Published in final edited form as:

Geriatr Gerontol Int. 2014 April ; 14(2): 403–412. doi:10.1111/ggi.12115.

Functional decline over two years in older Spanish adults: Evidence from SHARE

Santiago Rodríguez López¹, Pilar Montero¹, Margarita Carmentate¹, and Mauricio Avendano^{2,3,4}

¹Department of Biology. Universidad Autónoma de Madrid, Spain ²London School of Economics and Political Science, LSE Health and Social Care, London, UK ³Department of Public Health, Erasmus Medical Center, Rotterdam, The Netherlands ⁴Department of Society, Human Development and Health, Harvard School of Public Health, Boston, MA, USA

Abstract

Aim—To evaluate the social, educational, health and behavioral predictors of physical functional decline in older Spanish adults.

Methods—Two-year longitudinal study based on 699 community-dwelling Spanish adults over 65 year-old participating in the Survey of Health, Ageing and Retirement of Europe (SHARE). Several predictors of a combined measure of functional disability were examined using logistic regressions.

Results—A decline in function was experienced by 166 individuals. Functional decline in men was associated with increased number of chronic diseases (OR= 2.25, 95%CI 1.21–4.19) and depressive symptoms (OR= 5.05, 95%CI 2.42–10.54) over a two-year period, while among women it was associated with decreased numeracy score (OR= 1.88, 95%CI 1.05–3.34).

Conclusions—Longitudinal changes in predictors are strongly associated with longitudinal changes in function between baseline and a two-year follow-up, most clearly among men. A decrease in cognitive functioning and increased depressive symptoms are associated with a decline in physical functioning and can serve as useful clinical predictors to prevent disability in older Spanish adults.

Keywords

Disability; functional decline; two-year follow-up; Spanish adults; SHARE project

INTRODUCTION

Functional decline is one of the most common features associated with aging^{1–2}. The maintenance of functional capacity has been shown to be an important factor of mortality in older adults, and the loss of this capacity is associated with higher morbidity³. As other Mediterranean countries, Spain has higher life-expectancy and lower mortality rates than most other European countries⁴. However, despite the fact that in the last few decades disability has decreased in older Spanish individuals⁵, estimates of prevalence of disability

Corresponding author: Rodríguez López, Santiago. Calle Darwin 2. Departamento de Biología, Universidad Autónoma de Madrid. Campus Universitario de Cantoblanco. 28049. Madrid, Spain. Phone: +34 914972561. santiago.rodriguez@uam.es.

DISCLOSURE STATEMENT

No potential conflicts of interest were disclosed.

among people over 65 are higher than in other European and North American countries⁶. Except for advanced age⁷, many risk factors that have been associated with functional decline and disability in old age are potentially modifiable, including decreased physical activity, depression, extremes in Body Mass Index (BMI), poor self-perceived health and smoking history^{3,8-9}. Evidence suggests that trends in disability may also be reversible through increases in educational attainment, a reduction in social and gender inequalities, the adoption of healthy lifestyle habits and changes in the physical and social environment to encourage active aging¹⁰.

Previous studies have examined associations between health and disability measures, but few studies have examined how broader social, educational and behavioral determinants are related to functional decline in Spain. Millán-Calenti et al.⁷ described associations between functional dependence in basic ADL (Activities of Daily Living) and in IADL (Instrumental Activities of Daily Living) with morbidity in older Spanish people. Previous studies have described trends in disability and changes in functional status in community-dwelling old^{5-6, 11-12} and very old¹³⁻¹⁴ Spanish people, identifying factors that predict functional change. Most of these studies, however, analyze the determinants of functional status using cross-sectional data. A comprehensive examination of the predictors of changes in functional decline in older Spanish adults based on longitudinal data is not yet available.

A better understanding of the process of functional decline in the elderly is useful for clinical prediction². Longitudinal data provides the opportunity to examine changes in functional states and evaluate their potential predictors⁶. Although these predictors may change parallel to physical functioning so that no causal relationship can be established, assessing how they relate to disability will provide a useful clinical tool to identify elderly at increased risk of faster functional decline. This will enable practitioners to develop early interventions that may prevent functional decline in Spanish elderly at increased risk.

This study seeks to identify the social, educational, health and behavioral predictors of physical function and functional decline over a two-year window among older Spanish adults at ages 65 and older. Our study is innovative by examining how both baseline and two-year changes in predictors relate to changes in functional decline, and by assessing a wide array of potential predictors across multiple domains.

MATERIALS AND METHODS

Data

Data come from the first (W1) and second (W2) waves of the Survey of Health, Ageing and Retirement in Europe (SHARE) collected in 2004 and 2006, respectively. SHARE is a multidisciplinary cross-country longitudinal survey providing micro data on health, socioeconomic status, and retirement of individuals aged 50+ from fifteen European countries. The details of the data collection and sampling procedures have been previously described¹⁵⁻¹⁶.

Particularly, this is a two-year longitudinal study, focusing on individuals participating in W1 (baseline) and in W2 (follow-up) in Spain. Originally, 1252 Spanish individuals aged 65+ participated in W1. In W2, together with 407 lost (attrition= 32.5%) and 80 deaths (6.3%), a total of 765 participants were available. We excluded individuals who were missing data at baseline on age, number of ADL and IADL limitations. Our sample finally includes 699 individuals (mean age at baseline 74.3 year-old), 308 men (44.1%) and 391 women (55.9%), participating in both waves.

As previously reported¹⁷, the main reason for attrition in SHARE was lost to follow-up due to participants moving out without leaving any contact information behind, so that could not be re-contacted or they refused to participate in W2. In Spain, specific reasons for attrition were the length of interview and differences of education between the respondent and the interviewer: those with a short interview in W1 and those who were more educated than the interviewer were less likely to be interviewed in W2. To account for attrition and non-response bias, in sensitivity analyses, we replicated all analyses using calibrated longitudinal weights provided by SHARE and designed to compensate for attrition between W1 and W2. These weights control for the inverse probability of being included in each wave. Weighted analyses were very similar to analyses without using weights, suggesting that attrition was not a major source of bias in our study. We therefore present weighted analyses only.

Measures

Most of the following variables were registered both at baseline and follow-up:

Sociodemographic

Sociodemographic characteristics are summarized by gender, age, living arrangements (living as single or with spouse/non-relative) and education. Level of education was measured based on the highest level of education reported and translated into the International Standard Classification of Educational Degrees¹⁸. We recoded educational level into three broad groups: none (no formal education, without distinguishing illiterate from non-illiterate individuals), low (Primary school) and medium/high education (High school/University studies). These last categories were grouped due to the small number of individuals with high education.

Self-reported health

Represented by: self-reported health status (SRHS) (1= excellent, 2= very good, 3= good, 4= fair and 5= poor); the number of chronic diseases/conditions, calculated as the sum of affirmative self-reports to the following conditions (if diagnosed by a doctor): 1. Heart attack or myocardial infarction or coronary thrombosis or any other heart problem including congestive heart failure; 2. High blood pressure or hypertension; 3. High blood cholesterol; 4. Stroke or cerebral vascular disease; 5. Diabetes or high blood sugar; 6. Chronic lung disease such as chronic bronchitis or emphysema; 7. Asthma; 8. Arthritis, including osteoarthritis, or rheumatism; 9. Osteoporosis; 10. Cancer or malignant tumour, including leukaemia or lymphoma, but excluding minor skin cancers; 11. Stomach or duodenal ulcer, peptic ulcer; 12. Parkinson disease; 13. Cataracts; 14. Hip fracture or femoral fracture; 15. Other fractures; 16. Alzheimer's disease, dementia or senility; 17. Benign tumour and 18. Other conditions; the number of medical symptoms present for at least the past six months, weight and height. BMI was estimated from self-reported weight and height and recoded into four groups¹⁹: underweight (BMI<18.5), normal weight (18.5–24.9), overweight (25.0–29.9) and obese (BMI>30.0).

Cognitive functioning and mental health

Orientation to date, month, year and day of week (orientation) and a mathematical performance (numeracy score) were used to assess cognitive functioning. Mental health status was measured by the Euro-Depression (EURO-D) scale, a discrete measure of depressive symptoms. The score ranges from 0 to 12, with higher scores indicating higher levels of depression²⁰.

Health behaviors

Represented by self-assessed physical inactivity, smoke and alcohol consumption. Physical inactivity was defined based on self-reports of never or hardly ever engaging in moderate (gardening, washing the car or walking) or vigorous (such as sports, heavy housework or physical labor) physical activities; Smoking was categorized as current/former or never. Alcohol consumption was considered when drinking more than 2 glasses of any alcoholic beverage 5/6 days a week.

Change in functional disability

Change in functional disability levels across waves was used as the dependent variable in this study. Functional disability was defined as a composite index of ADL and IADL scales. ADL are defined as those activities essential for independent living, while IADL is more complex and requires a higher level of personal autonomy, referring to tasks implying enough capacity as to make decisions as well as a greater interaction with the environment²¹. Based on these differences, deficits in the IADL normally precede deficits in the ADL²². Limitations in ADL (or IADL) were defined as having difficulty with and/or receiving help from another person or being unable to do one or more of the following items: dressing, walking across a room, bathing or showering, eating -cutting up food, getting in or out of bed, using the toilet -including getting up/down. Similarly, IADL's include seven activities: difficulties on using a map in a strange place, preparing a hot meal, shopping for groceries, make telephone calls, taking medications, doing work around the house/garden and managing money -paying bills and keeping track of expenses. Disability levels were categorized as *none* (not disabled), *mild* (IADL limitations only), *moderate* (1–2 ADL limitations), and *severe* (3–5 ADL limitations)²³. Changes in disability levels were then dichotomized into *functional decline (FD)* (= 1, if disability level in W2 increased relative to W1 level) or *no change/improvement* (= 0, if disability level in W2 decreased or remained unchanged compared with that of baseline) and used as the outcome in further analyses (*functional decline (FD)*).

Change across time in covariates

We estimated the significance of both baseline and changes across time in the covariates (Δ = W1-W2) associated to FD: changes (Δ) in self-reported health, together with cognitive functioning and mental health were analyzed. Variables were all dichotomized into decrease and no change/improvement depending on whether they decreased, or not modified/ improved the general welfare in follow-up.

Statistical analyses

Statistical analyses were performed both for the total population and stratified by gender. Paired-samples t-test was used to analyze changes across time in physical functioning measures. Bivariant associations were tested between FD with sociodemographic characteristics, self-reported health, functional status, cognitive functioning/mental health and health behaviors, stratified by gender.

Multiple logistic regression was used to analyze odds ratios (ORs) of FD (outcome) as a function of covariates in the estimated model. In the last analysis, changes in covariates at follow-up were included. All analyses were performed using PASW Statistics 18.0.

RESULTS

Table 1 shows the distribution of characteristics at baseline and follow-up. More than half of the study sample at baseline was limited in activities, with higher prevalence of IADL

limitations. The frequency of individuals with limitations in ADL and IADL after two years was higher than at baseline for all measures.

Those lost to follow-up were more likely to be women, live alone, had more years of education and IADL limitations. However, sample participants were not different from those lost to follow-up in most study characteristics, including self-reported health, ADL limitations, cognitive function/mental health, and health behaviors.

Table 2 describes differences in variables at baseline between those who have experienced FD at follow-up and those who do not, separated for sexes. Compared to those who improved or did not modify their disability level across waves, individuals with FD are older, have poorer SRHS, and higher number of symptoms.

Women had higher prevalence of FD (27.6%) than men (19.3%). Compared to men without FD, men who experienced FD have lower numeracy and a larger proportion of them were physically active. Women who experienced FD had less years of education, more chronic diseases and higher EURO-D scores. They were also more likely to be physically inactive, but they reported healthier behaviors related to smoking and alcohol consumption.

Table 3 shows baseline factors associated with FD by gender and for the total sample. Adjusted ORs for FD by the described covariates are shown.

An age-dependent FD is observed. Older individuals show higher ORs for FD across waves, especially in men. The analyses for the whole sample show an educational gradient in FD, although not significant. Regarding self-reported health, individuals with fair and poor SRHS have higher risk of FD than those with excellent or very good SRHS, even after adjusting by confounders. The number of symptoms seems to be associated with increased disability as well. Adjusting for confounders attenuated the associations of cognitive functioning/mental health and health behaviors with FD.

There were gender differences in the association of baseline covariates and disability. Compared to women, older and poorly educated (Low/Primary) men are more likely to show FD across waves. Instead, their SRHS and self-reported BMI were not associated with disability. Among women, a lower SRHS was significantly associated with FD.

Table 4 shows the decrease in general welfare in the covariates at follow-up, adjusting for confounders. Increased number of chronic diseases and symptoms between W1 and W2, and decreased SRHS together with worse numeracy and EURO-D score, were significantly associated with FD in the whole sample. FD in men was more strongly associated with an increased number of chronic diseases and increased depressive symptoms, while among women the association was stronger for numeracy score.

DISCUSSION

Our purpose was to assess the baseline and longitudinal predictors of two-year changes in physical functioning based on a composite index of functional status. At baseline, we found that age, educational level, self-rated health, number of symptoms and chronic diseases were associated with FD over a two-year period. Longitudinally, we found that FD was correlated with a decline in self-rated health, an increase in the number of chronic diseases and symptoms, reduced numeracy score, and increased depressive symptoms. Our findings suggest that in addition to age, educational level, self-rated health, the onset of symptoms, the onset of chronic diseases and depressive symptoms and reduced numeracy score are clinical predictors potentially useful in the prevention of functional disability.

In general, baseline levels of self-reported health were more strongly associated with FD among women. This finding is in line with previous evidence of worse self-reported health among Spanish women when compared to men²⁴. Similarly, our findings differ from those reported for the US population²³ as well, where poor global self-reported health affected functional decline in men only. Variations in the study population, framing of the question and response formats, variables controlled for, follow-up periods, and cultural differences may all partially account for the differences in results²³. We found no association between baseline physical inactivity and the occurrence of decline in function after two years. This is quite surprising, since several studies have observed individual's functional fitness level to be associated with functional decline^{3,25}. Probably, our indicator of physical inactivity may not sufficiently capture health changes which occur during the rather short time span studied in the present analysis.

Although men reported better health than females, changes in self-reported health were more strongly associated with decline in men. One possible interpretation is that health and symptoms are already so much worse for women than for men at baseline, that longitudinal changes for women are smaller than for men -due to ceiling effects. As a result, at any given age, change may appear to be a stronger predictor for the relatively healthier men, while the already poor levels of health at baseline may turn out to be stronger predictors for women. Our findings also suggest that change is a stronger predictor of FD than baseline levels. A possible explanation is that all these changes occur simultaneously; i.e., as people develop a new chronic disease they are also more likely to be impaired, while baseline levels, reflect more the result of health experiences over the life-course rather than a recent change in health.

Previous longitudinal studies have showed a higher prevalence of disability among low educated participants¹¹⁻¹². Our results are generally consistent with these studies. Compared to men with Medium/High education, low educated men were twice more likely to experience FD after two years. However, no formal education in women seems to be protective against FD. This might sound surprising, but similar findings for other physical health outcomes have been previously observed²⁶⁻²⁷. These results may be explained by a cohort effect, since the few Spanish women with university education at middle-age have had a greater lifetime exposure to stressful life events than women with lower level of education²⁷. The effort required to compete in an occupational sector dominated by men, in addition to responsibility for household domestic chores at a time when family responsibilities were assumed exclusively by women, could explain this greater exposure to risk factors of a psychosocial nature²⁷.

Longitudinally, we found that changes in cognitive functioning and mental health were more strongly associated with FD than factors at baseline. These results are in line with a study conducted in Spain⁶, where the presence of cognitive problems and depressive symptoms predicted transitions in functional status. Moreover, a distinctive result was found in our study related to changes in depressive symptoms; men with decreased EURO-D score across waves had five times the odds of FD as compared to men who did not experience a change in the EURO-D score, while for women, the effect was smaller. This finding could be explained by previous results from a cross-national comparison of depressive symptoms²⁸. The prevalence of depressive symptoms is higher in women than in men in most European countries, probably due to a higher exposition to gender-based socio-structural risks factors, poorer health and higher disability along their life course. However, despite the higher exposition to these risk factors, women might not be more vulnerable to them²⁸. Findings in the above mentioned study indicate that the female excess in depressive symptoms remains after taking into account the higher prevalence of socio-structural and health-related risk

factors, suggesting the existence of additional pathways linked to gender and/or biological sex.

The use of dynamic indicators across time in this study supports their usefulness in evaluating decline in functional status, especially among cognitive and mental health indicators. We found that increased diseases and symptoms, together with worse numeracy and EURO-D scores across time, are more strongly associated with FD than baseline levels. This suggests that identifying changes in clinical practice may potentially be more useful than examining levels only if the aim is to predict future FD.

The prevention/delay of the onset of disability in older adults, particularly among older women, could have a positive impact on their quality of life⁸. Effective strategies are needed for the prevention or rehabilitation from FD, which may help reducing the incidence of disabilities and the period of dependence near the end of life². Our study provides tools for the clinical prediction of FD, which may help curb increasing trends in disability in the older Spanish population.

Several limitations in this study need to be highlighted. Firstly, we cannot entirely treat the factors considered as causal, as they may simply occur together with changes in functional disability. For example, it is likely that the correlations between the number of chronic disease and FD reflect either a causal effect from chronic disease to physical function, the impact of physical function on the onset of diseases, or a common biological process that causes both FD and the onset of symptoms, without the latter being causally related. However, our study did not aim at establishing the causal association between these factors and FD, but to identify useful clinical predictors for the prevention of FD. Thus, results referring causality of the potential loss of functional capacity must be interpreted with caution. Another limitation is a possible flooring effect for those elderly with already severe disability at baseline (N= 34), who cannot experience further FD during the follow-up period.

An additional limitation in this study is the use of self-reported weight and height to estimate BMI²⁹. This might result in an underestimation of BMI, since Spanish people over-report height than other Europeans³⁰. We found no significantly association between self-reported BMI with FD. Future studies based on measured height and weight are required to confirm this finding.

In conclusion, we assessed the baseline and longitudinal predictors of two-year FD, where the latter were strongly associated with FD, most clearly among men. We found that FD is correlated with baseline age, education, self-rated health, number of symptoms and chronic diseases, as well as with declining self-rated health, increasing number of chronic diseases and symptoms, reduced numeracy score, and increasing depressive symptoms. These variables are potentially useful clinical predictors for the prevention of functional disability among the elderly.

Acknowledgments

This paper uses data from SHARE wave 4 release 1, as of November 30th 2012 or SHARE wave 1 and 2 release 2.5.0, as of May 24th 2011 or SHARELIFE release 1, as of November 24th 2010. The SHARE data collection has been primarily funded by the European Commission through the 5th Framework Programme (project QLK6-CT-2001-00360 in the thematic programme Quality of Life), through the 6th Framework Programme (projects SHARE-I3, RII-CT-2006-062193, COMPARE, CIT5-CT-2005-028857, and SHARELIFE, CIT4-CT-2006-028812) and through the 7th Framework Programme (SHARE-PREP, N° 211909, SHARE-LEAP, N° 227822 and SHARE M4, N° 261982). Additional funding from the U.S. National Institute on Aging (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, R21 AG025169, Y1-AG-4553-01, IAG BSR06-11 and OGHA 04-064) and the German Ministry of Education and Research as well as from various national sources is

gratefully acknowledged (see www.share-project.org for a full list of funding institutions). Mauricio Avendano is funded by a European Research Council Starting Researcher grant (No. 263684), a Eur-Fellowship from the Erasmus University, a grant from the National Institute of Ageing (R01AG037398) and the McArthur Foundation Research Network on Aging Society.

REFERENCES

1. Bernis C. Aging, aged populations and elderly people. *Antropo*. 2004; 6:1–14.
2. Hebert R. Functional decline in old age. *Can Med Assoc J*. 1997; 157:1037–1045. [PubMed: 9347774]
3. Stuck A, Walthert J, Nikolaus T, Bula C, Hohmann C, Beck J. Risk factors for functional status decline in community-living elderly people: A systematic literature review. *Soc Sci Med*. 1999; 8:445–469. [PubMed: 10075171]
4. Nolte E, McKee M. Measuring the health of nations: Analysis of mortality amenable to health care. *Br Med J*. 2003; 327:1129. [PubMed: 14615335]
5. Sagardui-Villamor J, Guallar-Castillón P, García-Ferruelo M, Banegas J, Rodríguez-Artalejo F. Trends in disability and disability-free life expectancy among elderly people in Spain: 1986–1999. *J Gerontol A Biol Sci Med Sci*. 2005; 60:1028–1034. [PubMed: 16127108]
6. Béland F, Zunzunegui M. Predictors of functional status in older people living at home. *Age Ageing*. 1999; 28:153–159. [PubMed: 10350412]
7. Millán-Calenti JC, Tubio J, Pita-Fernández S, González-Abraldes I, Lorenzo T, Fernández-Arruty T, et al. Prevalence of functional disability in activities of daily living (ADL), instrumental activities of daily living (IADL) and associated factors, as predictors of morbidity and mortality. *Arch Gerontol Geriatr*. 2010; 50:306–310. [PubMed: 19520442]
8. McCurry S, Gibbons L, Bond G, Rice M, Graves A, Kukul W, et al. Older adults and functional decline: A cross-cultural comparison. *Int Psychogeriatr*. 2002; 14:161–179. [PubMed: 12243207]
9. Sarkisian C, Liu H, Gutiérrez P, Seeley D, Cummings S, Mangione C, et al. Modifiable risk factors predict functional decline among older women: A prospectively validated clinical prediction tool. *J Am Geriatr Soc*. 2000; 48:170–178. [PubMed: 10682946]
10. Zunzunegui MV. Evolution of disability and dependency. An international perspective. *Gac Sanit*. 2011; 25:12–20. [PubMed: 22169442]
11. Zunzunegui MV, Nuñez O, Durban M, García de Yébenes M, Otero A. Decreasing prevalence of disability in activities of daily living, functional limitations and poor self-rated health: A 6-year follow-up study in Spain. *Aging Clin Exp Res*. 2006; 18:352–358. [PubMed: 17167298]
12. Otero A, Zunzunegui MV, Rodríguez-Laso A, Aguilar MD, Lázaro P. Burden and trends of activities of daily living disability in elderly Spanish people. *Rev Esp Salud Publica*. 2004; 78:201–213. [PubMed: 15199798]
13. Formiga F, Ferrer A, Espauella J, Rodríguez-Molinero A, Chivite D, Pujol R. Decline in the performance of activities of daily living over three years of follow-up in nonagenarians: The NonaSantfeliu study. *Eur Geriatr Med*. 2010; 1:77–81.
14. Ferrer A, Formiga F, Ruiz D, Mascaró J, Olmedo C, Pujol R. Predictive items of functional decline and 2-year mortality in nonagenarians - the NonaSantfeliu study. *Eur J Public Health*. 2008; 18:406–409. [PubMed: 18519307]
15. Börsch-Supan A, Hank K, Jürges H. A new comprehensive and international view on aging: Introducing the survey of 'Health, Ageing and Retirement in Europe'. *Eur J Ageing*. 2005; 2:245–253.
16. Klevmarken, N.; Swensson, B.; Hesselius, P. The SHARE sampling procedures and calibrated design weights. In: Börsch-Supan, A.; Jürges, H., editors. *The Survey of Health, Ageing and Retirement in Europe - Methodology*. Mannheim, Germany: Mannheim Research Institute for the Economics of Ageing; 2005. p. 28–70.
17. Schröder, M. Attrition. In: Börsch-Supan, A.; Brugiavini, A.; Jürges, H.; Kapteyn, A.; Mackenbach, J.; Siegrist, J., et al., editors. *First Results from the Survey of Health, Ageing and Retirement in Europe (2004–2007) - Starting the Longitudinal Dimension*. Mannheim, Germany: Mannheim Research Institute for the Economics of Ageing; 2008. p. 327–332.

18. International Standard Classification of Education. International standard classification of education: ISCED 1997. Re-Edition ed. Canada: UNESCO publication; 2006.
19. WHO (World Health Organization). Global Database on Body Mass Index. Available from: <http://apps.who.int/bmi/index.jsp>
20. Buber I, Engelhardt H. The association between age and depressive symptoms among older men and women in Europe Findings from SHARE. *Comp Popul Stud.* 2011; 36:103–126.
21. World Health Organization. International classification of functioning, disability and health: ICF. World Health Organization ed. Geneva: WHO Library Cataloguing-in-Publication Data; 2001.
22. Judge J, Schechtman K, Cress E. The relationship between physical performance measures and independence in instrumental activities of daily living. *J Am Geriatr Soc.* 1996; 44:1332–1341. [PubMed: 8909349]
23. Lee Y. The predictive value of self assessed general, physical, and mental health on functional decline and mortality in older adults. *J Epidemiol Community Health.* 2000; 54:123–129. [PubMed: 10715745]
24. Bardage C, Pluijm SMF, Pedersen NL, Deeg DJH, Jylhä M, Noale M, et al. Self-rated health among older adults: A cross-national comparison. *Eur J Ageing.* 2005; 2:149–158.
25. Landi F, Onder G, Carpenter I, Cesari M, Soldato M, Bernabei R. Physical activity prevented functional decline among frail community-living elderly subjects in an international observational study. *J Clin Epidemiol.* 2007; 60:518–524. [PubMed: 17419963]
26. Rodríguez, López S.; Nilsson, C.; Lund, R.; Montero, P.; Fernández-Ballesteros, R.; Avlund, K. Social inequality in dynamic balance performance in an early old age Spanish population: The role of health and lifestyle associated factors. *Arch Gerontol Geriatr.* 2012; 54:e139–e145. [PubMed: 22142494]
27. Regidor E, Barrio G, de la Fuente L, Domingo A, Rodríguez C, Alonso J. Association between educational level and health related quality of life in Spanish adults. *J Epidemiol Community Health.* 1999; 53:75–82. [PubMed: 10396467]
28. Zunzunegui MV, Minicuci N, Blurnstein T, Noale M, Deeg D, Jylha M, et al. Gender differences in depressive symptoms among older adults: A cross-national comparison - the CLESA project. *Soc Psychiatry Psychiatr Epidemiol.* 2007; 42:198–207. [PubMed: 17450402]
29. Andersen-Ranberg K, Petersen I, Frederiksen H, Mackenbach JP, Christensen K. Cross-national differences in grip strength among 50+year-old Europeans: Results from the SHARE study. *Eur J Ageing.* 2009; 6:227–236.
30. Gorber SC, Tremblay M, Moher D, Gorber B. Diagnostic in obesity comorbidities - A comparison of direct vs. self-report measures for assessing height, weight and body mass index: A systematic review. *Obes Rev.* 2007; 8:307–326. [PubMed: 17578381]

Table 1

Descriptive analyses at baseline and follow-up.

Variables	W1 (Baseline)			W2 (Follow-up)			p-value ^d	Alive in W2 but lost to follow up (N=407)	p-value ^b
	N	Mean (SD) / %	Range	N	Mean (SD) / %	Range			
Sociodemographic									
Age	699	74.3 (6.4)	65.0 – 102.7	699	76.8 (6.4)	67.1 – 104.3	<0.001	75.1 (6.9)	0.066
Gender (Female %)	699	55.9	.	.	.	.	.	62.9	0.023
Living as single (%)	699	28.2	.	.	.	.	.	43.5	<0.001
Years of education	695	5.0 (4.1)	0 – 17	.	.	.	.	5.7 (4.0)	<0.005
Self-reported health									
SRHS (1 Excellent - 5 Poor)	694	3.5 (1.0)	0 – 5	699	3.8 (0.9)	0 – 5	<0.001	3.6 (0.9)	0.080
Chronic diseases	694	2.3 (1.7)	0 – 9	699	2.2 (1.6)	0 – 9	0.531	2.2 (1.7)	0.633
Medical symptoms	695	2.2 (2.1)	0 – 10	699	2.4 (2.3)	0 – 11	0.096	2.2 (2.0)	0.795
BMI	647	27.7 (4.3)	17.3 – 45.7	625	27.7 (4.5)	16.0 – 49.9	0.890	24.5 (9.3)	<0.001
Functional status									
ADL	694	0.4 (1.0)	0 – 6	698	0.6 (1.5)	0 – 6	<0.001	0.5 (1.4)	0.165
1+ADL limitations	694	18.7	.	698	22.3	.	.	16.7	0.401
IADL	694	0.7 (1.4)	0 – 7	698	1.0 (1.9)	0 – 7	<0.001	0.9 (1.7)	0.007
1+IADL limitations	694	30.7	.	698	32.6	.	.	40.6	<0.005
Limited with activities	696	56.2	.	699	58.1	.	.	52.1	0.192
Cognitive functioning / mental health									
Orientation (0 Bad - 4 Good)	689	3.5 (0.9)	0 – 4	694	3.3 (1.2)	0 – 4	<0.001	3.3 (1.2)	0.121
Numeracy score (1 Bad - 5 Good)	691	2.1 (1.0)	1 – 5	691	2.1 (1.0)	1 – 5	0.597	2.1 (1.0)	0.641
EURO-D scale	674	3.5 (2.8)	0 – 12	657	3.3 (2.8)	0 – 12	0.054	3.4 (2.8)	0.361
Health behaviors									
Physical inactivity	694	16.3	.	699	25.5	.	.	18.2	0.415
Ever smoke daily	694	33.0	.	.	.	.	.	28.7	0.138
Alcohol consumption	694	13.5	.	.	.	.	.	10.0	0.082

^a Comparison between W1 and W2;^b Comparison of W1 respondents and those alive in W2 but lost to follow-up;

SRHS: Self Rated Health Status; BMI: Body Mass Index; ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living; EURO-D: depression scale (0 not depressed - 12 very depressed); Alcohol consumption > 2 glasses, 5/6 days a week.

Table 2

Descriptive analyses at baseline by occurrence of functional decline, stratified by gender.

Variables	Functional decline (FD)	N	Mean (SD) / %	p-value	N	Mean (SD) / %	p-value
<i>Sociodemographic</i>							
Age (years)	No	246	72.9 (5.5)	<0.001	281	74.2 (6.7)	<0.005
	Yes	59	76.4 (7.1)		107	76.3 (6.6)	
Living as single	No	246	12.2	0.103	281	37.4	0.237
	Yes	59	20.3		107	43.9	
Years of education	No	244	5.8 (4.7)	0.410	279	4.7 (3.6)	0.018
	Yes	59	5.4 (3.2)		107	3.7 (3.7)	
<i>Self-reported health</i>							
SRHS (1 Excellent - 5 Poor)	No	246	3.2 (0.9)	0.017	281	3.5 (1.0)	<0.001
	Yes	59	3.5 (0.9)		107	3.9 (0.8)	
Number of chronic diseases	No	246	1.9 (1.5)	0.068	280	2.4 (1.7)	0.033
	Yes	59	2.3 (1.4)		107	2.8 (1.8)	
Number of medical symptoms	No	246	1.4 (1.6)	<0.005	281	2.6 (2.2)	<0.005
	Yes	59	2.1 (1.7)		107	3.4 (2.3)	
BMI	No	237	27.2 (3.8)	0.936	254	28.0 (4.5)	0.486
	Yes	54	27.1 (4.0)		100	28.4 (5.1)	
<i>Functional status</i>							
1+ADL limitations	No	246	15.4	0.486	281	24.2	0.048
	Yes	59	11.9		107	15.0	
1+IADL limitations	No	246	19.9	0.604	281	40.6	0.458
	Yes	59	16.9		107	36.4	
Limited with activities	No	246	42.7	0.021	281	59.8	0.006
	Yes	59	59.3		107	68.4	
<i>Cognitive functioning / mental health</i>							
Orientation (0 Bad - 4 Good)	No	244	3.7 (0.8)	0.203	278	3.4 (1.0)	0.164
	Yes	59	3.5 (0.8)		107	3.3 (1.1)	
Numeracy score (1 Bad - 5 Good)	No	244	2.5 (1.1)	0.022	280	1.9 (0.9)	0.097
	Yes	59	2.1 (1.0)		107	1.7 (0.8)	

Variables	Functional decline (FD)	Men			Women		
		N	Mean (SD) / %	p-value	N	Mean (SD) / %	p-value
EURO-D scale (0 not D - 12 very D)	No	241	2.2 (2.1)	0.683	268	4.2 (2.8)	<0.001
	Yes	59	2.4 (1.8)		105	5.4 (3.0)	
<i>Health behaviors</i>							
Physical inactivity	No	246	11.0	0.053	281	18.1	0.453
	Yes	59	20.3		107	21.5	
Ever smoke daily	No	246	66.7	0.092	281	5.0	0.603
	Yes	59	78.0		107	3.7	
Alcohol consumption	No	246	27.2	0.584	281	4.3	0.103
	Yes	59	23.7		107	0.9	

SRHS: Self Rated Health Status; BMI: Body Mass Index; EURO-D: depression scale (0 not depressed - 12 very depressed); Alcohol consumption > 2 glasses, 5/6 days a week.

Table 3

Baseline factors associated with functional decline. Multiple logistic regression analyses with odds ratios (OR) and 95% confidence intervals (95% CI).

Variables	Functional decline (FD) OR (95% CI)		
	Men	Women	Total
<i>Sociodemographic</i>			
Age (at baseline)			
65 – 74	1.00	1.00	1.00
75 – 84	2.05 (1.10 – 3.84)	1.88 (1.14 – 3.08)	1.95 (1.32 – 2.87)
85+	4.18 (1.45 – 12.02)	1.75 (0.76 – 4.04)	2.33 (1.22 – 4.48)
Living arrangements			
With spouse / non-relative	1.00	1.00	1.00
Living as single	1.53 (0.68 – 3.23)	0.97 (0.58 – 1.63)	1.04 (0.67 – 1.61)
Education			
Medium / High	1.00	1.00	1.00
Low	2.48 (1.06 – 5.80)	1.19 (0.53 – 2.68)	1.22 (0.69 – 2.17)
No formal education	1.25 (0.47 – 3.34)	0.63 (0.28 – 1.39)	1.47 (0.81 – 2.69)
<i>Self-reported health</i>			
SRHS			
Excellent / Very good	1.00	1.00	1.00
Good	0.76 (0.30 – 1.93)	3.87 (1.09 – 13.74)	1.60 (0.78 – 3.30)
Fair	1.56 (0.62 – 3.93)	5.63 (1.63 – 19.49)	2.78 (1.37 – 5.62)
Poor	1.69 (0.49 – 5.78)	5.37 (1.44 – 20.04)	2.65 (1.18 – 5.94)
Chronic diseases			
number of chronic diseases ^a	1.15 (0.92 – 1.42)	1.08 (0.93 – 1.26)	1.10 (0.97 – 1.25)
Less than 2	1.00	1.00	1.00
2+	1.54 (0.81 – 2.91)	1.28 (0.74 – 2.21)	1.41 (0.93 – 2.13)
Symptoms			
number of symptoms ^b	1.21 (1.01 – 1.46)	1.11 (0.99 – 1.24)	1.14 (1.03 – 1.25)
Less than 2	1.00	1.00	1.00
2+	1.64 (0.88 – 3.05)	1.29 (0.75 – 2.21)	1.45 (0.97 – 2.18)
BMI			
Underweight / Normal weight	1.00	1.00	1.00
Overweight	0.95 (0.46 – 1.98)	1.34 (0.73 – 2.46)	1.20 (0.76 – 1.91)
Obese	1.05 (0.43 – 2.54)	1.22 (0.63 – 2.37)	1.18 (0.70 – 2.00)
<i>Cognitive functioning / mental health</i>			
Orientation (0 Bad – 4 Good)			
Good	1.00	1.00	1.00
1 – 3	1.39 (0.70 – 2.75)	1.26 (0.75 – 2.10)	1.29 (0.59 – 2.80)
Bad	.	1.01 (0.29 – 3.80)	1.40 (0.61 – 3.24)
Numeracy score (1 Bad – 5 Good)			
Good	1.00	1.00	1.00

Variables	Functional decline (FD) OR (95% CI)		
	Men	Women	Total
2 – 3	1.29 (0.48 – 3.47)	1.28 (0.34 – 4.79)	1.29 (0.59 – 2.80)
Bad	2.18 (0.70 – 6.81)	1.15 (0.30 – 4.48)	1.40 (0.61 – 3.24)
EURO-D scale (0 Not D – 12 Very D)			
Not depressed	1.00	1.00	1.00
1 – 2 – 3	1.05 (0.46 – 2.40)	0.69 (0.22 – 2.16)	0.90 (0.46 – 1.74)
4 – 12	1.59 (0.54 – 4.67)	0.68 (0.20 – 2.34)	1.04 (0.48 – 2.25)
<i>Health behaviors</i>			
Physical inactivity			
Other ^c	1.00	1.00	1.00
Yes	1.28 (0.56 – 2.92)	0.85 (0.46 – 1.54)	0.99 (0.61 – 1.61)
Ever smoked daily			
No	1.00	1.00	1.00
Yes	1.82 (0.90 – 3.66)	1.09 (0.32 – 3.70)	1.58 (0.89 – 2.80)
Alcohol consumption			
Other	1.00	1.00	1.00
> 2 glasses of alcohol 5/6 days a week	0.99 (0.49 – 2.01)	0.33 (0.04 – 2.67)	0.87 (0.46 – 1.64)

^a the sum of affirmative self-reports to the diagnosed conditions at baseline;

^b the number of medical symptoms present for at least the past six months at baseline;

^c Self-reports of performing moderate or vigorous physical activities one to three times a month, once a week, or more than once a week; Adjusting for age, gender, years of education, heart attack/stroke and depression;

RHS: Self Rated Health Status; BMI: Body Mass Index; EURO-D: depression scale (0 not depressed –12 very depressed). Note: OR for FD in men with bad orientation is not shown due to the small number of individuals within this category.

Table 4

Odds ratios (95% CI) for functional decline by decrease in general welfare at follow-up.

Variables	Functional decline (FD) OR (95% CI)		
	Men	Women	Total
<i>Self-reported health</i>			
Δ SRHS (1 Excellent – 5 Poor)			
no change / improved	1.00	1.00	1.00
decreased	1.69 (0.90 – 3.14)	1.32 (0.81 – 2.16)	1.46 (1.00 – 2.19)
Δ Chronic diseases			
no change / less	1.00	1.00	1.00
increased	2.25 (1.21 – 4.19)	1.33 (0.82 – 2.17)	1.63 (1.11 – 2.39)
Δ Symptoms			
no change / less	1.00	1.00	1.00
increased	3.66 (1.94 – 6.88)	2.36 (1.45 – 3.86)	2.81 (1.91 – 4.12)
Δ BMI			
no change / improved	1.00	1.00	1.00
worse	1.38 (0.59 – 3.24)	0.95 (0.49 – 1.83)	1.07 (0.63 – 1.79)
<i>Cognitive functioning / mental health</i>			
Δ Orientation (0 Bad – 4 Good)			
no change / improved	1.00	1.00	1.00
decreased	1.59 (0.70 – 3.62)	1.22 (0.65 – 2.27)	1.31 (0.80 – 2.14)
Δ Numeracy score (1 Bad – 5 Good)			
no change / improved	1.00	1.00	1.00
decreased	1.71 (0.89 – 3.25)	1.88 (1.05 – 3.34)	1.81 (1.19 – 2.78)
Δ EURO-D scale (0 Not D – 12 Very D)			
no change / improved	1.00	1.00	1.00
decreased	5.05 (2.42 – 10.54)	1.89 (1.08 – 3.29)	2.74 (1.78 – 4.22)

Adjusting for age, gender, years of education, heart attack/stroke, depression and level of disability at baseline; Δ : change across time (Δ = W1-W2). If welfare status decreases between W1 and W2 = 1, no change / improvement = 0 (reference category)

SRHS: Self Rated Health Status; Worse BMI was established when individuals change their BMI category in wave 1 to a worse BMI category in wave 2: Normal to underweight or normal to overweight or normal to obese or overweight to obese; EURO-D: depression scale (0 not depressed - 12 very depressed).