




Functional ability and independence among older adults in northern Portugal: a cross-sectional study

 Juliana Moreira¹,  Rubim Santos¹,  Andreia Sousa¹

1 - Centro de Investigação em Reabilitação, E2S, Politécnico do Porto

Corresponding author: jmo@ess.ipp.pt

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ABSTRACT

Introduction: The aging process impacts daily living activities, highlighting the need to assess functional ability to support independence in older adults. **Objective:** To characterize the functional ability of community-dwelling older adults in northern Portugal. **Methodology:** Sixty older adults, aged 60 and above, were assessed for body composition, self-reported health, medication intake, and fall history. Independence in basic and instrumental daily activities was evaluated using the Barthel Index and Lawton and Brody scale, respectively. Functional tests included handgrip strength, 10 meters walk test, five-times sit-to-stand, Timed up and go test, and one leg standing test. **Results:** Participants had an average age of 67.86 ± 6.46 years, classified as pre-obese based on body mass index, 43.95 ± 6.77 kilograms of muscle mass, and 30% of body fat. Over half (51.6%) rated their health as poor, 88.3% took prescribed medication (average of three per day), and 36.7% had fallen in the past year. Dependence was observed in daily activities (Barthel Index: 19.86 ± 0.35 ; Lawton and Brody: 22.70 ± 1.23). Functional tests revealed a handgrip strength of 27.39 ± 8.56 kilograms (37.21 ± 6.06 for males, and 22.50 ± 3.93 for females), a self-selected gait velocity of 1.78 ± 0.19 meters/second, a time to complete the five-times sit-to-stand, the Timed up and Go and the one leg standing of 15.48 ± 3.71 , 9.32 ± 1.99 and 30.23 ± 23.07 seconds, respectively. **Conclusions:** While older adults in northern Portugal demonstrate mild functional impairments, their challenges in daily activities and self-perceived health from age 60 underscore the importance of early

intervention strategies. Further research is needed to identify influencing factors and develop targeted interventions to enhance independence.

Keywords: Gerontology; Functional ability; Independence; Activities of daily living.

INTRODUCTION

Population ageing poses significant challenges, since the global rise in life expectancy does not necessarily translate into additional years lived in good health (Mitchell & Walker, 2020; WHO, 2024). Ageing leads to the gradual loss of the body's capacities, reducing the ability to respond to stress and compromising essential functions (Khan et al., 2017; Manini, 2011). However, the impact of ageing varies greatly between individuals, and age alone does not determine the level of physical functionality (Manini, 2011).

Furthermore, ageing is often associated with disability, a concept that extends beyond mere physical limitations (WHO, 2001). As defined by the World Health Organization, in the International Classification of Functioning, Disability, and Health (ICF), "disability serves as an umbrella term for impairments, activity limitations or participation restrictions" (WHO, 2001). Additionally, the notion of "pre-clinical disability" refers to the earliest signs of functional decline during which individuals begin to adapt their activity patterns by reducing the frequency of daily tasks or developing compensatory strategies to manage emerging difficulties (Manini, 2011). Early identification of this stage is essential, as it enables timely interventions that may delay or prevent the progression to overt

disability (Manini, 2011). Moreover, the evaluation of the functionality represents a critical part of the assessment of the older person, both in the clinical as well as the research setting.

Several functional tests have been used to assess functional ability among older adults, particularly, the Timed Up and Go test (TUG), the 10-Meter Walk Test (10MWT), the Five Times Sit-to-Stand Test (5TSTS), the One-Leg Standing test (OLS), and the Handgrip Strength test (HGS). The TUG test assesses dynamic balance and lower limb muscle strength (Podsiadlo & Richardson, 1991). Complementarily, the 10MWT aims to evaluate gait speed, dynamic balance, and aerobic capacity (Peters et al., 2013), and the 5TSTS the lower limb muscle strength, being closely related to overall functionality (Goldberg et al., 2012). For a more objective assessment of postural control static balance, and fall risk the OLS test was developed, which consists of a unipedal stance (Goldberg et al., 2011). Finally, the HGS is a key indicator of overall muscle strength, particularly in older adults, being directly associated with general health and functional capacity (Alonso et al., 2018).

The clinical and research importance of all these instruments has been demonstrated by their predictive capacity for negative health-related outcomes as hospitalizations or falls (Goldberg et al., 2011; Patrizio et al., 2021). They also have shown to be associated with subclinical and clinical conditions that are not directly related to the physical domain (e.g., inflammation, oxidative stress, overall mortality) (Patrizio et al., 2021). For this reason, they have been repeatedly indicated as markers of

wellbeing linked to the burden of multiple chronic conditions rather than mere parameters of mobility or strength (Patrizio et al., 2021).

Accordingly, this study aimed to characterize the functional ability of community-dwelling older adults in northern Portugal.

METHODS

Study design and sample

This cross-sectional study is part of a broader research initiative registered in the ClinicalTrials.gov database (identifier: NCT05611723) and adheres to the guidelines set forth by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) (Elm et al., 2008). All participants received information about the study's purpose and methodology, and they completed an informed consent form.

Procedures

Older adults, aged 60 and above, were assessed for body composition, self-reported health, medication intake, and fall history. Independence in basic and instrumental daily activities was evaluated using the Barthel Index and Lawton and Brody scale, respectively. Functional tests included HGS, 10MWT, 5TSTS, TUG test, and OLS test.

Anthropometric measurements were taken, with body mass (kg) assessed by bioimpedance analysis (Tanita Inner Scan BC-601) and height measured using a seca® 222 stadiometer (seca—Medical Scales and Measuring Systems®, Birmingham, UK), with 1 mm precision. Information on prescribed medications was collected, with polypharmacy defined as the use of five or more prescription medications (Lee et al., 2020; Masnoon et al., 2017). The MMSE

(Folstein et al., 1975), was administered to evaluate cognitive function, covering temporal and spatial orientation, short-term memory, calculation, coordination, language, and visuospatial skills. Total MMSE scores range from 0 to 30, with scoring criteria adjusted for literacy levels: 22 for 0–2 years of literacy, 24 for 3–6 years, and 27 for 7 or more years (Morgado et al., 2009). Self-reported physical activity was assessed by the seven-item short version of IPAQ, considering moderate and vigorous physical activity (Craig et al., 2003).

Overall SRH was assessed through the question, "In general, how do you rate your health today?" with response options of "Very bad," "Bad," "Fair," "Good," and "Very Good." SRH was then dichotomized into "Good" (responses of "Good" or "Very Good") and "Poor" (responses of "Fair," "Bad," or "Very Bad") categories (Crimmins, 2004). The Barthel Index was used to evaluate participants' independence in ADL (Araújo et al., 2007; Mahoney & DW, 1965). The scoring system of 0 indicating complete dependency and 20 indicating functional independence was used as this scoring correct for a uneven impression of accuracy (Collin et al., 1988). Functional capacity was further assessed using the Lawton & Brody Scale (Lawton & Brody, 1969), which measures independence across seven instrumental activities of daily living (IADL), with total scores ranging from 7 to 23 (Araújo et al., 2008).

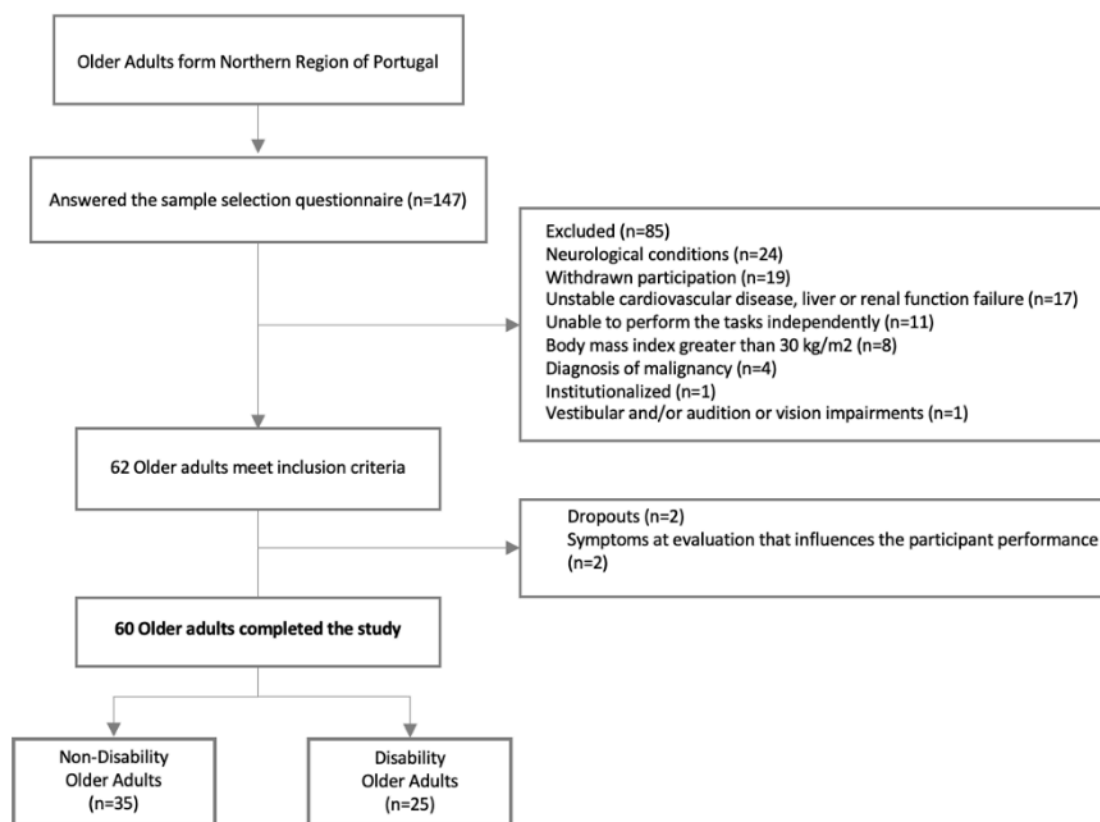
HGS was measured with a Jamar® Plus+ Digital dynamometer (Performance Health Supply, Cedarburg, WI, USA), with participants seated, shoulder adducted, elbow flexed at 90 degrees and unsupported, forearm in a neutral position, and wrist

extended to 30 degrees, following guidelines by the American Society of Hand Therapists (Fess, 1992; Jansen et al., 2008). The OLS test was conducted on the preferred leg, with eyes open, to measure balance in seconds (Chung et al., 2016; Furuna et al., 1998). Timing ceased when the participant lost balance (e.g., the flexed leg touched the ground), with a maximum duration of 60 seconds (Furuna et al., 1998).

past 12 months, medication intake, and SRH status.

RESULTS

Of the 147 older adults who completed the eligibility questionnaire, 62 were enrolled in the study (Figure 1). During the assessment phase, two participants exhibited symptoms that compromised their performance, yielding a final analytical sample of



Statistical analysis

The IBM SPSS (version 28.0; SPSS Inc) statistical package was used to compile the data and for statistical analysis. The demographic and clinical characteristics of the participants were analyzed using means and standard deviations, supplemented by frequency counts to describe categorical variables such as sex, history of falls in the

60 participants.

Participants had an average age of 67.86 ± 6.46 years, mainly females (63.3%) classified as pre-obese based on body mass index, 43.95 ± 6.77 kilograms of muscle mass, and 30% of body fat (Table 1). Over half (51.6%) rated their health as poor, 88.3% took prescribed medication (average

of three per day), and 36.7% had fallen in the past year (Table 1).

Table 1: Body composition and clinical characterization of older adults sample (n=60).

		Older Adults (n=60)
Body Composition		Mean ± SD
Height (m)		1.61±0.08
Weight (kg)		66.16±10.22
Muscle Mass (kg)		43.95±6.77
Bone Mass (Kg)		2.35±0.35
Percentage of Body fat (%)		30.17±5.83
Body Mass Index (kg/m ²)		25.39±2.96
Clinical Characterization		
Medication	Yes	53 (88.3)
	No	7 (11.7)
	Number	3.0±2.4
History of Fall	Yes	22 (36.7%)
	No	38 (63.3%)
	Number	0.49±0.77
Fear of Fall	Yes	19 (31.7)
	No	41 (68.3)
	Self-reported health status	
Good	29 (48.3)	
Poor	31 (51.6)	

Dependence was observed in daily activities (Barthel Index: 19.86±0.35; Lawton and Brody: 22.70±1.23) (Table 2). Functional tests revealed a handgrip strength of 27.39±8.56 kilograms (37.21±6.06 for males, and 22.50±3.93 for females), a self-selected gait velocity of 1.78±0.19 meters/second, a time to complete the five-times sit-to-stand, the Timed up and Go and the one leg standing of 15.48±3.71,

9.32±1.99 and 30.23±23.07 seconds, respectively (Table 2).

Table 2: Basic and instrumental activities of daily living and functional tests performance of older adults sample (n=60).

		Older Adults (n=60)
Activities of Daily Living		
Basic Activities of Daily Living (Barthel Index score)		19.86±0.35
Instrumental Activities of Daily Living (Lawton and Brody IADL scale score)		22.70±1.23
Functional Tests		
Hand Grip Strength (kg)		27.39±8.56
10 meter walk test (m/s)		1.78±0.19
5 times Sit-to-stand (s)		15.48±3.71
Timed up and Go (s)		9.32±1.99
One leg standing test (s)		30.23±23.07

Discussion

The present study sought to characterize the functional capacity of community-dwelling older adults in northern Portugal through an assessment of body composition, clinical parameters, performance in activities of daily living, and standardized functional tests. The findings indicate that, although this population demonstrated only mild functional limitations in objective physical performance measures, they nevertheless experience considerable challenges in daily life. Notably, over half of the participants self-rated their health as poor, and more than one-third reported at least one fall in the preceding year—observations that highlight a potential mismatch between objectively assessed physical capacity and subjective or practical well-being.

In the present study cohort of community-dwelling older adults in northern Portugal, 36.7% reported experiencing at least one fall within the past year. This prevalence closely aligns with the estimated 32–42% annual fall rate among individuals aged 70 and older living in the community and the generally accepted 28–35% rate for those older than 65 (Alves et al., 2025). These figures confirm that our study's fall prevalence is consistent with national and international benchmarks. Contrarily, 51.6% self-rated their health as poor, a notably higher proportion than that observed in broader Portuguese samples. National survey data indicate that approximately 16% of adults report their health as "poor" or "very poor" (Shaaban et al., 2022), while regionally, the prevalence of poor perceived health ranges between 32% (urban areas) and 41% (rural areas) (Araújo et al., 2011). The elevated rate in our sample may reflect regional disparities, higher levels of functional limitations, or specific socio-demographic characteristics of the participants.

Medication intake was also high: 88.3% reported taking medications, with an average of 3.0 ± 2.4 daily medications. Although this mean value falls below the conventional threshold for polypharmacy (≥ 5 drugs), it nevertheless reflects substantial medication exposure. National evidence indicates that polypharmacy is widespread among Portuguese older adults: a nationwide primary care study found that 77% of patients aged ≥ 65 years used at least five medications daily (Simões et al., 2024), while a regional survey in central Portugal reported 60.7% of home-dwelling older adults were polymedicated (Dixe et al.,

2023). Taken together, these findings suggest that the relatively lower average in our cohort may partly reflect sample characteristics, such as younger-old participants or fewer chronic conditions, yet the high overall prevalence of medication use remains consistent with broader Portuguese trends. In terms of body composition, participants had a mean BMI of 25.4 ± 3.0 kg/m², placing them in the overweight category, and an average body fat percentage of approximately 30%. Nationally, older Portuguese adults exhibit even higher combined prevalence of overweight and obesity—approximately 70.4% in males and 74.7% in females aged 65+ (Sardinha et al., 2012). This concordance supports the interpretation that our sample's body composition reflects broader trends in Portugal's elder population and underscores the potential links between adiposity, sarcopenia, and functional decline commonly observed in aging individuals.

The levels of dependence observed in both basic and instrumental activities of daily living, evidenced by mean scores of 19.86 (± 0.35) on the Barthel Index and 22.70 (± 1.23) on the Lawton & Brody IADL Scale, underscore the impact of aging on functional autonomy. Although these scores suggest that participants retain a substantial degree of independence, subtle impairments are present, particularly in more complex daily tasks. This aligns with findings from a Portuguese family health unit sample, where increasing age was associated with greater dependency in both basic and instrumental activities of daily living (Barbosa et al., 2025). Sadio et al. (2025) employed the validated Portuguese versions of these scales to assess functional

decline in community-dwelling older adults, and their findings support the continued utility and sensitivity of these instruments in such settings.

Globally, the results of this study emphasize the importance of implementing early and multidimensional intervention strategies, even in relatively healthy elderly populations. Promoting physical function alone may not be enough; attention must also be paid to psychosocial factors, self-perception of health and environmental risks to support independent living.

The conclusions drawn from this study must be weighed against its methodological constraints. First, the relatively small sample size ($n = 60$) and the fact that participants were drawn from a single region in northern Portugal limit the generalizability of the findings to the broader Portuguese older population. Second, the cross-sectional design precludes any causal inference between clinical factors, functional performance, and self-perceived health. Third, some variables, including falls and self-rated health, were assessed through self-report, which may be subject to recall bias and under- or overestimation. In addition, objective performance tests and functional scales may not fully capture the multidimensional nature of autonomy, particularly psychological or social determinants of functioning. Finally, the study did not incorporate nutritional biomarkers, cognitive assessments, or longitudinal follow-up, which are known to influence functional decline in aging populations. Future research should build on these findings by conducting larger, multicenter longitudinal studies that integrate physical, cognitive, nutritional, and psychosocial measures to

capture the multidimensional nature of functional decline. The use of objective tools such as wearable technology could provide more accurate monitoring of activity and falls in real-world contexts. For clinical practice, the results highlight the need for comprehensive geriatric assessment, including medication review, fall risk screening, and support for autonomy in daily living, delivered through multidisciplinary teams to promote healthier and more independent aging.

CONCLUSION

Although community-dwelling older adults in northern Portugal exhibited only mild impairments in standardized functional measures, their reported difficulties in daily activities and poorer self-perceived health from the age of 60 highlight the need for proactive, early intervention. Addressing functional limitations before they progress may help preserve autonomy and quality of life. Future research should focus on elucidating the biological, clinical, and psychosocial determinants of functional decline and on developing targeted, multidisciplinary interventions to support independence and healthy aging.

AUTHOR CONTRIBUTIONS

Conceptualization, J.M. and A.S.P.S.; methodology, J.M. and A.S.P.S.; software, J.M.; validation, J.M., R.S., and A.S.P.S.; formal analysis, J.M. and A.S.P.S.; investigation, J.M. and A.S.P.S.; resources, J.M. and A.S.P.S.; data curation, J.M.; writing—original draft preparation, J.M. and A.S.P.S.; writing—review and editing, J.M., R.S., and A.S.P.S.; visualization, J.M. and A.S.P.S.; supervision, R.S. and A.S.P.S.; project

administration, J.M., R.S., and A.S.P.S.; funding acquisition, J.M., R.S., and A.S.P.S. All authors have read and agreed to the published version of the manuscript.

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INSTITUTIONAL REVIEW BOARD STATEMENT

The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Ethics Committee of E2S, Polytechnic of Porto (protocol code CE0064C and date of approval 25 May 2022).

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REFERENCES

Alonso, A. C., Ribeiro, S. M., Luna, N. M. S., Peterson, M. D., Bocalini, D. S., Serra, M. M., Brech, G. C., Greve, J. M. D., & Garcez-Leme, L. E. (2018). Association between handgrip strength, balance, and knee flexion/extension strength in older adults. *PLoS one*, 13(6), e0198185.

<https://doi.org/10.1371/journal.pone.0198185>

Alves, T., Silva, S., Braz, P., Papadakaki, M., Aniceto, C., Mexia, R., & Matias-Dias, C. (2025). Epidemiology of Falls Among Older Adults in Portugal: Analysis of Unintentional Injuries Reported by a National Emergency Surveillance System. *Healthcare*, 13(10), 1160.

<https://www.mdpi.com/2227-9032/13/10/1160>

Araújo, F., Ribeiro, J., Oliveira, A., & Pinto, C. (2007). Validação do índice de Barthel numa amostra de idosos não institucionalizados. *Rev Port Saúde de Pública* 2007, 25, 59–66.

Araújo, F., Ribeiro, J. P., Oliveira, A., Pinto, C., & Martins, T. (2008). Validação da escala de Lawton e Brody numa amostra de idosos não institucionalizados. *Actas do 7º congresso nacional de psicologia da saúde*, 217-220.

Araújo, J., Ramos, E., & Lopes, C. (2011). [Lifestyles and self-rated health, in Portuguese elderly from rural and urban areas]. *Acta Med Port*, 24 Suppl 2, 79-88. (Estilos de vida e percepção do estado de saúde em idosos Portugueses de zonas rural e urbana.)

Barbosa, M., Almeida, L., Colaço, T., Santo, M. E., Santos, R., Martins, P., Sawada, N. O., & Martins, T. (2025). Dependency profile of the older adult population of a family health unit in northern Portugal [Original Research]. *Frontiers in Public Health*, Volume 13 - 2025. <https://doi.org/10.3389/fpubh.2025.1473713>

Chung, P.-K., Zhao, Y., Liu, J.-D., & Quach, B. (2016). Functional fitness norms for community-dwelling older adults in Hong

Kong. *Archives of gerontology and geriatrics*, 65. <https://doi.org/10.1016/j.arch-ger.2016.03.006>

Collin, C., Wade, D. T., Davies, S., & Horne, V. (1988). The Barthel ADL Index: a reliability study. *Int Disabil Stud*, 10(2), 61-63. <https://doi.org/10.3109/09638288809164103>

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., Pratt, M., Ekelund, U., Yngve, A., Sallis, J. F., & Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine and science in sports and exercise*, 35(8). <https://doi.org/10.1249/01.MSS.0000078924.61453.FB>

Crimmins, E. M. (2004). Trends in the health of the elderly. *Annu Rev Public Health*, 25, 79-98. <https://doi.org/10.1146/annurev.publhealth.25.102802.124401>

Dixe, M. d. A., Pinho, J., Pereira, F., Verloo, H., Meyer-Masseti, C., & Pereira, S. G. (2023). Patterns of Medication Management and Associated Medical and Clinical Features among Home-Dwelling Older Adults: A Cross-Sectional Study in Central Portugal. *International journal of environmental research and public health*, 20(3), 1701. <https://www.mdpi.com/1660-4601/20/3/1701>

Elm, E. v., Altman, D., Egger, M., Pocock, S., Gøtzsche, P., & Vandenbroucke, J. (2008). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for Reporting Observational Studies. *Journal of clinical epidemiology*, 61(4).

<https://doi.org/10.1016/j.jclinepi.2007.11.008>

Fess, E. (1992). Grip strength. In J. Casanova (Ed.), *Clinical assessment recommendations* (2nd ed., pp. 41-45). American Society of Hand Therapists.

Folstein, M., Folstein, S., & McHugh, P. (1975). "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *Journal of psychiatric research*, 12(3). [https://doi.org/10.1016/0022-3956\(75\)90026-6](https://doi.org/10.1016/0022-3956(75)90026-6)

Furuna, T., Nagasaki, H., Nishizawa, S., Sugiura, M., Okuzumi, H., Ito, H., Kinugasa, T., Hashizume, K., & Maruyama, H. (1998). Longitudinal change in the physical performance of older adults in the community. *Journal of the Japanese Physical Therapy Association = Rigaku ryoho*, 1(1). <https://doi.org/10.1298/jjpta.1.1>

Goldberg, A., Casby, A., & Wasielewski, M. (2011). Minimum detectable change for single-leg-stance-time in older adults. *Gait & Posture*, 33(4), 737-739. <https://doi.org/https://doi.org/10.1016/j.gaitpost.2011.02.020>

Goldberg, A., Chavis, M., Watkins, J., & Wilson, T. (2012). The five-times-sit-to-stand test: validity, reliability and detectable change in older females. *Aging clinical and experimental research*, 24(4), 339-344. <https://doi.org/10.1007/BF03325265>

Jansen, C. W. S., Niebuhr, B. R., Cousirat, D. J., Hawthorne, D., Moreno, L., & Phillip, M. (2008). Hand force of men and women over 65 years of age as measured by maximum pinch and grip force. *Journal of aging and physical activity*, 16(1). <https://doi.org/10.1123/japa.16.1.24>

Khan, S. S., Singer, B. D., & Vaughan, D. E. (2017). Molecular and physiological manifestations and measurement of aging in humans. *Aging Cell*, 16(4), 624-633. <https://doi.org/10.1111/ace1.12601>

Lawton, M. P., & Brody, E. M. (1969). Assessment of older people: self-maintaining and instrumental activities of daily living. *The Gerontologist*, 9(3). <https://www.ncbi.nlm.nih.gov/pub-med/5349366>

Lee, E. A., Brettler, J. W., Kanter, M. H., Steinberg, S. G., Khang, P., Distasio, C. C., Martin, J., Dreskin, M., Thompson, N. H., Cotter, T. M., Thai, K., Lyn Yasumura, & Gibbs, N. E. (2020). Refining the Definition of Polypharmacy and Its Link to Disability in Older Adults: Conceptualizing Necessary Polypharmacy, Unnecessary Polypharmacy, and Polypharmacy of Unclear Benefit. *The Permanente journal*, 24. <https://doi.org/10.7812/TPP/18.212>

Mahoney, F., & DW, B. (1965). Functional Evaluation: The Barthel Index. *Maryland state medical journal*, 14. <https://www.ncbi.nlm.nih.gov/pub-med/14258950>

Manini, T. (2011). Development of physical disability in older adults. *Current aging science*, 4(3). <https://doi.org/10.2174/1874609811104030184>

Masnoon, N., Shakib, S., Kalisch-Ellett, L., & Caughey, G. E. (2017). What is polypharmacy? A systematic review of definitions [OriginalPaper]. *BMC geriatrics*, 17(1), 1-10. <https://doi.org/doi:10.1186/s12877-017-0621-2>

Mitchell, E., & Walker, R. (2020). Global ageing: successes, challenges and

opportunities. *Br J Hosp Med (Lond)*, 81(2), 1-9. <https://doi.org/10.12968/hmed.2019.0377>

Morgado, J., Rocha, C., Maruta, C., Guerreiro, M., & Martins, I. (2009). Novos valores normativos do Mini-Mental State Examination. *Sinapse*, 2, 10-16.

Patrizio, E., Calvani, R., Marzetti, E., & Cesari, M. (2021). Physical Functional Assessment in Older Adults. *The Journal of frailty & aging*, 10(2). <https://doi.org/10.14283/jfa.2020.61>

Peters, D. M., Fritz, S. L., & Krotish, D. E. (2013). Assessing the reliability and validity of a shorter walk test compared with the 10-Meter Walk Test for measurements of gait speed in healthy, older adults. *J Geriatr Phys Ther*, 36(1), 24-30. <https://doi.org/10.1519/JPT.0b013e318248e20d>

Podsiadlo, D., & Richardson, S. (1991). The timed "Up & Go": a test of basic functional mobility for frail elderly persons. *Journal of the American Geriatrics Society*, 39(2). <https://doi.org/10.1111/j.1532-5415.1991.tb01616.x>

Sadio, R., Henriques, A., Nogueira, P., & Costa, A. (2025). A multidimensional analysis of older adults wellbeing and health literacy in Alentejo: a cross-sectional study [Original Research]. *Frontiers in Public Health*, Volume 13 - 2025. <https://doi.org/10.3389/fpubh.2025.1514968>

Sardinha, L. B., Santos, D. A., Silva, A. M., Coelho-e-Silva, M. J., Raimundo, A. M., Moreira, H., Santos, R., Vale, S., Baptista, F., & Mota, J. (2012). Prevalence of overweight, obesity, and abdominal obesity in a representative sample of Portuguese adults.

PloS one, 7(10), e47883.

<https://doi.org/10.1371/journal.pone.0047883>

Shaaban, A. N., Martins, M. R. O., & Peleteiro, B. (2022). Factors associated with self-perceived health status in Portugal: Results from the National Health Survey 2014 [Original Research]. *Frontiers in Public Health*, Volume 10 - 2022.

<https://doi.org/10.3389/fpubh.2022.879432>

Simões, P. A., Santiago, L. M., & Simões, J. A. (2024). Prevalence of polypharmacy in the older adult population within primary care in Portugal: a nationwide cross-sectional study [journal article]. *Archives of Medical Science*, 20(4), 1118-1127.

<https://doi.org/10.5114/aoms.2020.93537>

WHO. (2001). International classification of functioning, disability and health: ICF. In: World Health Organization.

WHO, W. H. O. (2024). *Ageing and health*. <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>

[health](https://www.who.int/news-room/fact-sheets/detail/ageing-and-health)