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Low morale is associated with increased risk of mortality in the elderly: a population-based prospective study (NEDICES)

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Abstract

Objective: the study aimed to assess the association between morale and mortality.

Design: we used data from the Neurological Disorders in Central Spain (NEDICES), a population-based study.

Subjects: 2,516 older persons (mean age 75.7 years) participated in the study.

Methods: Cox models were used to estimate risk of mortality. Morale was assessed using the Philadelphia Geriatric Center Morale Scale.

Results: 489 (21.8%) participants died over a median follow-up of 5.9 years (range 0.1–7.7 years), including 253 (21.8%) deaths among 1,163 participants with low morale scores, 168 (19.3%) among 870 participants with moderate scores and 68 (14.1%) among participants with high scores. In an unadjusted Cox model, relative risk (RR) of mortality in participants with low morale scores = 1.69 ($P < 0.001$) and RR in participants with moderate scores = 1.47 ($P < 0.01$) were compared to the reference group (participants with high scores). In a Cox model that adjusted for a variety of demographic factors and comorbidities, RR of mortality in participants with low morale scores = 1.35 ($P < 0.05$) and moderate scores = 1.16 (not significant) were compared to the reference group.

Conclusion: low morale may be an independent predictor of mortality in the elderly. By assessing morale, practitioners might be better positioned to identify patients with poorer prognoses.

Keywords: elderly, epidemiology, quality of life, morale, mortality

Introduction

The number of older people is increasing in developed countries as is their proportion in the population; both declining fertility and increasing life expectancies are contributing to these trends [1]. It is therefore important to identify those older people at risk for poor health. Psychosocial predictors, including health-related quality of life (HRQoL) measurements, can be useful in designing interventions [2].

HRQoL is a concept that involves those aspects of life quality or function that are influenced by health status; it is based on physical, psychological and social dimensions that may be measured [3]. Various measures of HRQoL predict mortality in different medical settings, including heart or cardiovascular disease [4], haemodialysis [5], asthma [6], advanced chronic liver disease [7] or diabetes [8]. Morale, which is a measure of HRQoL, may be defined as a basic sense of satisfaction with oneself, a feeling that there is a place in the environment for oneself, and a certain acceptance of what cannot be changed [9–13]. It is important to assess morale in the elderly [9–13]. First, morale is a subject-centred measure of well-being. Second, morale is an important component of quality of life, which can certainly decline as people age. Although it is known that morale is affected in several specific medical diseases [10–13], the more general association between lower morale and mortality in the community-dwelling elderly has yet to be assessed.

The goal of this population-based, prospective study was to examine the association between low morale and mortality in community-dwelling elderly individuals in three communities in Spain.

Methods

Study population

This investigation was part of the Neurological Disorders in Central Spain (NEDICES), a longitudinal, population-based survey of Parkinson's disease (PD), essential tremor (ET), stroke and dementia in persons age 65 years and older [12–24]. The NEDICES study sample, used here, was taken from the census of three communities in central Spain: Las Margaritas, a working-class neighbourhood in Getafe (Greater Madrid); Lista, a professional-class neighbourhood in Salamanca district (Central Madrid); and Arévalo, the agricultural zone of Arévalo county (125 km northwest of Madrid). We have reported elsewhere a detailed account of the methods [23, 24]. All procedures were approved by the university's ethical standards committee on human experimentation. Written (signed) informed consent was obtained from all participants upon enrollment.

Study design

Detailed accounts of the study population, sampling methods and assessments have been published [23, 24]. In brief, a baseline evaluation (1994–1995) and a second (i.e. follow-up)

evaluation (1997–1998) were performed. Participants were interviewed using an 800-item screening questionnaire; a short form of the questionnaire was mailed to participants who were unavailable for face-to-face or telephone screening. Both the 800-item and the shorter form of the questionnaire elicited data on demographic characteristics, neurologic disorders (PD, ET, stroke and dementia), current medications, smoking status (current smoker vs not current smoker), current alcohol use (drinker = consumption at least once per week) and their family doctor (name and contact information). Heart disease, chronic obstructive pulmonary disease, osteoarthritis, hypertension, diabetes mellitus and other health conditions were assessed by asking participants whether a physician had given them a diagnosis of any of those conditions and, in the case of hypertension and diabetes, whether they were receiving medications for these conditions.

We assessed depressive symptoms by self-report, using a single screening question ('Do you suffer from depression?'). This same approach has similarly been utilised in other previous study of depression [22]. We also assessed the use of antidepressant medications, which is a more tangible measure of depression that is less prone to reporting biases than is a screening question.

Morale was not assessed at baseline (1994–1995) but was added to the second evaluation (1997–1998). Therefore, the data used in this study, including demographic and clinical variables, are from the second evaluation, and included an instrument to assess morale (see below). All study instruments were administered by psychologists, social workers, student nurses and general physicians, each of whom had been trained by a senior clinical investigator with expertise in health sciences research (J.R.-N.).

Participants who screened positive for any neurological disease (i.e. PD, ET, dementia or stroke) were examined by one of eight senior neurologists who met at the inception of the study to establish standardised methods to perform and interpret the examination (J.B.-L., F.B.-P.; and see acknowledgements: A.B., A.M.-S., J.D.-G., J.O., J.P. and J.P.-E.). For participants who could not be examined, medical records were obtained from their general practitioners, from in-patient hospitalisations and from neurological specialists (if they had visited one).

The diagnosis of dementia and stroke was based on a clinical data and medical record review [19–21]. The World Health Organization clinical definition of a stroke was applied [25]. For the diagnosis of dementia, we applied Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV criteria [26]. Parkinsonism was diagnosed when at least two cardinal signs (resting tremor, rigidity, bradykinesia and impaired gait/postural reflexes) were present, and PD was diagnosed in these patients when there were no secondary causes or atypical features [14–16]. Diagnostic criteria for ET were similar to those used in the Sicilian Study [27].

Follow-up data on death were collected until 1 May 2004. The date of death was obtained from the National Population Register of Spain (Instituto Nacional de Estadística). In Spain, all deceased individuals receive a death certificate,

completed by a doctor, at the time of death. The certificate is then sent to the local police authority in the municipality where the person had been living, and the information is collected in the National Register.

Assessment of morale during follow-up evaluation (1997–1998)

In participants who were evaluated by face-to-face interview, morale was assessed by questionnaire, as detailed below. In participants who were unavailable for a face-to-face interview, morale was not assessed.

When the British Geriatrics Society and the Royal College of Physicians of London reviewed HRQoL instruments for the elderly, they recommended the Philadelphia Geriatric Center Morale Scale for assessment of subjective well-being [28]. Hence, the scale was chosen and then interviewer-administered. The Philadelphia Geriatric Center Morale Scale was designed to provide a measure of morale or psychological well-being in social geriatric studies [9–13]. To make the questions comprehensible to elderly subjects, they were phrased as simply as possible without multiple clauses, difficult vocabulary or several response alternatives. The length of the scale was also limited so that it would not result in fatigue or inattention [9]. The scale measures three consistently reproducible factors, which capture different dimensions of psychological well-being: agitation, lonely dissatisfaction and attitude toward own ageing. The agitation factor is comprised of six questions that assess anxiety and dysphoria, the lonely dissatisfaction factor is comprised of six questions that assess acceptance or dissatisfaction with social interactions the participant experiences and the final factor is comprised of five questions that assess the participant's attitude towards the ageing process. Each of the 17 questions is scored so that the value 0 indicates low morale and the value 1 indicates high morale; the total score ranges from 0 to 17. In the administration and scoring instructions for the scale, the designer suggested that scores of 13–17 should be considered consistent with high morale/good psychological well-being, 10–12 would fall within the middle range and scores of ≤ 9 are at the lower end of morale [9, 10]. The scale, which is short and easy to administer, has demonstrated high inter-rater reliability and internal consistency and it has been used in a variety of geriatric studies in a number of countries [9–13] (including Spain) [11–13], indicating that there is cross-cultural comparability.

Exclusions and final sample for analyses

5,278 participants underwent a baseline evaluation (1994–1995); 1,462 of these did not undergo a second evaluation because they declined ($n = 112$), were unreachable ($n = 560$) or had died ($n = 790$) (Figure 1, please see the figure Appendix 1 in the supplementary data available in *Age and Ageing* online). We also excluded 1,300 participants who ei-

ther (i) had no data on morale because they were unavailable for face-to-face interview ($n = 813$) or (ii) had incomplete data ($n = 487$). This left an eligible sample of 2,516 for these analyses (Figure 1, please see the figure Appendix 1 in the supplementary data available in *Age and Ageing* online). We compared the final 2,516 participants to the 1,300 excluded participants and they were younger (75.7 ± 6.1 [median = 74] vs 76.5 ± 6.9 [median = 75] years at second evaluation, Mann–Whitney test, $P < 0.05$), a smaller proportion were women (1,434 [57.0%] vs 797 [61.3%], chi-square [X^2] = 6.56, $P < 0.05$) and they were more educated (274 [10.9%] vs 215 [16.7%] were illiterate, $X^2 = 32.80$, $P < 0.001$).

Data analyses

Statistical analyses were performed in SPSS Version 15.0 (SPSS, Inc., Chicago, IL). All P -values are two-tailed, and we considered $P < 0.05$ as significant. Characteristics of participants were compared using X^2 tests. As the continuous variables were not normally distributed, Mann–Whitney and Kruskal–Wallis tests were used.

We used Cox proportional hazards models to estimate the relative risk (RR) of mortality; this generated RR with 95% confidence intervals (CI). The time variable was the years from the date of the second evaluation (1997–1998) to either (i) 1 May 2004 in living participants or (ii) the date of death in participants who had died prior to 1 May 2004.

In the Cox proportional hazards analyses, we estimated the risks of mortality in participants with low morale and participants with moderate morale, each compared with the reference group (participants with high morale). In additional analyses, we created tertiles of morale score based on our own data (≤ 8 , 10–12 and ≥ 13) and also treated morale as a continuous variable. In each analysis, we began with an unadjusted model. Then, in adjusted models, we first considered variables that were associated with both morale and death ('Model 1' [more restrictive criteria for confounding]) and then considered baseline variables that were associated with either morale or death ('Model 2' [less restrictive criteria for confounding]).

Survival curves for those participants with low morale scores, moderate scores and high scores were calculated using the Kaplan–Meier method. The log-rank test was used to compare the differences between curves.

Results

Four hundred eighty-nine (19.4%) of 2,516 participants died over a median follow-up of 5.9 years (range 0.1–7.7 years), including 253 (21.8%) deaths among 1,163 participants with low morale scores, 168 (19.3%) deaths among 870 participants with moderate scores and 68 (14.1%) among 483 participants with high scores (Figure 1, please see the figure Appendix 1 in the supplementary data available in *Age and Ageing* online). There were significant differences

Table 1. Demographic and clinical characteristics of cohort stratified by morale score

Characteristics at second evaluation	Participants with low morale (n = 1,163)	Participants with moderate morale (n = 870)	Participants with high morale (n = 483)
Age in years***	76.3 ± 6.1 (75.0)	75.5 ± 6.2 (74.0)	74.6 ± 5.6 (73.0)
Female gender***	791 (68.0%)	429 (49.3%)	214 (44.3%)
Geographical area***			
Arévalo county (rural area)	489 (42.0%)	351 (40.3%)	142 (29.4%)
Las Margaritas (blue collar area)	358 (30.8%)	237 (27.2%)	146 (30.2%)
Lista (white collar area)	316 (27.2%)	282 (32.4%)	195 (40.4%)
Education***			
Illiterate	159 (13.7%)	82 (9.4%)	33 (6.8%)
Can read and write	495 (42.6%)	352 (40.5%)	208 (43.1%)
Primary studies	381 (32.8%)	306 (35.2%)	152 (31.5%)
≥Secondary studies	127 (10.9%)	129 (14.8%)	90 (18.6%)
Marital status***			
Single	89 (8.0%)	74 (8.8%)	55 (11.8%)
Married	588 (53.0%)	511 (60.5%)	292 (62.4%)
Widowed	18 (1.6%)	16 (1.9%)	9 (1.9%)
Separated or divorced	414 (37.3%)	243 (28.8%)	112 (23.9%)
Number of offspring*	1.4 ± 0.7 (2.0)	1.3 ± 0.7 (1.0)	1.3 ± 0.7 (1.0)
Nighttime sleep duration***			
<8 h	746 (64.5%)	501 (57.7%)	244 (50.6%)
≥8 h	410 (35.5%)	368 (42.3%)	238 (49.4%)
Current smoker**	82 (7.4%)	92 (10.9%)	60 (12.9%)
Current drinker***	275 (25.0%)	321 (38.2%)	204 (44.1%)
Hypertension***	699 (60.3%)	450 (51.8%)	237 (49.2%)
Diabetes mellitus***	265 (23.0%)	139 (16.2%)	63 (13.1%)
Chronic obstructive pulmonary disease***	297 (25.5%)	187 (21.5%)	78 (16.1%)
Osteoarthritis***	812 (69.8%)	504 (58.0%)	224 (46.5%)
Dementia**	84 (7.2%)	53 (6.1%)	13 (2.7%)
Stroke**	96 (8.3%)	46 (5.3%)	21 (4.3%)
Parkinson's disease*	37 (3.2%)	15 (1.7%)	7 (1.4%)
ET***	117 (10.1%)	56 (6.4%)	21 (4.3%)
Heart disease	146 (12.6%)	88 (10.1%)	43 (9.0%)
Depressive symptoms or antidepressant use***	433 (37.2%)	131 (15.1%)	44 (9.1%)
Number of medications***	3.2 ± 2.2 (3.0)	2.6 ± 2.0 (2.0)	2.0 ± 1.7 (2.0)

Mean values ± SD (median) is given for age, number of offspring and number of medications. Kruskal–Wallis test was used for comparison of continuous data and X² test for proportions. *P < 0.05, **P < 0.01, ***P < 0.001.

in age, gender, education and medical co-morbidities when participants in the three morale categories were compared (Table 1).

The morale score was lower in participants who had died than in those who were still alive, as were the Lonely Dissatisfaction Subscore and Attitude Toward Own Ageing Subscore (Table 2). As expected, deceased participants were significantly older, predominantly men and had more medical co-morbidity than living participants. The Kaplan–Meier curve for overall survival (Figure 2, please see the figure Appendix 2 in the supplementary data available in *Age and Ageing* online) shows the low morale cohort to be at increased risk of death (log-rank P < 0.001).

In an unadjusted Cox model, risk of mortality was increased in participants with low morale (RR = 1.69, 95% CI = 1.29–2.21, P < 0.001) and moderate morale (RR = 1.47, 95% CI = 1.10–1.94, P < 0.01) vs those ones with high morale (reference group). In a Cox model that adjusted for age in years, gender, marital status, nighttime sleep duration, hypertension, diabetes mellitus, chronic obstructive pulmonary disease, osteoarthritis, dementia,

stroke, PD and number of medications (i.e. variables that were associated with both morale and death), the risk of mortality remained increased in participants with low morale (RR = 1.35, 95% CI = 1.01–1.80, P < 0.05, Model 1 in Table 3). The results did not change in a Cox model that adjusted for variables that were associated with either morale or death (age in years, gender, education, geographical area, marital status, nighttime sleep duration, number of offspring, smoker, drinker, diabetes mellitus, hypertension, heart disease, chronic obstructive pulmonary disease, osteoarthritis, dementia, stroke, PD, ET, number of medications, depressive symptoms or antidepressant use) (Model 2 in Table 3).

In additional analyses, we created tertiles of morale score based on our own data (≤8, 10–12 and ≥13). The results were similar: unadjusted RR for lowest vs highest tertile = 1.64, 95% CI = 1.31–2.66, P < 0.001 and Model 2 adjusted RR = 1.36, 95% CI = 1.05–1.77, P = 0.02. We also treated morale as a continuous variable and lower morale was associated with higher mortality: unadjusted RR = 0.95, 95% CI = 0.92–0.97, P < 0.001 and Model 2 adjusted RR = 0.96, 95% CI = 0.93–0.99, P = 0.02.

Table 2. Demographic and clinical characteristics of cohort stratified by mortality

	Died (n = 489)	Alive (n = 2,027)
Age***	79.1 ± 6.7 (79.0)	74.9 ± 5.6 (74.0)
Gender (male)***	284 (58.1%)	798 (39.4%)
Geographical area		
Arévalo county (rural area)	185 (37.8%)	797 (39.3%)
Las Margaritas (blue collar area)	134 (27.4%)	607 (29.9%)
Lista (white collar area)	170 (34.8%)	623 (30.7%)
Education		
Illiterate	60 (12.3%)	214 (10.6%)
Can read and write	208 (42.6%)	847 (41.8%)
Primary studies	148 (30.3%)	691 (34.1%)
≥Secondary studies	72 (14.8%)	274 (13.5%)
Marital status*		
Single	32 (6.8%)	186 (9.5%)
Married	261 (55.2%)	1,130 (58.0%)
Widowed	166 (35.1%)	603 (31.0%)
Separated or divorced	14 (3.0%)	29 (1.5%)
Number of offspring	1.4 ± 0.7 (2.0)	1.3 ± 0.7 (1.0)
Nighttime sleep duration**		
<8 h	263 (53.8%)	1,228 (60.9%)
≥8 h	226 (46.2%)	790 (39.1%)
Current cigarette smoker	49 (10.4%)	185 (9.6%)
Current drinker	142 (30.2%)	658 (34.0%)
Hypertension†	294 (60.5%)	1,092 (54.0%)
Diabetes mellitus***	120 (24.9%)	347 (17.2%)
Chronic obstructive pulmonary disease***	152 (31.1%)	410 (20.2%)
Osteoarthritis*	278 (56.9%)	1,262 (62.3%)
Dementia***	70 (14.3%)	80 (3.9%)
Stroke**	51 (10.4%)	112 (5.5%)
Parkinson's disease***	28 (5.7%)	31 (1.5%)
ET	37 (7.6%)	157 (7.7%)
Heart disease***	82 (16.8%)	195 (9.6%)
Depressive symptoms or antidepressant use	124 (25.4%)	484 (23.9%)
Number of medications***	3.6 ± 2.3 (3.0)	2.6 ± 2.0 (2.0)
Total Philadelphia Geriatric Center Morale Scale Score	8.95 (9.0) ± 3.25***	9.59 (10.0) ± 3.29
Agitation Subscore	3.88 (4) ± 1.71	3.74 (4.0) ± 1.66
Little things bother me more this year	0.58 (1.0) ± 0.49	0.61 (1.0) ± 0.49
I sometimes worry so much that I can't sleep	0.61 (1.0) ± 0.49**	0.53 (1.0) ± 0.50
I am afraid of a lot of things	0.78 (1.0) ± 0.42	0.79 (1.0) ± 0.41
I get mad more than I used to	0.67 (1.0) ± 0.47	0.67 (1.0) ± 0.47
I take things hard	0.57 (1.0) ± 0.49**	0.50 (1.0) ± 0.50
I get upset easily	0.66 (1.0) ± 0.47	0.65 (1.0) ± 0.48
Lonely Dissatisfaction Subscore	3.01 (3.0) ± 1.17**	3.18 (3.0) ± 1.10
I sometimes feel that life isn't worth living	0.75 (1.0) ± 0.43*	0.81 (1.0) ± 0.39
I have a lot to be sad about	0.61 (1.0) ± 0.49	0.60 (1.0) ± 0.49
Life is hard for me much of the time	0.71 (1.0) ± 0.45	0.75 (1.0) ± 0.43
I am satisfied with my life today	0.70 (1.0) ± 0.46**	0.77 (1.0) ± 0.42
I feel lonely	0.24 (0.0) ± 0.43	0.25 (0.0) ± 0.43
I see enough of my friend and relatives	0.78 (1.0) ± 0.42*	0.82 (1.0) ± 0.38
Attitude Toward Own Ageing Subscore	2.06 (2.0) ± 1.49***	2.66 (3.0) ± 1.57
Things keep getting worse as I get older	0.22 (0.0) ± 0.42***	0.37 (0.0) ± 0.48
I have as much pep as I had last year	0.43 (0.0) ± 0.50***	0.57 (1.0) ± 0.49
As I get older I am less useful	0.33 (0.0) ± 0.47***	0.50 (1.0) ± 0.50
As I get older things are better than I thought they would be	0.65 (1.0) ± 0.48**	0.72 (1.0) ± 0.45
I am as happy now as when I was younger	0.43 (0.0) ± 0.50**	0.50 (0.0) ± 0.50

Mean values ± SD (median) is given for age, number of offspring, number of medications and Philadelphia Geriatric Center Morale Scale scores. Mann–Whitney test was used for comparisons of continuous data and χ^2 test for proportions.

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Discussion

To our knowledge, this is the only prospective study of the association between low morale and risk of mortality in

community-dwelling elderly individuals. Using follow-up mortality data (median = 5.9 years and maximum = 7.7 years), we demonstrated that the Philadelphia Geriatric Center Morale Scale score was an independent predictor of

Table 3. Relative risks of mortality in participants who had low morale and moderate morale vs those with high morale (reference group)

	Unadjusted		Model 1		Model 2	
	Relative risk	95% CI	Relative risk	95% CI	Relative risk	95% CI
Participants with low morale (<i>n</i> = 1,163)	1.69***	1.29–2.21	1.35*	1.01–1.80	1.35*	1.00–1.81
Participants with moderate morale (<i>n</i> = 870)	1.47**	1.10–1.94	1.17	0.87–1.56	1.16	0.87–1.56
Participants with high morale (<i>n</i> = 483) (reference category)	1.00	–	1.00	–	1.00	–

Model 1: adjusted for age in years, gender, marital status, nighttime sleep duration, diabetes mellitus, hypertension, chronic obstructive pulmonary disease, osteoarthritis, dementia, stroke, Parkinson's disease and number of medications. Model 2: adjusted for age in years, gender, education, geographical area, marital status, nighttime sleep duration, number of offspring, smoker, drinker, diabetes mellitus, hypertension, heart disease, chronic obstructive pulmonary disease, osteoarthritis, dementia, stroke, Parkinson's disease, ET, number of medications, depressive symptoms or antidepressant use.

P* < 0.05, *P* < 0.01, ****P* < 0.001.

mortality. Mortality was related to lower morale after we controlled for a variety of confounding co-morbid medical conditions. Even after adjusting for reported depressive symptoms and intake of antidepressant medications, low morale continued to be associated with increased risk of mortality.

Assessing morale with an easy-to-administer scale such as the Philadelphia Geriatric Center Morale Scale might provide useful mortality risk stratification in the community-dwelling elderly. Detecting and improving low morale could improve the psychological well-being and health risks of community-dwelling elderly individuals.

Morale reflects an individual's perception of the quality of their physical and mental health. It is closely related to the individual's perceived burden of chronic disease and behavioural risk factors [9–13]. We adjusted for a variety of demographic, behavioural and self-reported co-morbid factors. It is possible that there may be residual confounding or that morale is a marker for some unmeasured behaviour or exposure. Yet expansion of our initial adjusted model (Model 1) to incorporate 20 covariates, including multiple medical co-morbidities (Model 2), did not change the relative risk (RR in both Models 1 and 2 = 1.35).

Morale is linked to HRQoL. The possible association of HRQoL and mortality has been explored in several cause-specific settings (e.g. in patients with heart disease, advanced liver disease, among others) [5–9]. Only a few studies have investigated the association between HRQoL and mortality in the elderly [29–31]. In one of them, HRQoL was assessed using the Centers for Diseases Control's Behavioral Risk Factor Surveillance System Core HRQoL scale. In this study, all dimensions of the HRQoL (global self-rated general health, recent physical health, recent mental health and recent activity limitation) were significant predictors of short-term and long-term hospitalisation as well as mortality in Cox regression models controlling for demographic factors and co-morbidity [29]. In another study, low baseline Physical Component Summary scores and the baseline Mental Component Summary scores of the Short Form 36-item questionnaire (SF-36) were important independent risk factors for 3-year mortality among community-dwelling older

persons recruited from a population-based survey in Taiwan [30]. Our results are in agreement with these studies, which used different instruments than what we used [29–31].

Self-reported life satisfaction also has been shown to predict mortality [32]. The mechanism whereby low morale or life dissatisfaction impact on mortality is not clear but there are a number of possibilities. Low morale could be a proxy for the presence of other health risk factors, poor social support or poor personal coping resources or maladaptive health behaviours (e.g. lowered interest in maintaining health); combinations of such factors could be operative as well [32].

This study had limitations. Specifically, the 1,300 excluded participants were older and more likely to be women or illiterate; therefore, the included participants may have had higher morale in general than those who were excluded. This study also had considerable strengths because of its large size, prospective design and sizable set of other risk variables considered for risk adjustment.

Key points

- Morale reflects an individual's perception of the quality of their physical and mental health.
- Low morale may be an independent predictor of mortality in the elderly.
- Assessing morale with an easy-to-administer scale such as the Philadelphia Geriatric Center Morale Scale might provide useful mortality risk in the community-dwelling elderly.

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Conflicts of interest

None declared.

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Author contributions

Julián Benito-León: research project conception, organisation and execution; statistical analysis design and execution; manuscript writing (writing the first draft and making subsequent revisions).

Elan D. Louis: research project conception, organisation and execution; statistical analysis design and execution; manuscript writing (writing the first draft and making subsequent revisions).

Jesús Rivera-Navarro: research project conception, organisation and execution; manuscript writing (making subsequent revisions).

María José Medrano: research project conception, organisation and execution; manuscript writing (making subsequent revisions).

Saturio Vega: research project conception, organisation and execution; manuscript writing (making subsequent revisions).

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Supplementary data

Supplementary data mentioned in the text is available to subscribers in *Age and Ageing* online.

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Potentially inappropriate prescribing including under-use amongst older patients with cognitive or psychiatric co-morbidities

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Abstract

Objective: the study aimed to determine the prevalence of and risk factors for inappropriate prescribing (IP) and prescribing omission (PO) in elderly with mental co-morbidities.