Self-rated health and clinical-functional vulnerability in older adults: an integrated analysis of IVCF-20 domains in Paraná, Brazil

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Abstract

Objective: To analyze the association between the domains of the Clinical-Functional Vulnerability Index-20 (IVCF-20) and self-rated health among older adults in Paraná, Brazil, as well as to describe their clinical-functional profile and the concordance between these dimensions. *Methods:* This observational, cross-sectional, analytical study included 86,183 older adults (≥60 years) registered in the Paraná Older Adult Information System (*Sistema de Informação da Pessoa Idosa do Paraná* [SIPI-PR]) between September 2023 and September 2024. Descriptive analyses were performed, and associations were assessed using Cramér's V ($p<0.001$), followed by multivariable binary logistic regression, with positive self-rated health as the outcome. *Results:* Positive self-rated health was reported by 61.1% of participants, and 65.3% were classified as robust. Concordance between self-rated health and clinical-functional vulnerability was observed in most cases, although discrepancies were also identified. Increasing age and impairment across all analyzed IVCF-20 domains were associated with lower odds of positive self-rated health ($p<0.001$), with the strongest associations observed for activities of daily living (ADLs) (OR=0.33; 95% CI: 0.31–0.34) and mood (OR=0.40; 95% CI: 0.38–0.41). *Conclusion:* Self-rated health among older adults was associated with multiple clinical-functional domains, particularly ADLs and mood, reinforcing its multidimensional nature. These findings may inform the planning of health actions and the organization of care in primary health care. The IVCF-20 may be used as a multidimensional assessment tool to identify priority domains.

Keywords: Aged. Self-Concept. Health Vulnerability. Geriatric Assessment.

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INTRODUCTION

Self-rated health refers to an individual's subjective assessment of their own health status and is a complex construct encompassing multiple dimensions. Among older adults, this perception involves not only physical aspects, such as mobility, but also emotional and social factors, including depressive symptoms and communication ability, thus requiring a comprehensive understanding of the aging process[1-3]. As an indicator that integrates multiple dimensions of health, self-rated health has been widely associated with morbidity and mortality in this population[4-6].

Despite its relevance, the literature shows substantial methodological heterogeneity in the assessment of factors associated with self-rated health among older adults, including variations in the questions used, response categories, and determinants examined[4,7]. Although such diversity is important for exploring self-rated health from different perspectives, the lack of even minimal standardization poses a considerable challenge to comparisons across studies on this topic, thereby limiting the applicability of their findings not only to clinical practice but also to health policy development.

Recent reviews have reinforced this limitation. Kaufman et al.[7] highlighted the need for greater transparency in the formulation and analysis of self-rated health measures in Latin America. Similarly, Pagotto et al.[4] demonstrated a lack of uniformity in the instruments used and suggested standardizing questions and response options as a strategy to improve the comparability of findings and support health-related decision-making.

In this context, the Clinical-Functional Vulnerability Index-20 (IVCF-20, acronym derived from the Portuguese name) represents a promising tool for investigating factors associated with self-rated health. Developed and validated in Brazil,[8] the instrument assesses clinical-functional vulnerability across eight domains: age, self-rated health, activities of daily living (ADLs), cognition, mood, mobility, communication, and comorbidities. Based on these domains, older adults can be classified as robust, at risk of frailty, or frail. By incorporating self-rated health into its structure, the IVCF-20 enables standardized and reproducible assessment of its relationship with the other clinical-functional domains.

In the state of Paraná, the IVCF-20 was incorporated into the Older Adult Health Care Guidelines in 2018 and subsequently adopted throughout the state health care network[9]. Information obtained through its application is recorded in the Paraná Older Adult Information System (*Sistema de Informação da Pessoa Idosa* [SIPI-PR]), providing a population-level database that enables large-scale analyses of the health of older adults.

Against this background, the present study aimed to analyze the association between the multidimensional domains of the IVCF-20 and self-rated health among older adults in Paraná, as well as to describe the clinical-functional profile of this population and explore the concordance between self-rated health and clinical-functional vulnerability.

METHODS

This was an observational, cross-sectional, analytical study based on secondary data from the SIPI-PR. The study included records of care provided to older adults in primary health care by multidisciplinary teams within the Health Care Network (*Rede de Atenção à Saúde* [RAS]) across the 22 Health Regions of the state of Paraná, Brazil, between September 2023 and September 2024.

SIPI-PR is a statewide database maintained by the Paraná State Department of Health (*Secretaria de Estado da Saúde do Paraná* [SESA-PR]) for monitoring the health status of the older population. The data are not publicly accessible, and their use for research purposes was authorized by SESA-PR within the scope of the project approved by the Research Ethics Committee. Information is obtained through the administration of the IVCF-20 in primary health care facilities. The instrument[8] comprises 20 items distributed across eight domains: age, self-rated health, ADLs, cognition, mood, mobility, communication, and comorbidities. The total score ranges from 0 to 40 points, with higher scores indicating greater clinical-functional vulnerability. Individuals are

classified as robust (0–6 points), at risk of frailty (7–14 points), or frail (≥15 points).

The study included 86,183 individuals aged 60 years or older who had a complete assessment recorded in SIPI-PR. Data were organized in electronic spreadsheets and analyzed using IBM SPSS Statistics, version 27.0.

For the association and regression analyses, the clinical-functional domains of the IVCF-20, including activities of daily living, cognition, mood, mobility, communication, and comorbidities, were operationalized according to their respective clinical criteria and subsequently dichotomized into categories representing the absence or presence of impairment in each domain, in accordance with the scoring criteria established in the original instrument. For analytical purposes, a score of zero in the respective domain was considered indicative of no impairment, whereas any score indicating clinical-functional vulnerability was classified as impairment.

Categorical variables were described using absolute and relative frequencies. The association between self-rated health and the IVCF-20 domains was assessed using Cramér's V, with $p<0.001$ considered statistically significant. For the multivariable analysis, variables showing statistically significant associations were included in a binary logistic regression model, with positive self-rated health as the dependent variable. Measures of association were expressed as odds ratios (ORs) with their respective 95% confidence intervals (95% CIs).

Additionally, a descriptive analysis of self-rated health according to clinical-functional vulnerability classification was performed to identify potential discrepancies between these dimensions.

This study is part of the broader research project entitled "Older Adult Health System (SIPI): a digital tool to promote healthy aging in Paraná," approved by the Research Ethics Committee of the Paraná State Department of Health, affiliated with the *Complexo Hospital do Trabalhador*, in accordance with Resolution No. 466/2012, under CAAE No. 75610023.2.0000.5225 and approval No. 6,621,839, issued on January 23, 2024. The present investigation constitutes a secondary analysis of data obtained from SIPI-PR and is related to the broader project objective of conducting a situational assessment of the health of older adults in Paraná using the system.

USE OF ARTIFICIAL INTELLIGENCE

NotebookLM (Google; notebooklm.google.com) was used solely as editorial support for scientific writing. The tool had no direct access to the study database and was not involved in the statistical analysis, interpretation of results, or formulation of conclusions.

DATA AVAILABILITY

The dataset is not publicly available because of ethical, legal, and institutional restrictions. The data used in this study were provided by the Paraná State Department of Health, contain information concerning users of the Brazilian Unified Health System (Sistema Único de Saúde [SUS]), and were made available exclusively for research purposes following approval by a Research Ethics Committee and under a confidentiality agreement signed by the research team. Accordingly, the authors are not authorized to make the dataset publicly available.

RESULTS

A total of 86,183 older adults were included, of whom 70.8% were aged 60-74 years, 22.6% were aged 75-84 years, and 6.6% were aged 85 years or older. Positive self-rated health was reported by 61.1% of participants, whereas 38.9% reported negative self-rated health. According to the IVCF-20 classification, 65.3% of participants were classified as robust, 20.8% as at risk of frailty, and 13.9% as frail.

When self-rated health and clinical-functional vulnerability classification were considered jointly, 84.2% of participants with positive self-rated health were classified as robust, whereas 15.8% were at risk of frailty or frail. Among participants with negative self-rated health, 64.2% were at risk of frailty or frail, whereas 35.7% were classified as robust.

Regarding the IVCF-20 domains, functional independence and the absence of impairments predominated across the different components assessed. Most participants were independent in ADLs (81.7%), had no clinical conditions contributing points to the comorbidity domain (74.2%), and showed no impairments in the mood (73.7%), cognition (73.1%), or communication (71.7%) domains. Mobility was the domain with the lowest proportion of participants without limitations (55.2%), whereas 44.8% presented some degree of mobility limitation. Detailed sample characteristics are presented in Table 1.

Table 1. Sociodemographic and clinical-functional characteristics of older adults assessed through the SIPI-PR in municipalities of Paraná State, Brazil, 2023–2024 (n=86,183).

Variables	Frequency and percentage n (%)
Age (years)	
60–74 years	60,975 (70.8)
75–84 years	19,484 (22.6)
≥85 years	5,724 (6.6)
Self-rated health	
Very good or good	52,625 (61.1)
Fair or poor	33,558 (38.9)
IVCF-20 classification	
Robust	56,312 (65.3)
At risk of frailty	17,908 (20.8)
Frail	11,963 (13.9)
ADLs	
Independent in ADLs	70,398 (81.7)
Functional dependence in ADLs	15,785 (18.3)
Comorbidities	
No scorable clinical conditions	63,980 (74.2)
Scorable clinical conditions	22,203 (25.8)
Mood	
No mood impairment	63,551 (73.7)
Mood impairment	22,632 (26.3)
Cognition	
No cognitive impairment	63,032 (73.1)
Cognitive impairment	23,151 (26.9)
Communication	
No communication limitation	61,760 (71.7)
Communication limitation	24,423 (28.3)
Mobility	
No mobility limitation	47,538 (55.2)
Mobility limitation	38,645 (44.8)

IVCF-20 = Clinical-Functional Vulnerability Index-20; ADLs = Activities of Daily Living. **Source:** Paraná Older Adult Information System (SIPI-PR), 2023–2024.

The association analysis using Cramér's V showed that negative self-rated health was associated with higher proportions of unfavorable conditions across all domains assessed (p<0.001). In this group, a higher proportion of individuals aged 75 years or older was observed (39.1%), along with higher proportions of functional dependence in ADLs (36.0%), scorable clinical conditions in the comorbidity domain (41.9%), mood impairment (45.8%), cognitive impairment (43.8%), communication limitation (38.9%), and mobility limitation (64.3%) (Table 2).

In the multivariable analysis, all variables remained significantly associated with self-rated health (p<0.001). The presence of clinical-functional impairment was associated with lower odds of positive self-rated health, with odds ratios below 1.0 across all domains (Table 3).

Impairment in ADLs showed the strongest association (OR=0.33; 95% CI: 0.31–0.34), followed by impairment in the mood domain (OR=0.40; 95% CI: 0.38–0.41). Intermediate associations were observed for comorbidities (OR=0.47; 95% CI: 0.45–0.49), cognition (OR=0.58; 95% CI: 0.56–0.60), and mobility (OR=0.61; 95% CI: 0.59–0.63).

The communication (OR=0.77; 95% CI: 0.74–0.80) and age (OR=0.88; 95% CI: 0.85–0.91) domains showed associations of smaller magnitude, although they remained statistically significant.

Table 2. Association between clinical-functional variables and self-rated health assessed using Cramér's V among older adults (n=86,183) in municipalities of Paraná State, Brazil, 2023–2024.

Variables	Self-Rated Health			p-value[2]
	Distribution of Older Adults	Very good or good	Fair or poor	
	N = 86,183[1]	N = 52,625[1]	N = 33,558[1]	
	n (%)	n (%)	n (%)	
Age (years)				
60–74	60,975 (70.8)	40,522 (77.0)	20,453 (60.9)	<0.001
≥75	25,208 (29.2)	12,103 (23.0)	13,105 (39.1)	
ADLs				
Independent in ADLs	70,398 (81.7)	48,931 (93)	21,467 (64.0)	<0.001
Functional dependence in ADLs	15,785 (18.3)	3,694 (7.0)	12,091 (36.0)	
Comorbidities				
No scorable clinical conditions	63,980 (74.2)	44,494 (84.5)	19,486 (58.1)	<0.001
Scorable clinical conditions	22,203 (25.8)	8,131 (15.5)	14,072 (41.9)	
Mood				
No mood impairment	63,551 (73.7)	45,347 (86.2)	18,204 (54.2)	<0.001
Mood impairment	22,632 (26.3)	7,278 (13.8)	15,354 (45.8)	
Cognition				
No cognitive impairment	63,032 (73.1)	44,169 (83.9)	18,863 (56.2)	<0.001
Cognitive impairment	23,151 (26.9)	8,456 (16.1)	14,695 (43.8)	
Communication				
No communication limitation	61,760 (71.7)	41,255 (78.4)	20,505 (61.1)	<0.001
Communication limitation	24,423 (28.3)	11,370 (21.6)	13,053 (38.9)	
Mobility				
No mobility limitation	47,538 (55.2)	35,558 (67.6)	11,980 (35.7)	<0.001
Mobility limitation	38,645 (44.8)	17,067 (32.4)	21,578 (64.3)	

[1] n (%); [2] Cramér's V. ADLs = Activities of Daily Living.

Table 3. Binary logistic regression of the associations between IVCF-20 domains and positive self-rated health among older adults in municipalities of Paraná State, Brazil, 2023–2024.

Variables	Distribution of Older Adults	Very Good or Good Self-Rated Health	Logistic Regression		*p*-value
			Odds ratio	95% CI	
	N = 86,183	N = 52,625			
Age (years)					
≥75	25,208	12,103 (48.0%)	0.88	[0.85; 0.91]	<0.001
ADLs					
Functional dependence in ADLs	15,785	3,694 (23.4%)	0.33	[0.31; 0.34]	<0.001
Comorbidities					
Scorable clinical conditions	22,203	8,131 (36.6%)	0.47	[0.45; 0.49]	<0.001
Mood					
Mood impairment	22,632	7,278 (32.2%)	0.40	[0.38; 0.41]	<0.001
Cognition					
Cognitive impairment	23,151	8,456 (36.5%)	0.58	[0.56; 0.60]	<0.001
Communication					
Communication limitation	24,423	11,370 (46.6%)	0.77	[0.74; 0.80]	<0.001
Mobility					
Mobility limitation	38,645	17,067 (44.2%)	0.61	[0.59; 0.63]	<0.001

95% CI = 95% confidence interval; ADLs = Activities of Daily Living. **Source:** Paraná Older Adult Information System (SIPI-PR), 2023–2024.

DISCUSSION

The integrated analysis of self-rated health and clinical-functional vulnerability based on the IVCF-20 domains contributes to a broader understanding of the multiple factors that influence health perceptions among older adults. In a large statewide dataset from Paraná, positive self-rated health and classification as robust predominated, suggesting that preserved functional capacity tends to be accompanied by a more favorable perception of one's own health status. This finding is consistent with Brazilian studies showing a high frequency of positive self-rated health among older adults, even in the presence of chronic conditions, indicating that this perception results from the interaction of physical, functional, emotional, and social aspects of aging[1,10,11].

Although most participants reported favorable health assessments, a substantial proportion of the population reported negative self-rated health, highlighting the heterogeneity of the aging process and reinforcing that this perception is not determined exclusively by the presence of disease. Studies have shown that self-rated health is a multidimensional indicator influenced by functional status, emotional well-being, social relationships, and living conditions, and is considered an important marker of overall health and a consistent predictor of adverse outcomes, including frailty, functional disability, and mortality[1-3,12,13]. From this perspective, the findings of the present study reinforce the importance of incorporating multidimensional instruments, such as the IVCF-20, into primary health care practice, enabling the early identification of factors associated with poorer self-rated health and supporting the planning of more comprehensive, timely, and person-centered interventions tailored to the needs of older adults.

Among the domains analyzed, ADLs showed the strongest association with self-rated health, indicating that preservation of functional capacity is one of the main factors associated with how older adults perceive their own health status. Beyond reflecting the ability to perform daily tasks independently, functional

capacity is an important marker of autonomy, social participation, and quality of life, directly influencing perceptions of well-being and healthy aging. This finding is consistent with the longitudinal study by Borim et al.[14], which showed that limitations in ADLs reduce the likelihood of improvement in self-rated health over time, reinforcing the central role of functional status in this process. From a public health perspective, these results suggest that strategies aimed at preventing functional decline and promoting independence in daily activities may yield benefits that extend beyond the physical domain, also contributing to more positive self-rated health and the maintenance of quality of life among older adults.

The mood domain was also strongly associated with self-rated health, indicating that emotional well-being plays a central role in how older adults perceive their own health status. Although depressive symptoms and mood disturbances often coexist with chronic diseases and functional limitations, they may adversely affect self-rated health even in the absence of objective clinical deterioration, underscoring the importance of the subjective dimension of aging. This finding is consistent with studies demonstrating the influence of depressive symptoms on self-rated health among older adults[15,16]. Data from the Brazilian Longitudinal Study of Aging (ELSI-Brazil) showed that the presence of depressive symptoms significantly increases the likelihood of negative self-rated health, independently of the presence of physical diseases[3]. From a health care perspective, these results reinforce the need to incorporate systematic mental health screening and early management of mood disturbances into primary health care, thereby promoting more comprehensive care and contributing to healthy aging.

Comorbidities showed an intermediate association with self-rated health, indicating that cumulative clinical burden also influences how older adults evaluate their health status. Within the IVCF-20, this domain is not limited to the isolated presence of chronic diseases but also encompasses scorable clinical conditions, such as multimorbidity, polypharmacy, and recent hospitalization, which may heighten the perception of vulnerability and reduce the sense of control over one's own health. This finding corroborates evidence showing that the accumulation of chronic conditions is associated with poorer self-rated health[17]. In the *Longitudinal Aging Study in India* (LASI), Rana et al.[18] also identified comorbidities as a key factor associated with negative self-rated health. From a care perspective, these results reinforce the importance of longitudinal management of chronic conditions, periodic medication review, and care coordination in primary health care, particularly among older adults with a greater burden of illness.

Similarly, the cognition and mobility domains were significantly associated with self-rated health, indicating that cognitive impairment and mobility limitations affect not only functional capacity but also how older adults perceive their own health status. Deficits in these domains may compromise autonomy, restrict social participation, and increase dependence in daily activities, thereby negatively affecting perceptions of well-being and quality of life. These findings are consistent with previous studies linking cognitive impairment and gait limitations to poorer self-rated health. Aguiñaga et al.[19] demonstrated that poorer cognitive performance is associated with less favorable self-rated health, whereas Neufeld et al.[20] showed that mobility limitations negatively affect this assessment independently of other clinical conditions. These results reinforce the importance of early identification of cognitive and mobility impairments in primary health care, enabling preventive and rehabilitative interventions, such as physical activity programs, functional rehabilitation, cognitive stimulation, fall-prevention strategies, and multidisciplinary follow-up tailored to the needs identified through risk stratification. Such interventions may help preserve autonomy, reduce the risk of functional disability, and promote more active and healthy aging.

Age and communication showed associations of smaller magnitude with self-rated health, although they remained statistically significant, suggesting that these factors may influence health perceptions more indirectly and through interactions with other components of the aging process. Regarding age, studies have shown that its relationship with self-rated health varies across age groups and may be modified by functional capacity, clinical conditions, and social context; therefore, age alone does not constitute a

determinant of health perception[21]. With respect to communication, sensory impairments, particularly hearing and visual impairments, may compromise social interaction, access to health information, and autonomy, thereby negatively affecting self-rated health, especially when associated with cognitive decline[22]. These findings reinforce the importance of early identification of sensory impairments and the implementation of strategies that promote effective communication, social inclusion, and access to health services, contributing to more comprehensive and person-centered care for older adults.

The findings of the present study are consistent with recent evidence from qualitative research describing self-rated health among older adults as a multidimensional phenomenon shaped by the interaction of physical, functional, cognitive, emotional, social, and spiritual dimensions, as well as by individual experiences and contexts of care and health education[23]. This perspective broadens the interpretation of our findings by highlighting that self-rated health extends beyond the presence of disease and incorporates elements related to autonomy, functional capacity, social participation, and well-being.

The main limitations of this study include its cross-sectional design, which precludes causal inference, and the use of self-reported information, which may be subject to perception bias. Nevertheless, the large dataset and the consistency of the findings strengthen the analyses. Future longitudinal studies may provide a deeper understanding of the relationship between clinical-functional vulnerability and self-rated health and help strengthen the evidence base on this topic.

CONCLUSION

The present study demonstrated that self-rated health among older adults is associated with multiple clinical-functional domains assessed using the IVCF-20, reinforcing its multidimensional nature. Among the factors analyzed, ADLs and mood showed the strongest associations with self-rated health, followed by comorbidities, cognition, mobility, age, and communication, indicating that perceptions of one's own health emerge from the interaction of functional, clinical, cognitive, and psychosocial factors.

These findings contribute to a broader understanding of the factors associated with self-rated health among older adults and provide evidence that may support the planning of health promotion initiatives, disability prevention strategies, and care organization in primary health care, thereby supporting more comprehensive, interprofessional, and person-centered approaches tailored to the needs of older adults.

In this context, the IVCF-20 appears to be a useful tool for the multidimensional assessment of clinical-functional vulnerability, enabling the identification of priority domains for follow-up and care planning. Future longitudinal studies may further elucidate the relationships between clinical-functional vulnerability and self-rated health throughout the aging process.

AUTHORSHIP

- Caroline Arrais Scottini Eiras – Manuscript drafting, data analysis and interpretation, and final approval of the manuscript.
- Caren Cristiane Muraro – Study conception and design, data interpretation, critical revision of the manuscript, and final approval of the manuscript.
- Giseli da Rocha – Critical revision of the manuscript and final approval of the manuscript.
- Jéssica Oliveira de Lima – Critical revision of the manuscript and final approval of the manuscript.
- Emanuel Péricles Salvador – Data analysis and interpretation and final approval of the manuscript.
- Solena Ziemer Kusma Fidalski – Accountability for all aspects of the work.

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