complex tasks requiring cognitive and physical effort, such as meal preparation, housekeeping, medication and financial management, and use of transportation. Each scale ranged from 0 (independent) to 7 (totally dependent) [21,22].

#### 2.4. Assessment of intrinsic capacity

IC was operationalised according to the WHO framework as the composite of five domains [23,24] (Supplementary Table S1). Locomotion was measured using the Short Physical Performance Battery (SPPB), which includes balance, 4-m gait speed, and chair-stand tests [25]. Participants were asked to maintain progressively challenging standing positions (side-by-side, semi-tandem, tandem) for up to 10 s, walk a 4-m course at usual pace, and rise five times from a chair with folded arms. Each subtest was scored from 0 (unable) to 4 (best), yielding a total score from 0 to 12. Cognition was assessed using the Cognitive Performance Scale (CPS) derived from five MDS-HC items [26]. Vitality was assessed with the Mini Nutritional Assessment–Short Form (MNA-SF; range 0–14; 12–14 = normal, 8–11 = at risk, 0–7 = malnutrition) [27]. Psychological well-being was measured using the MDS Depression Rating Scale (MDS-DRS; range 0–14), with scores  $\geq 3$  suggesting probable depressive symptoms [28]. Sensory function was derived from MDS-HC items on vision (D1; 0–4) and hearing (C1; 0–3) [29,30]. All variables were standardized using the percent of maximum possible (POMP) transformation, rescaling each domain to a 0–100 scale where higher values indicate greater capacity [31]. IC score was obtained as the mean of the five standardized domain scores (range 0–100). Participants were further classified as having high IC ( $\geq 77.6$ ) or low IC ( $< 77.6$ ) based on a previously identified cut-off associated with two-year incident disability [23].

#### 2.5. Assessment of urinary incontinence

UI was assessed using item I1 of the MDS-HC, which evaluates bladder control over the previous seven days [32]. Scores range from 0 (completely continent) to 5 (completely incontinent). Participants scoring  $\geq 3$  (indicating at least two episodes of urine loss per week up to daily incontinence) were classified as incontinent, while those with scores  $< 3$  were considered continent or near-continent. Urinary incontinence was modelled as the dependent variable in all analyses, reflecting its possible role as a clinical manifestation of reduced functional reserves.

#### 2.6. Statistical analysis

Participants' characteristics were summarised using descriptive statistics and stratified by UI status, with normality of continuous variables assessed using the Shapiro–Wilk test. Continuous variables were expressed as median [interquartile range] and compared using the Wilcoxon rank-sum test, whereas categorical variables were expressed as counts and percentages and compared using the chi-squared or Fisher's exact test, as appropriate. To explore potential non-linear associations between IC and UI, restricted cubic spline models were fitted with IC entered as a continuous variable. Restricted cubic splines with four knots were specified, and models were adjusted for age, sex, education level, number of chronic conditions, and number of medications. Non-linearity was formally tested using a Wald test comparing the spline model to the linear term. Knot locations were automatically selected by the *rms* package [33] according to the distribution of the IC score. Linearity of the association between IC and UI was assessed with spline

functions. Logistic regression models were then fitted to examine the association between IC and UI, analysing IC both as a continuous variable (per 10-point increase) and as a dichotomous variable (high vs. low IC, based on the identified cut-off). Three models were constructed: unadjusted, Model 1 (age and sex adjusted), and Model 2 (further adjusted for education, number of chronic conditions, and number of medications). The same analyses were repeated for each IC domain. All analyses were performed using R version 4.5.1 (R Foundation for Statistical Computing, Vienna, Austria), with statistical significance set at  $p < 0.05$ .

### 3. Results

The characteristics of the 320 participants (median age 83.9 years [81.7–88.5]; 67.2% women), stratified by UI status, are shown in Table 1. Incontinent individuals ( $n = 35$ , 10.9%) were older and more frequently women than continent participants (all  $p < 0.05$ ). They were less physically active, had poorer functional status (higher ADL and IADL scores), and worse nutritional, physical, and cognitive performance, while depressive symptoms did not differ between groups. Hearing impairment was more frequent among incontinent participants, whereas visual impairment was less common. The total IC score was lower in incontinent individuals (60.2 [51.5–69.7] vs. 85.2 [76.1–92.7];  $p < 0.001$ ), and low IC ( $< 77.6$ ) was more prevalent (88.6% vs. 29.5%;  $p < 0.001$ ).

Fig. 2 shows differences in overall IC and its domains between continent and incontinent participants. Significantly lower scores were observed across all IC domains, including locomotion (16.7 [0.0–33.3] vs. 66.7 [41.7–83.3];  $p < 0.001$ ), cognition (50.0 [25.0–91.7] vs. 100.0 [83.3–100.0];  $p < 0.001$ ), vitality (71.4 [64.3–85.7] vs. 92.9 [85.7–100.0];  $p < 0.001$ ), sensory function (66.7 [54.2–83.3] vs. 83.3 [70.8–100.0];  $p < 0.001$ ), and psychological well-being (92.9 [75.0–100.0] vs. 100.0 [85.7–100.0];  $p = 0.026$ ). Restricted cubic spline analysis confirmed a linear association between IC and UI (Fig. 3,  $p$  for non-linearity = 0.701).

In logistic regression models (Table 2), higher IC scores were associated with lower odds of UI. When IC was analysed as a continuous variable, each ten-point increase corresponded to a significant reduction in the odds of incontinence across all models (OR 0.34, 95% CI 0.24–0.48,  $p < 0.001$ ). When analysed as a categorical variable, high IC was associated with lower odds of UI compared with low IC, and the association remained significant after adjustment for age, sex, education, number of chronic diseases, and number of medications (OR 0.07, 95% CI 0.02–0.20;  $p < 0.001$ ). Analyses by domain showed that higher scores in locomotion, cognition, vitality, and sensory function were independently associated with lower odds of UI, while the psychological domain was not significantly associated. In adjusted models, neither education level, multimorbidity, nor number of medications showed independent associations with UI, whereas older age and female sex were associated in specific models, particularly for the cognitive and sensory domains. When all IC domains were entered simultaneously in the same model, only locomotion and cognition retained independent associations with UI (Supplementary Table S2).

### 4. Discussion

In this population-based cohort of community-dwelling octogenarians, lower IC was strongly and linearly associated with UI, independent of sociodemographic and clinical covariates. Each ten-point increase in the IC score corresponded to a 66% reduction in the odds of UI, and the association remained robust after adjustment for major confounders. Participants with high IC had markedly lower odds of UI than those with low IC. Among the five domains, locomotion, cognition, vitality, and sensory function were independently associated with continence, whereas the psychological domain showed no significant relationship. These findings indicate that UI in very old adults reflects a multidomain

**Table 1**  
Characteristics of participants according to intrinsic capacity categories.

	Continent (N = 285)	Incontinent (N = 35)	Total sample (N = 320)	p
<b>Personal characteristics</b>				
Age, years	83.8 (81.7–87.9)	87.4 (82.9–92.5)	83.9 (81.7–88.5)	0.001
Sex, female	186 (65.3%)	29 (82.9%)	215 (67.2%)	0.037
Education, years	5.0 (5.0–5.0)	5.0 (5.0–5.0)	5.0 (5.0–5.0)	0.102
Living alone	93 (32.6%)	8 (22.9%)	101 (31.6%)	0.261
Alcohol abuse	38 (13.3%)	2 (5.7%)	40 (12.5%)	0.310
Active smoking	8 (2.8%)	0 (0%)	8 (2.5%)	0.667
Physically active	196 (68.8%)	6 (17.1%)	202 (63.1%)	<0.001
ADL score	0.0 (0.0–0.0)	5.0 (2.5–6.0)	0.0 (0.0–0.0)	<0.001
IADL score	2.0 (0.0–4.0)	7.0 (5.0–7.0)	2.0 (0.0–4.2)	<0.001
<b>Nutritional status and physical performance</b>				
BMI, kg/m <sup>2</sup>	26.0 (22.9–28.6)	24.0 (20.4–29.0)	25.8 (22.5–28.7)	0.170
MNA-SF total score	13.0 (12.0–14.0)	10.0 (9.0–12.0)	13.0 (12.0–14.0)	<0.001
Malnutrition (MNA-SF <8)	52 (18.2%)	16 (45.7%)	68 (21.3%)	<0.001
At risk (MNA-SF 8–11)	5 (1.8%)	4 (11.4%)	9 (2.8%)	
Normal (MNA-SF ≥12)	228 (80.0%)	15 (42.9%)	243 (75.9%)	
SPPB summary score	8.0 (5.0–10.0)	2.0 (0.0–4.0)	8.0 (4.0–10.0)	<0.001
<b>Cognition and psychological status</b>				
CPS score	0.0 (0.0–1.0)	3.0 (0.5–4.5)	0.0 (0.0–1.0)	<0.001
MDS-DRS score	0.0 (0.0–2.0)	1.0 (0.0–3.5)	0.0 (0.0–3.0)	0.131
<b>Sensory impairment</b>				
<b>Hearing impairment</b>				
Absent	5 (1.8%)	2 (5.7%)	7 (2.2%)	<0.001
Mild/moderate	139 (48.8%)	28 (80.0%)	167 (52.2%)	
Severe	141 (49.5%)	5 (14.3%)	146 (45.6%)	
<b>Vision impairment</b>				
Absent	7 (2.5%)	5 (14.3%)	12 (3.8%)	0.001
Mild/moderate	105 (36.8%)	15 (42.9%)	120 (37.5%)	
Severe	173 (60.7%)	15 (42.9%)	188 (58.8%)	
<b>Intrinsic capacity</b>				
Total score	85.2 (76.1–92.7)	60.2 (51.5–69.7)	83.8 (73.0–91.7)	<0.001
Low intrinsic capacity (<77.6)	84 (29.5%)	31 (88.6%)	115 (35.9%)	<0.001
High intrinsic capacity (≥77.6)	201 (70.5%)	4 (11.4%)	205 (64.1%)	
<b>Clinical characteristics</b>				
Coronary artery disease	33 (11.6%)	4 (11.4%)	37 (11.6%)	0.999
Heart failure	11 (3.9%)	5 (14.3%)	16 (5.0%)	0.021
Diabetes mellitus	54 (18.9%)	12 (34.3%)	66 (20.6%)	0.065
COPD	38 (13.3%)	6 (17.1%)	44 (13.8%)	0.721
Dementia	14 (4.9%)	5 (14.3%)	19 (5.9%)	0.044
Parkinson's disease	5 (1.8%)	1 (2.9%)	6 (1.9%)	0.504
Depression	69 (24.2%)	13 (37.1%)	82 (25.6%)	0.147
Cancer	13 (4.6%)	3 (8.6%)	16 (5.0%)	0.538
Osteoarthritis	60 (21.1%)	6 (17.1%)	66 (20.6%)	0.750
Number of diseases	2.0 (1.0–3.0)	2.0 (2.0–4.0)	2.0 (1.0–3.0)	0.055
Multimorbidity	180 (63.2%)	27 (77.1%)	207 (64.7%)	0.148
Number of medications	3.0 (1.0–4.0)	3.0 (2.0–4.5)	3.0 (1.8–4.2)	0.260
Polypharmacy	71 (24.9%)	9 (25.7%)	80 (25.0%)	0.999

Data are reported as medians (interquartile range) and absolute numbers (%) for continuous and categorical variables, respectively.

Alcohol abuse: ≥500 mL daily of wine or equivalent; multimorbidity: ≥2 chronic diseases; polypharmacy: ≥5 medications.

Abbreviations: BMI: body mass index; CPS: cognitive performance scale; COPD:

chronic obstructive pulmonary disease; MDS-DRS: Minimum Data Set-Depression Rating Scale; SPPB: short physical performance battery.

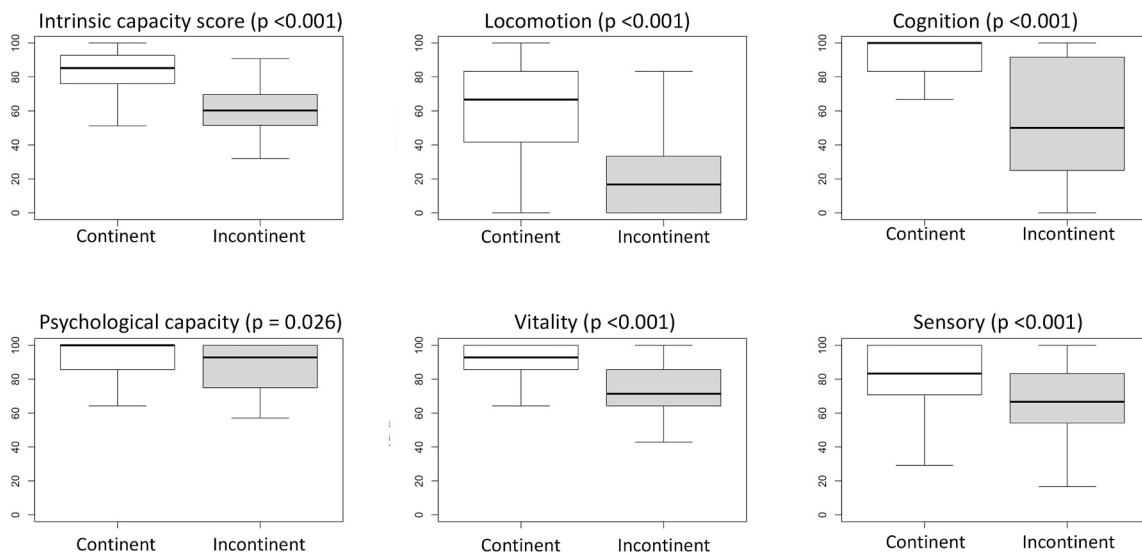
functional decline, reinforcing the concept of UI as a systemic rather than organ-specific geriatric syndrome. This interpretation aligns with recent expert recommendations advocating the integration of continence assessment into comprehensive geriatric evaluation and frailty management frameworks [7,34].

Notably, in our cohort only 10.9% of participants reported UI, a prevalence lower than that generally reported in population-based studies. In community-dwelling adults aged ≥65 years, prevalence estimates typically range from 11 to 22% in men and 22–38% in women, increasing further in advanced age, with approximately 24% of men and 35% of women affected at 85 years, and even higher rates among the oldest women [35–38]. The lower prevalence observed in our study likely reflect selective survival, the relatively high functional status of community-dwelling octogenarians, and the conservative threshold adopted to define incontinence within the MDS-HC. Moreover, prevalence estimates relying on self-report are vulnerable to underreporting, particularly in very old adults, in whom stigma and normalization of symptoms remain common [7]. While this may limit the generalisability of prevalence estimates, it reinforces the importance of active case finding and routine screening and supports the interpretation of UI as a marker of reduced IC even within a comparatively robust older population.

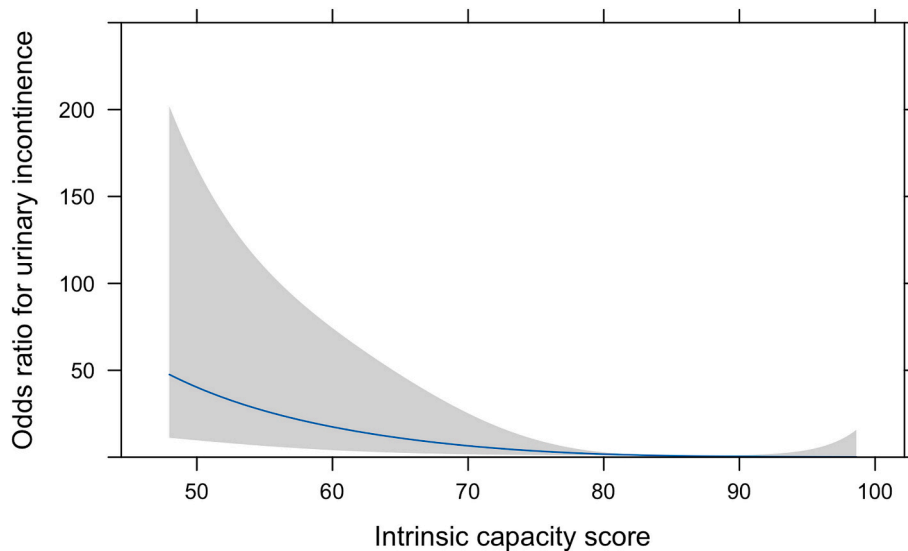
Our results extend prior evidence linking UI to physical, cognitive, and nutritional impairments in later life. Sarcopenia and reduced mobility contribute to impaired pelvic floor strength and functional incontinence [39], while cognitive impairment compromises bladder control and toileting behaviours [40]. Similarly, malnutrition and low vitality have been associated with muscle wasting and reduced resilience of the lower urinary tract [41]. The strong associations observed across IC domains mirror these multifactorial pathways. In contrast, the psychological domain was not significantly related to UI, diverging from literature linking incontinence to higher rates of depression, anxiety, and reduced self-esteem [42,43]. Although data in adults aged ≥80 years are scarce, psychological distress and reduced quality of life remain common [44,45]. Our finding may reflect both the low prevalence of clinically relevant depression in the cohort and the limited sensitivity of the MDS-DRS to capture broader sequelae such as anxiety and social withdrawal [46,47]. Moreover, normalization and psychological adjustment to urinary symptoms in very old age, may attenuate the self-perceived burden of UI, leading to underreporting of emotional distress in standardized assessments [7,48,49]. Nonetheless, the absence of association should not be interpreted as evidence of no link between mood and continence. Numerous longitudinal studies have shown that depressive symptoms can both precede and result from urinary incontinence, supporting a bidirectional relationship that may not be fully captured by the measures available in our dataset [50].

Our findings support the interpretation of UI as a late expression of reduced IC, arising from cumulative deficits across motor, cognitive, metabolic, and sensory systems. The magnitude and consistency of these associations across models suggest that IC captures the shared functional substrate underlying continence in ageing. These data complement longitudinal evidence showing that declines in IC precede disability and loss of independence [9,10]. Thus, assessing IC may help identify individuals at risk for UI before symptom onset, enabling earlier multi-domain interventions.

From a geroscience perspective, the association between IC and UI underscores the biological interconnectedness of age-related functional losses. As emphasised by the ICFSR–Geroscience Task Force [51], IC and frailty represent functional expressions of ageing, IC reflecting reserve and frailty vulnerability, while resilience modulates their balance. Cellular senescence, mitochondrial dysfunction, and chronic inflammation contribute to multisystem decline. The alignment of our findings with this model suggests that UI may act as a sentinel manifestation of



**Fig. 2.** Differences in intrinsic capacity domains and total score in participants with and without urinary incontinence. Numbers of participants: continent = 285, incontinent = 35.



**Fig. 3.** Restricted cubic spline showing the adjusted association between intrinsic capacity score and odds of urinary incontinence. The solid line represents adjusted odds ratios and the shaded area the 95% confidence interval. Estimates are adjusted for age, sex, education level, number of chronic conditions, and number of medications.

**Table 2**

Unadjusted and adjusted logistic regression models exploring the association between intrinsic capacity composite score and urinary incontinence and between intrinsic capacity domains and incontinence.

	Unadjusted OR (95% CI)	p	Model 1 OR (95% CI)	p	Model 2 OR (95% CI)	p
Intrinsic capacity score per ten-point increase	0.34 (0.24–0.46)	<0.001	0.35 (0.25–0.48)	<0.001	0.34 (0.24–0.48)	<0.001
Intrinsic capacity categories						
Low (<77.6)	–		–		–	
High (≥77.6)	0.05 (0.02–0.14)	<0.001	0.07 (0.02–0.18)	<0.001	0.07 (0.02–0.20)	<0.001
Domains per ten-point increase						
Locomotion	0.61 (0.52–0.71)	<0.001	0.63 (0.53–0.73)	<0.001	0.63 (0.53–0.74)	<0.001
Cognition	0.67 (0.59–0.76)	<0.001	0.66 (0.58–0.76)	<0.001	0.67 (0.58–0.77)	<0.001
Vitality	0.50 (0.39–0.63)	<0.001	0.52 (0.41–0.67)	<0.001	0.54 (0.42–0.70)	<0.001
Psychology	0.85 (0.69–1.06)	0.140	0.88 (0.71–1.12)	0.300	1.02 (0.79–1.34)	0.900
Sensory	0.68 (0.57–0.80)	<0.001	0.70 (0.58–0.85)	<0.001	0.73 (0.60–0.89)	0.002

Model 1: age- and sex-adjusted. Model 2: fully adjusted for age, sex, education, number of chronic diseases, and number of medications. Abbreviations: CI, confidence interval; OR, odds ratio.

impaired resilience. The parallel decline in locomotion, vitality, and cognition observed in incontinent participants likely reflects cumulative impairments in neuromuscular integrity, energy metabolism, and brain–bladder control, consistent with experimental evidence that mitochondrial dysfunction and neuroinflammation compromise both central and peripheral mechanisms of micturition [52]. Notably, when all IC domains were considered simultaneously, locomotion and cognition retained independent associations with UI, suggesting that deficits in vitality, psychological well-being, and sensory function may be clinically expressed through concomitant impairments in locomotion and cognition; further research is needed to investigate the interrelationships among IC domains [53,54].

The present findings align with the second edition of the WHO ICOPE Handbook [12], which recognises UI as a core component of functional health assessment in older adults. Including continence screening within Step 1 of the ICOPE algorithm, alongside the five IC domains, represents a shift toward proactive, person-centred care aimed at preserving function and independence. By embedding UI within the IC framework, the WHO explicitly positions continence as both a determinant and an indicator of healthy ageing. Our data provide empirical support for this integration. Similar approaches emphasise the importance of non-pharmacological and non-surgical continence promotion within healthy ageing strategies to maintain autonomy and quality of life [55,56]. Assessing IC in routine practice could help clinicians detect early decline in those with mild or occasional UI, prompting multidomain interventions targeting mobility, nutrition, and cognition rather than symptom management alone. Such an approach resonates with the geroscience principle that addressing upstream mechanisms of ageing may mitigate multiple clinical outcomes simultaneously [57,58].

From a policy perspective, incorporating IC-based assessment into primary care and community programmes could enhance the effectiveness of continence promotion strategies and reduce disability burden in very old populations. In practice, screening for UI within ICOPE Step 1 could serve as a pragmatic entry point to identify older adults with reduced IC. Simple measures, such as gait speed, nutritional screening, and cognitive testing, may guide multidisciplinary interventions addressing upstream determinants of UI, rather than focusing solely on symptom containment.

#### 4.1. Strengths and limitations

The main strengths of this study include its population-based design, standardized assessment of UI using the MDS-HC instrument, and comprehensive evaluation of the five IC domains within a well-characterised cohort of very old adults. The use of spline modelling to test linearity and the robustness of multivariable adjustment strengthen the validity of the findings. However, several limitations should be acknowledged. First, the cross-sectional design precludes inference on temporal or causal relationships between IC and UI. Although IC is theoretically upstream of functional outcomes, longitudinal analyses are needed to determine whether declines in IC predict incident UI. Second, the relatively small number of incontinent participants limited statistical power for interaction analyses and domain-specific stratification. Third, the operationalisation of IC was based on existing measures harmonised through the POMP method, which may not fully capture the dynamic interplay between domains. Finally, the study sample, composed of community-dwelling octogenarians from a rural Italian area, may not represent institutionalised or ethnically diverse populations, limiting generalisability. Future longitudinal work integrating IC trajectories with continence outcomes, ideally across diverse populations and care settings, will be crucial to inform IC-guided continence promotion strategies advocated within the WHO ICOPE framework.

## 5. Conclusions

In summary, this study provides novel evidence that lower IC,

particularly deficits in locomotion, cognition, vitality, and sensory function, is strongly associated with UI among community-dwelling octogenarians. These findings support a multidimensional interpretation of UI as a clinical manifestation of declining IC and resilience within the geroscience framework. Integrating continence assessment into IC-based models of care, as recommended by the WHO ICOPE 2024 handbook, may facilitate earlier identification and intervention, promoting healthy longevity and functional independence in very old adults.

## Contributors

Stefano Cacciatore contributed to conceptualization, methodology, formal analysis, writing the original draft, visualization, and funding acquisition.

Mathias Schlögl contributed to conceptualization, validation, and review and editing of the draft paper.

Riccardo Calvani contributed to conceptualization, methodology, validation, and review and editing of the draft paper.

Andrea Russo contributed to conceptualization, validation, investigation, and review and editing of the draft paper.

Matteo Tosato contributed to conceptualization, validation, and review and editing of the draft paper.

Adrian Wagg contributed to conceptualization, validation, and review and editing of the draft paper.

Emanuele Marzetti contributed to conceptualization, methodology, validation, review and editing of the draft paper, supervision, and funding acquisition.

Francesco Landi contributed to conceptualization, methodology, validation, investigation, review and editing of the draft paper, supervision, and funding acquisition.

All authors saw and approved the final version and no other person made a substantial contribution to the paper.

## Ethical approval

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the Catholic University of Sacred Heart, Rome, Italy. Informed consent was obtained from all subjects involved in the study.

## Provenance and peer review

This article was not commissioned and was externally peer reviewed.

## Declaration of Generative AI and AI-assisted technologies in the writing process

No generative artificial intelligence (AI) or AI-assisted tools were used in the writing, editing, or preparation of this paper.

## Funding

This work was partly supported by the Università Cattolica del Sacro Cuore (D1.2024 and D1.2025), the Ministry of Health, Italy (Ricerca Corrente 2025), and the nonprofit research foundation “Centro Studi Achille e Linda Lorenzon” (N/A). E.M. received support from Next Generation EU PRIN (2022YNENP3). The authors also acknowledge co-funding from Next Generation EU, in the context of the National Recovery and Resilience Plan, Investment PE8—Project Age-It: “Ageing Well in an Ageing Society”. This resource was co-financed by the Next Generation EU (DM 1557 11.10.2022). The views and opinions expressed are only those of the authors and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the European Commission can be held responsible for them.

## Data sharing and collaboration

There are no linked research data sets for this paper. The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available because they could compromise the privacy of the research participants.

## Declaration of competing interest

The authors declare that they have no competing interest.

## Acknowledgements

Stefano Cacciatore acknowledges support from the Ermenegildo Zegna Founder's Scholarship. This study was supported by the Italian Ministry of Health (Ricerca Corrente 2024). The “Invecchiamento e Longevità nel Sirente” (iLSIRENTE) study was supported by the “Comunità Montana Sirentina” (Secinaro, L'Aquila, Italy). We thank all participants for their enthusiasm in engaging in the project and their patience during assessments. We are grateful to volunteers of the “Protezione Civile” and the Italian Red Cross of the Abruzzo Region for their support. Finally, we thank the “Comunità Montana Sirentina” and its President who promoted and strongly supported the development of the project. Members of the iLSIRENTE Study Group are listed in [15].

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.maturitas.2026.108871>.

## References

- [1] S. Batmani, R. Jalali, M. Mohammadi, S. Bokaei, Prevalence and factors related to urinary incontinence in older adults women worldwide: a comprehensive systematic review and meta-analysis of observational studies, *BMC Geriatr.* 21 (2021) 212, <https://doi.org/10.1186/s12877-021-02135-8>.
- [2] S.P. Daugirdas, T. Markossian, E.R. Mueller, R. Durazo-Arvizu, G. Cao, H. Kramer, Urinary incontinence and chronic conditions in the US population age 50 years and older, *Int. Urogynecol. J.* 31 (5) (2020) 1013–1020, <https://doi.org/10.1007/s00192-019-04137-y>.
- [3] F. Yan, L.D. Xiao, K. Zhou, Z. Li, S. Tang, Perceptions and help-seeking behaviours among community-dwelling older people with urinary incontinence: a systematic integrative review, *J. Adv. Nurs.* 78 (6) (2022) 1574–1587, <https://doi.org/10.1111/jan.15183>.
- [4] S. Horrocks, M. Somerset, H. Stoddart, T.J. Peters, What prevents older people from seeking treatment for urinary incontinence? A qualitative exploration of barriers to the use of community continence services, *Fam. Pract.* 21 (6) (2004) 689–696, <https://doi.org/10.1093/fampra/cmh622>.
- [5] C. Shaw, A review of the psychosocial predictors of help-seeking behaviour and impact on quality of life in people with urinary incontinence, *J. Clin. Nurs.* 10 (1) (2001) 15–24, <https://doi.org/10.1046/j.1365-2702.2001.00443.x>.
- [6] W. Gibson, A. Wagg, New horizons: urinary incontinence in older people, *Age Ageing* 43 (2) (2014) 157–163, <https://doi.org/10.1093/ageing/afu214>.
- [7] M. Schlogl, M.H. Umbeh, M.H. Habib, A. Wagg, A.L. Gordon, R. Harwood, Promoting continence in older people, *Age Ageing* 51 (9) (2022), <https://doi.org/10.1093/ageing/afac199>.
- [8] E.S. Lukacz, Y. Santiago-Lastra, M.E. Albo, L. Brubaker, Urinary incontinence in women: a review, *JAMA* 318 (16) (2017) 1592–1604, <https://doi.org/10.1001/jama.2017.12137>.
- [9] J.L. Sanchez-Sanchez, W.H. Lu, D. Gallardo-Gomez, B. Del Pozo Cruz, P. de Souto Barreto, A. Lucia, P.L. Valenzuela, Association of intrinsic capacity with functional decline and mortality in older adults: a systematic review and meta-analysis of longitudinal studies, *Lancet Healthy Longev.* 5 (7) (2024) e480–e492, [https://doi.org/10.1016/S2666-7568\(24\)00092-8](https://doi.org/10.1016/S2666-7568(24)00092-8).
- [10] M.J. Prince, D. Acosta, M. Guerra, Y. Huang, K.S. Jacob, I.Z. Jimenez-Velazquez, A. T. Jotheeswaran, J.J. Llibre Rodriguez, A. Salas, A.L. Sosa, I. Acosta, R. Mayston, Z. Liu, J.J. Llibre-Guerra, A.M. Prina, A. Valhuerdi, Intrinsic capacity and its associations with incident dependence and mortality in 10/66 Dementia Research Group studies in Latin America, India, and China: a population-based cohort study, *PLoS Med.* 18 (9) (2021) e1003097, <https://doi.org/10.1371/journal.pmed.1003097>.
- [11] G. Belloni, M. Cesari, Frailty and intrinsic capacity: two distinct but related constructs, *Front. Med. (Lausanne)* 6 (2019) 133, <https://doi.org/10.3389/fmed.2019.00133>.
- [12] *Integrated Care for Older People (ICOPE): Guidance for Person-centred Assessment and Pathways in Primary Care*, second edition, World Health Organization, Geneva, 2024.
- [13] P. Abrams, K.E. Andersson, A. Apostolidis, L. Birder, D. Bliss, L. Brubaker, L. Cardozo, D. Castro-Diaz, P.R. O'Connell, A. Cottenden, N. Cotterill, D. de Ridder, R. Dmochowski, C. Dumoulin, M. Fader, C. Fry, H. Goldman, P. Hanno, Y. Homma, V. Khullar, C. Maher, I. Milsom, D. Newman, R.J.M. Nijman, K. Rademakers, D. Robinson, P. Rosier, E. Rovner, S. Salvatore, M. Takeda, A. Wagg, T. Wagner, A. Wein, c. members of the, 6th International Consultation on Incontinence, Recommendations of the International Scientific Committee: evaluation and treatment of urinary incontinence, pelvic organ prolapse and faecal incontinence, *NeuroUrol. Urodyn.* 37 (7) (2018) 2271–2272, <https://doi.org/10.1002/nau.23551>.
- [14] E.M. Langballe, V. Skirbekk, B.H. Strand, Subjective age and the association with intrinsic capacity, functional ability, and health among older adults in Norway, *Eur. J. Ageing* 20 (1) (2023) 4, <https://doi.org/10.1007/s10433-023-00753-2>.
- [15] F. Landi, A. Russo, M. Cesari, C. Barillaro, G. Onder, V. Zamboni, A. De Santis, M. Pahor, L. Ferrucci, R. Bernabei, The iLSIRENTE study: a prospective cohort study on persons aged 80 years and older living in a mountain community of Central Italy, *Aging Clin. Exp. Res.* 17 (6) (2005) 486–493, <https://doi.org/10.1007/BF03327416>.
- [16] J.N. Morris, B.E. Fries, K. Steel, N. Ikegami, R. Bernabei, G.I. Carpenter, R. Gilgen, J.P. Hirdes, E. Topinkova, Comprehensive clinical assessment in community setting: applicability of the MDS-HC, *J. Am. Geriatr. Soc.* 45 (8) (1997) 1017–1024, <https://doi.org/10.1111/j.1532-5415.1997.tb02975.x>.
- [17] F. Landi, E. Tua, G. Onder, B. Carrara, A. Sgadari, C. Rinaldi, G. Gambassi, F. Lattanzio, R. Bernabei, S.-H.S.G.o. Bergamo, Minimum data set for home care: a valid instrument to assess frail older people living in the community, *Med. Care* 38 (12) (2000) 1184–1190, <https://doi.org/10.1097/00005650-200012000-00005>.
- [18] L. Ferrucci, S. Bandinelli, E. Benvenuti, A. Di Iorio, C. Macchi, T.B. Harris, J. M. Guralnik, Subsystems contributing to the decline in ability to walk: bridging the gap between epidemiology and geriatric practice in the InCHIANTI study, *J. Am. Geriatr. Soc.* 48 (12) (2000) 1618–1625, <https://doi.org/10.1111/j.1532-5415.2000.tb03873.x>.
- [19] I. Mangani, M. Cesari, A. Russo, G. Onder, C. Maraldi, V. Zamboni, N. Marchionni, R. Bernabei, M. Pahor, F. Landi, Physical function, physical activity and recent falls. Results from the “Invecchiamento e Longevita nel Sirente (iLSIRENTE)” Study, *Aging Clin. Exp. Res.* 20 (3) (2008) 234–241, <https://doi.org/10.1007/BF03324778>.
- [20] D.J. Plonczynski, J. Wilbur, J.L. Larson, K. Thiede, Lifestyle physical activity of older rural women, *Res. Nurs. Health* 31 (5) (2008) 501–513, <https://doi.org/10.1002/nur.20282>.
- [21] J.N. Morris, B.E. Fries, S.A. Morris, Scaling ADLs within the MDS, *J. Gerontol. A Biol. Sci. Med. Sci.* 54 (11) (1999) M546–M553, <https://doi.org/10.1093/gerona/54.11.m546>.
- [22] J.N. Morris, K. Berg, B.E. Fries, K. Steel, E.P. Howard, Scaling functional status within the interRAI suite of assessment instruments, *BMC Geriatr.* 13 (2013) 128, <https://doi.org/10.1186/1471-2318-13-128>.
- [23] S. Cacciatore, E. Marzetti, R. Calvani, A. Picca, S. Salini, A. Russo, M. Tosato, F. Landi, Intrinsic capacity and recent falls in adults 80 years and older living in the community: results from the iLSIRENTE Study, *Aging Clin. Exp. Res.* 36 (1) (2024) 169, <https://doi.org/10.1007/s40520-024-02822-7>.
- [24] S. Cacciatore, R. Calvani, K. Prokopidis, M. Schlogl, A. Russo, M. Tosato, S. D. Anton, C. Leeuwenburgh, J.A. Batsis, E. Marzetti, F. Landi, Intrinsic capacity-frailty phenotypes and subclinical inflammation in community-dwelling octogenarians: a cross-sectional analysis from the iLSIRENTE study, *Exp. Gerontol.* 214 (2026) 113026, <https://doi.org/10.1016/j.exger.2026.113026>.
- [25] J.M. Guralnik, L. Ferrucci, C.F. Pieper, S.G. Leveille, K.S. Markides, G.V. Ostir, S. Studenski, L.F. Berkman, R.B. Wallace, Lower extremity function and subsequent disability: consistency across studies, predictive models, and value of gait speed alone compared with the short physical performance battery, *J. Gerontol. A Biol. Sci. Med. Sci.* 55 (4) (2000) M221–M231, <https://doi.org/10.1093/gerona/55.4.m221>.
- [26] S.L. Hartmaier, P.D. Sloane, H.A. Guess, G.G. Koch, C.M. Mitchell, C.D. Phillips, Validation of the minimum data set cognitive performance scale: agreement with the mini-mental state examination, *J. Gerontol. A Biol. Sci. Med. Sci.* 50 (2) (1995) M128–M133, <https://doi.org/10.1093/gerona/50a.2.m128>.
- [27] L.Z. Rubenstein, J.O. Harker, A. Salva, Y. Guigoz, B. Vellas, Screening for undernutrition in geriatric practice: developing the short-form mini-nutritional assessment (MNA-SF), *J. Gerontol. A Biol. Sci. Med. Sci.* 56 (6) (2001) M366–M372, <https://doi.org/10.1093/gerona/56.6.m366>.
- [28] A.B. Burrows, J.N. Morris, S.E. Simon, J.P. Hirdes, C. Phillips, Development of a minimum data set-based depression rating scale for use in nursing homes, *Age Ageing* 29 (2) (2000) 165–172, <https://doi.org/10.1093/ageing/29.2.165>.
- [29] D.M. Guthrie, N. Williams, A. Jaiswal, P. Mick, H.M. O'Rourke, M.K. Pichora-Fuller, W. Wittich, R. Sutradhar, Prevalence of sensory impairments in home care and long-term care using interRAI data from across Canada, *BMC Geriatr.* 22 (1) (2022) 944, <https://doi.org/10.1186/s12877-022-03671-7>.
- [30] M.W. Swanson, G. McGwin Jr., A.F. Elliott, C. Owsley, Association between the nursing home minimum data set for vision and vision-targeted health-related quality of life in nursing home residents as assessed by certified nursing assistants, *J. Opt.* 2 (3) (2009) 148–154, <https://doi.org/10.3921/joptom.2009.148>.
- [31] P. Cohen, J. Cohen, L.S. Aiken, S.G. West, The problem of units and the circumstance for POMP, *Multivar. Behav. Res.* 34 (3) (1999) 315–346, [https://doi.org/10.1207/s15327906mbr3403\\_2](https://doi.org/10.1207/s15327906mbr3403_2).

- [32] N.M. Resnick, G.H. Brandeis, M.M. Baumann, J.N. Morris, Evaluating a national assessment strategy for urinary incontinence in nursing home residents: reliability of the minimum data set and validity of the resident assessment protocol, *NeuroUrol.Urodyn.* 15 (6) (1996) 583–598, [https://doi.org/10.1002/\(SICI\)1520-6777\(1996\)15:6<583::AID-NAUI>3.0.CO;2-B](https://doi.org/10.1002/(SICI)1520-6777(1996)15:6<583::AID-NAUI>3.0.CO;2-B).
- [33] F. Harrell, *rms: Regression Modeling Strategies. R Package Version 8.1-0*, 2025.
- [34] W. Gibson, T. Johnson, R. Kirschner-Hermanns, G. Kuchel, A. Markland, S. Orme, J. Ostaszkiwicz, G. Szonyi, J. Wyman, A. Wagg, Incontinence in frail elderly persons: report of the 6th international consultation on incontinence, *NeuroUrol. Urodyn.* 40 (1) (2021) 38–54, <https://doi.org/10.1002/nau.24549>.
- [35] H. Sadri, A. Olliaei, S. Sadri, P. Pezeshki, B. Chughtai, D. Elterman, Systematic review and meta-analysis of urinary incontinence prevalence and population estimates, *NeuroUrol.Urodyn.* 43 (1) (2024) 52–62, <https://doi.org/10.1002/nau.25276>.
- [36] S. Maggi, N. Minicuci, J. Langlois, M. Pavan, G. Enzi, G. Crepaldi, Prevalence rate of urinary incontinence in community-dwelling elderly individuals: the Veneto study, *J. Gerontol. A Biol. Sci. Med. Sci.* 56 (1) (2001) M14–M18, <https://doi.org/10.1093/gerona/56.1.m14>.
- [37] D. Thom, Variation in estimates of urinary incontinence prevalence in the community: effects of differences in definition, population characteristics, and study type, *J. Am. Geriatr. Soc.* 46 (4) (1998) 473–480, <https://doi.org/10.1111/j.1532-5415.1998.tb02469.x>.
- [38] J.T. Anger, C.S. Saigal, M.S. Litwin, P. Urologic Diseases of America, The prevalence of urinary incontinence among community dwelling adult women: results from the National Health and nutrition examination survey, *J. Urol.* 175 (2) (2006) 601–604, [https://doi.org/10.1016/S0022-5347\(05\)00242-9](https://doi.org/10.1016/S0022-5347(05)00242-9).
- [39] A.M. Suskind, P.M. Cawthon, S. Nakagawa, L.L. Subak, I. Reinders, S. Satterfield, S. Cummings, J.A. Cauley, T. Harris, A.J. Huang, A.B.C.S. Health, Urinary incontinence in older women: the role of body composition and muscle strength: from the Health, Aging, and Body Composition Study, *J. Am. Geriatr. Soc.* 65 (1) (2017) 42–50, <https://doi.org/10.1111/jgs.14545>.
- [40] A.J. Huang, J.S. Brown, D.H. Thom, H.A. Fink, K. Yaffe, G. Study of Osteoporotic Fractures Research, Urinary incontinence in older community-dwelling women: the role of cognitive and physical function decline, *Obstet. Gynecol.* 109 (4) (2007) 909–916, <https://doi.org/10.1097/01.AOG.0000258277.01497.4b>.
- [41] J. Corral-Perez, L. Avila-Cabeza-de-Vaca, I. Valero-Cantero, A. Gonzalez-Mariscal, J.G. Ponce-Gonzalez, M.A. Vazquez-Sanchez, C. Casals, Predictors of urinary and fecal incontinence in prefrail and frail older adults: a cross-sectional study of the FRAGSALUD project, *J. Gerontol. A Biol. Sci. Med. Sci.* 79 (6) (2024), <https://doi.org/10.1093/gerona/glae072>.
- [42] H.F. de Vries, G.M. Northington, H.R. Bogner, Urinary incontinence (UI) and new psychological distress among community dwelling older adults, *Arch. Gerontol. Geriatr.* 55 (1) (2012) 49–54, <https://doi.org/10.1016/j.archger.2011.04.012>.
- [43] X. Yang, C. Cheng, W. Ma, C. Jia, Mediating role of functional limitations in the association of urinary incontinence with depressive symptoms among middle-aged and older adults: the English Longitudinal Study of Aging, *J. Affect. Disord.* 313 (2022) 158–162, <https://doi.org/10.1016/j.jad.2022.06.075>.
- [44] J. Sims, C. Browning, B. Lundgren-Lindquist, H. Kendig, Urinary incontinence in a community sample of older adults: prevalence and impact on quality of life, *Disabil. Rehabil.* 33 (15–16) (2011) 1389–1398, <https://doi.org/10.3109/09638288.2010.532284>.
- [45] M.A. Farage, K.W. Miller, E. Berardesca, H.I. Maibach, Psychosocial and societal burden of incontinence in the aged population: a review, *Arch. Gynecol. Obstet.* 277 (4) (2008) 285–290, <https://doi.org/10.1007/s00404-007-0505-3>.
- [46] C.C. Hendrix, K.M. Sakaiye, G. Karabatsos, D. Daigle, The use of the Minimum Data Set to identify depression in the elderly, *J. Am. Med. Dir. Assoc.* 4 (6) (2003) 308–312, <https://doi.org/10.1097/01.JAM.0000094065.05310.FB>.
- [47] C.K. Liang, L.K. Chen, C.F. Tsai, T.P. Su, Y.K. Lo, C.F. Lan, S.J. Hwang, Screening depression among institutionalized older Chinese men by minimum data set: we need a new instrument, *J. Geriatr. Psychiatry Neurol.* 24 (4) (2011) 179–183, <https://doi.org/10.1177/0891988709335795>.
- [48] M. Schlogl, A. Gordon, HEARTS, minds and souls-it is time for geriatricians to bring more to continence management, *Age Ageing* 50 (5) (2021) 1508–1511, <https://doi.org/10.1093/ageing/afab088>.
- [49] C. Shaw, S. Rajabali, C. Tannenbaum, A. Wagg, Is the belief that urinary incontinence is normal for ageing related to older Canadian women's experience of urinary incontinence? *Int. Urogynecol. J.* 30 (12) (2019) 2157–2160, <https://doi.org/10.1007/s00192-019-03906-z>.
- [50] C. Joinson, M.J. Drake, A. Fraser, K. Tilling, J. Heron, Bidirectional relationships between depression, anxiety and urinary symptoms in women: a prospective cohort study, *J. Affect. Disord.* 369 (2025) 516–522, <https://doi.org/10.1016/j.jad.2024.10.035>.
- [51] P. de Souto Barreto, Y. Rolland, L. Ferrucci, H. Arai, H. Bischoff-Ferrari, G. Duque, R.A. Fielding, J.R. Beard, J. Muscedere, F. Sierra, B. Vellas, N.K. LeBrasseur, Looking at frailty and intrinsic capacity through a geroscience lens: the ICFSR & Geroscience Task Force, *Nat. Aging* 3 (12) (2023) 1474–1479, <https://doi.org/10.1038/s43587-023-00531-w>.
- [52] C.C. Hardy, R. Korstanje, Aging and urinary control: alterations in the brain-bladder axis, *Aging Cell* 22 (12) (2023) e13990, <https://doi.org/10.1111/acer.13990>.
- [53] T. Zou, J. Liu, L. Zhang, F. Liu, E. Zhang, X. Wang, J. Ju, X. Huang, Q. Fang, Complex relationships among various domains of intrinsic capacity and their associated factors in community-dwelling older adults: a network analysis, *Exp. Gerontol.* 214 (2025) 113020, <https://doi.org/10.1016/j.exger.2025.113020>.
- [54] E. Gonzalez-Bautista, J.J. Llibre-Guerra, A.L. Sosa, I. Acosta, S. Andrieu, D. Acosta, J.J. Llibre-Rodriguez, M. Prina, Exploring the natural history of intrinsic capacity impairments: longitudinal patterns in the 10/66 study, *Age Ageing* 52 (7) (2023), <https://doi.org/10.1093/ageing/afad137>.
- [55] K.F. Hunter, J.I. Butler, S. Shrestha, C.A. Jones, A. Wagg, N. Millar, F. Carr, S. Dahlke, Interventions supporting the translation of gerontological evidence into practice to optimize functional outcomes for hospitalized older adults: a scoping review, *PLoS One* 20 (6) (2025) e0324953, <https://doi.org/10.1371/journal.pone.0324953>.
- [56] M. Kirillovich, S. Rajabali, A. Wagg, Exploring the priorities of older adults in managing urinary incontinence: a patient-oriented research approach, *Can. Geriatr. J.* 27 (4) (2024) 473–484, <https://doi.org/10.5770/cgj.27.758>.
- [57] D.R. Seals, J.N. Justice, T.J. LaRocca, Physiological geroscience: targeting function to increase healthspan and achieve optimal longevity, *J. Physiol.* 594 (8) (2016) 2001–2024, <https://doi.org/10.1113/jphysiol.2014.282665>.
- [58] S.B. Kritchevsky, S.R. Cummings, Geroscience: a translational review, *JAMA* 334 (12) (2025) 1094–1102, <https://doi.org/10.1001/jama.2025.11289>.