High morale is associated with increased survival in the very old

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Abstract

Background: high morale is defined as future-oriented optimism. Previous research suggests that a high morale independently predicts increased survival among old people, though very old people have not been specifically studied.

Objective: to investigate whether high morale is associated with increased survival among very old people.

Subjects: the Umeå 85+/GErontological Regional DAtabase-study (GERDA) recruited participants aged 85 years and older in northern Sweden and western Finland during 2000–02 and 2005–07, of whom 646 were included in this study.

Methods: demographic, functional- and health-related data were collected in this population-based study through structured interviews and assessments carried out during home visits and from reviews of medical records. The 17-item Philadelphia Geriatric Center Morale Scale (PGCMS) was used to assess morale.

Results: the 5-year survival rate was 31.9% for participants with low morale, 39.4% for moderate and 55.6% for those with high morale. In an unadjusted Cox model, the relative risk (RR) of mortality was higher among participants with low morale (RR = 1.86, \(P < 0.001\)) and moderate morale (RR = 1.59, \(P < 0.001\)) compared with participants with high morale. Similar results were found after adjustment for age and gender. In a Cox model adjusted for several demographic, health- and function-related confounders, including age and gender, mortality was higher among participants with low morale (RR = 1.36, \(P = 0.032\)) than those with high morale. There was a similar but non-significant pattern towards increased mortality in participants with moderate morale (RR = 1.21, \(P = 0.136\)).

Conclusion: high morale is independently associated with increased survival among very old people.

Keywords: morale, aged, 80 and older, survival, longevity, mortality, older people

Introduction

High morale is defined as future-oriented optimism regarding the problems and opportunities associated with living and ageing [1, 2]. According to Lawton, who developed the Philadelphia Geriatric Center Morale Scale (PGCMS) to assess morale [3, 4], one essence of high morale is to ‘strive appropriately, while still accepting the inevitable’ [3]. Morale correlates positively with well-being, measured with scales such as Life Satisfaction Index [3, 5] and negatively with ill-being, e.g. depressive symptom measured with Geriatric Depression Scale [6]. The PGCMS has been recommended for assessing well-being among old people [7].

A number of well-being concepts, such as life satisfaction, happiness and positive life orientation, have been suggested to have association with survival [8–13]. Individuals with a more positive self-perception of ageing, assessed with one of the three sub-scales of the PGCMS, were found to live longer than those with less positive self-perception [14, 15]. High morale has been associated with increased survival in a younger old sample (75.7 ± 6.1 years) [16]. Compared with the younger old, the biological decline among very old, often frail, elderly is more pronounced and it is not known if morale could influence their survival.

None of the previously mentioned studies that found an association between survival and morale or one of sub-scales of
the PGCMS have specifically examined very old people or included those living in institutional care. The very old constitutes the fastest growing age group in Europe [17], and a relatively large proportion of the very old live in institutional care [18].

The aim of this study was to investigate whether high morale is associated with an increased 5-year survival rate of very old people.

Method
The Umeå 85+/GErontological Regional DAtabase (GERDA) is a population-based study, which used structured interviews and assessment scales [19, 20]. The study investigated people living in northern Sweden in the years 2000–02. In the years 2005–07, participants were followed up and new participants were recruited. The study was then also expanded to include people in western Finland. Population registers were obtained from the National Tax Board in Sweden and the Finnish Population Register Centre, and three age groups including every other 85 year old, every 90 year old and everyone aged 95 years or older were invited to participate.

Participants
There were 1,489 individuals eligible for participation, of whom 118 died before contact and 230 declined participation. There were also 115 individuals who participated in the data collection in both 2000–02 and 2005–07. Only data from their second participation, i.e. when they were 5 years older, were used to include as many as possible of the oldest individuals.

Of the 1,026 individuals who participated once, 176 declined home visit and were excluded. Of the 850 who accepted home visit, 204 were excluded because they answered no PGCMS questions (n = 196) or fewer than 12 (n = 8). It was not noted why PGCMS questions were not answered. However, the 204 individuals who answered no PGCMS questions or fewer than 12 were generally older, with a mean age of 91.6 ± 4.9 versus 89.1 ± 4.4 years (P < 0.0001), the proportion of women was higher 79.4% (162/204) versus 67.3% (435/646) (P = 0.001) and they had a higher proportion of dementia disorders 61.3% (125/204) versus 18.4% (119/646) (P < 0.0001) than those 646 who answered 12 or more of the PGCMS questions. The 204 individuals also had low survival; only 15.2% (31/204) were alive after 5 years. The final sample comprised 646 individuals; 82.8% (535/646) of them answered all 17 PGCMS questions. In the final sample, 30.2% lived in institutional care.

Procedure
A letter was sent to potential participants containing information about the study. Later they were telephoned to obtain their informed consent to participate. If there were doubts concerning ability to give consent due to cognitive impairment, a next of kin was also asked. The participants were interviewed in their own homes. After the interview, medical records were reviewed, and when appropriate, the next of kin and caregivers were interviewed.

Information about dates of death during the 5 years of follow-up was acquired either from the Swedish National Board of Health and Welfare or the Finnish National Population Information System.

Associtation of high morale with increased survival
The PGCMS comprises 17 dichotomised questions. Scores of 0–9 points indicate low morale, 10–12 indicate moderate and 13–17 indicate high morale. Unanswered questions were listed as 0 points [21]. Morale consists of three sub-scales: Agitation that reflects anxiety and dysphoric mood elements; Lonely Dissatisfaction that reflects lack of contentment with the social interaction that the individual is receiving and Attitude Toward Own Ageing (ATOA) that reflects the individual’s perception of life change [3]. The Swedish PGCMS is a translation of the British English version [7].

A specialist in Geriatric Medicine determined medical diagnoses after reviewing information from interviews, assessment scales, medication and medical records from hospital, general practitioner and care institutions. Dementia and depressive disorders were diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders fourth edition (DSM-IV) criteria [22]. For additional assessments and diagnoses, see Supplementary data, Appendix S1 available in Age and Ageing online.

Characteristics known to be associated with well-being or decreased survival in old people were selected as potential confounders. These were sociodemographic (gender, age, living alone or living together with someone, living in an institution or community dwelling and educational level), social support (number of social contacts), and health- and functional-related factors (the presence of functional difficulties, cognitive impairment, major disease conditions and medication) (Table 1) [23].

Statistics
Three tests were used in univariate analyses: the χ² test, the Mann–Whitney U test and the Kruskal–Wallis test. The two latter were used, because continuous variables had a non-normal distribution. The unadjusted cumulative survival of high, moderate and low morale was plotted on a Kaplan–Meier curve. The relationship between survival and morale was explored using Cox Proportional Hazard Regression Analyses in three models, each with high morale as a reference group compared with low and moderate levels of morale: unadjusted, adjusted for age and gender and adjusted for confounders associated both with morale and survival derived from the univariate analyses. In the last model, referred to as the multi-variable confounder model, age and gender were added regardless of their P value, and highly correlating variables (≥0.5) were excluded to reduce risk of multicollinearity. Consequently, institutional care and malnutrition (MNA) were

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Table 1. Demographic and basic characteristics stratified according to level of morale (n = 646)

<table>
<thead>
<tr>
<th></th>
<th>Participants with low morale (n = 141)</th>
<th>Participants with moderate morale (n = 203)</th>
<th>Participants with high morale (n = 302)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
<td>89.9 ± 4.3 (90.0)</td>
<td>89.5 ± 4.9 (90.0)</td>
<td>88.5 ± 4.1 (86.0)</td>
<td>0.008</td>
</tr>
<tr>
<td>85</td>
<td>n = 49 (34.8%)</td>
<td>n = 99 (48.8%)</td>
<td>n = 161 (53.3%)</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>n = 58 (41.1%)</td>
<td>n = 51 (25.1%)</td>
<td>n = 95 (31.5%)</td>
<td></td>
</tr>
<tr>
<td>95 or older</td>
<td>n = 34 (24.1%)</td>
<td>n = 53 (26.1%)</td>
<td>n = 46 (15.2%)</td>
<td></td>
</tr>
<tr>
<td>Gender (female)</td>
<td>104 (73.8%)</td>
<td>141 (69.5%)</td>
<td>190 (62.9%)</td>
<td>0.057</td>
</tr>
<tr>
<td>Geographical area</td>
<td></td>
<td></td>
<td></td>
<td>0.848</td>
</tr>
<tr>
<td>Sweden* (n = 512)</td>
<td>114 (22.3%)</td>
<td>161 (31.4%)</td>
<td>237 (46.3%)</td>
<td></td>
</tr>
<tr>
<td>Finland* (n = 134)</td>
<td>27 (20.1%)</td>
<td>42 (31.3%)</td>
<td>65 (48.5%)</td>
<td></td>
</tr>
<tr>
<td>In institutional care</td>
<td>57 (40.4%)</td>
<td>74 (56.5%)</td>
<td>64 (21.2%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Living alone</td>
<td>125 (88.7%)</td>
<td>169 (83.3%)</td>
<td>223 (73.8%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Social contacts less than once a week</td>
<td>27 (21.3%)</td>
<td>26 (14.1%)</td>
<td>30 (10.7%)</td>
<td>0.018</td>
</tr>
<tr>
<td>Education &gt;6 years</td>
<td>78 (58.6%)</td>
<td>103 (55.1%)</td>
<td>161 (56.5%)</td>
<td>0.818</td>
</tr>
<tr>
<td>Impaired hearing</td>
<td>31 (22.0%)</td>
<td>26 (12.9%)</td>
<td>39 (13.0%)</td>
<td>0.029</td>
</tr>
<tr>
<td>Impaired vision</td>
<td>32 (22.9%)</td>
<td>36 (17.7%)</td>
<td>22 (7.3%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Functional level (Barthel ADL index)</td>
<td>16.7 ± 4.8 (19.0)</td>
<td>16.9 ± 4.8 (19.0)</td>
<td>18.7 ± 2.8 (20.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Malnutrition (MNA)</td>
<td>22.0 ± 4.0 (22.0)</td>
<td>23.8 ± 3.5 (24.5)</td>
<td>26.3 ± 2.9 (26.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Constipation</td>
<td>66 (46.8%)</td>
<td>81 (39.9%)</td>
<td>76 (25.2%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Dementia disorders</td>
<td>29 (20.6%)</td>
<td>50 (24.6%)</td>
<td>40 (13.2%)</td>
<td>0.004</td>
</tr>
<tr>
<td>Depressive disorders</td>
<td>88 (62.4%)</td>
<td>80 (39.4%)</td>
<td>23 (7.6%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Heart failure</td>
<td>52 (36.9%)</td>
<td>62 (30.5%)</td>
<td>60 (19.9%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Sleeping disorder</td>
<td>72 (51.4%)</td>
<td>88 (43.3%)</td>
<td>88 (29.1%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Stroke</td>
<td>25 (17.7%)</td>
<td>37 (18.2%)</td>
<td>54 (17.9%)</td>
<td>0.992</td>
</tr>
<tr>
<td>Number of medications</td>
<td>8.0 ± 4.5 (7.0)</td>
<td>7.0 ± 4.5 (6.0)</td>
<td>5.1 ± 3.6 (4.0)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Using χ² test and Kruskal–Wallis test. Mean values ± SD (median) is given for age, functional level, malnutrition and number of medications. ADL, activities of daily life; MNA, Mini Nutritional Assessment.

Excluded because of high correlation with functional level, and depressive disorder was excluded because of its high correlation with PGCMS score. The confounding variables were age, gender, impaired hearing, impaired vision, functional level (the Barthel ADL index), constipation, dementia, heart failure and number of medications. The rationale for using the PGCMS with three levels were based on a precedent of previous work [16]. Cox regressions were also performed for the three age groups, and for each of the three sub-scales of the PGCMS, the latter treated as continuous variables. In all tests, a P value of <0.05 was regarded as statistically significant. The IBM SPSS software version 20 (SPSS Inc., Chicago, IL, USA) was used for the calculations.

Ethics

The GERDA study was approved by the Regional Ethical Review Board in Umeå, Sweden, (99-326 and 05-063M) and the Ethics Committee of Vaasa Central Hospital in Finland (05-87).

Results

Participants with high morale were younger, used fewer medications and were less often living in institutional care, living alone, socially isolated or malnourished compared with participants with low and moderate morale. They also had higher functional level, fewer diseases, lower proportion of women and lower proportion of participants with impaired vision (Table 1). Morale was significantly higher at baseline for those who were alive after the 5-year follow-up than for those who died within the 5-year period (PGCMS score 12.7 ± 3.0 versus 11.3 ± 3.1, P value < 0.001) (Supplementary data, Appendix S2 available in Age and Ageing online).

The 5-year survival rate was 31.9% (45/141) in the low morale group, 39.4% (80/203) in the moderate morale group and 55.6% (168/302) in the high morale group. The unadjusted Cox regression analysis showed an increased relative mortality risk for both low morale (RR = 1.86, 95% CI = 1.43–2.43, P < 0.001) and moderate morale (RR = 1.59, 95% CI = 1.24–2.03, P < 0.001) groups compared with the high morale group. The patterns for the three age groups were similar to the pattern for the whole sample; however, for those aged 95 years or older, the increased mortality risk was non-significant. The Kaplan–Meier curves for Swedes and Finns separately had similar patterns, the curves for those answering 12–16 questions had similar pattern to those answering 17 questions and the curves for community-dwelling and those living in institutional care showed similar pattern, but greater mortality rate for the latter (data not shown). When adjusting for age and gender, an increased relative mortality risk was found for the groups with low morale (RR = 1.73, 95% CI = 1.33–2.26, P < 0.001) and moderate morale (RR = 1.46, 95% CI = 1.14–
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Table 2. The Cox proportional hazard regression analyses

<table>
<thead>
<tr>
<th>Morale level</th>
<th>Total, n = 646</th>
<th>By age group, n = 204</th>
<th>90-year olds, n = 133</th>
<th>Adjusted for age and genderb</th>
<th>Adjusted for multiple confoundersb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unadjusted</td>
<td>Adjusted for age and gender</td>
<td>Adjusted for age and gender</td>
<td>Adjusted for age and gender</td>
<td>Adjusted for age and gender</td>
</tr>
<tr>
<td></td>
<td>RR</td>
<td>95% CI</td>
<td>RR</td>
<td>95% CI</td>
<td>RR</td>
</tr>
<tr>
<td>High (n = 302)</td>
<td>1.00</td>
<td>1.00–1.00</td>
<td>1.00</td>
<td>1.00–1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Moderate (n = 203)</td>
<td>1.59***</td>
<td>1.24–2.03</td>
<td>1.28</td>
<td>0.85–1.92</td>
<td>1.79*</td>
</tr>
<tr>
<td>Low (n = 141)</td>
<td>1.86***</td>
<td>1.43–2.42</td>
<td>1.77*</td>
<td>1.11–2.80</td>
<td>1.90**</td>
</tr>
<tr>
<td>Sub-scales of the PGCMS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude towards own ageing</td>
<td>0.94</td>
<td>0.88–1.02</td>
<td>0.92*</td>
<td>0.86–0.98</td>
<td>0.99</td>
</tr>
<tr>
<td>Loneliness dissatisfaction</td>
<td>0.90**</td>
<td>0.84–0.97</td>
<td>0.87**</td>
<td>0.80–0.95</td>
<td>0.90</td>
</tr>
<tr>
<td>ATOA decreases the relative mortality risk in both the unadjusted (RR = 0.84, 95% CI = 0.77–0.91, P &lt; 0.001) and the age and gender model (RR = 0.87, 95% CI = 0.80–0.95, P = 0.001) but not in the multi-variable confounder model (Table 2).</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Discussion

High morale seems to be associated with increased survival even when adjusting for confounders associated with both morale and survival.

High morale has previously been shown to be associated with survival in a study investigating a younger old-age population than that used in the present study (mean age of 75.7 ± 6.1 versus 89.1 ± 4.4 years) [16]. The result from the total sample in the present study agrees with that from the previous study. In one of the three age groups, those aged 95 years or older, the pattern was towards increased survival for the high morale group, however not significant. Possible explanations for this might be the reduced power due to small sample size in this group. They also had, as expected, a very high mortality rate even in the high morale group, and the follow-up time might be too long to achieve significance. Also in agreement with the previously mentioned study, it seems that while women have lower morale than men they still had higher survival rate [16]. In the present study, the Kaplan–Meier curves for women and men showed patterns similar to the Kaplan–Meier curve for the whole sample.
The proportion of depressive disorders was high in the low morale group compared with the high morale group, a finding in line with other research since morale is known to negatively correlate with depressive symptoms [6]. This could have contributed to our main finding, since depression has been linked to decreased survival among very old people [24]; however, there are authors who disagree [25]. Because there was a high correlation between depression and PGCMS scores in our study and Agitation, one of the sub-scales in PGCMS, is considered to measure anxiety and dysphoric mood elements, depressive disorder was excluded as a confounder to avoid multicollinearity.

The only sub-scale that has previously been tested regarding survival was ATOA. It has previously been found to be associated with survival, after adjusting for a comprehensive set of confounders [14, 15]. The present study did not find any association between survival and ATOA or any other of the sub-scales in the multi-variable confounder model, but high morale, defined as future-oriented optimism, does seem to be associated with survival among the very old. Since morale correlates positively with well-being [3, 5], our result agree with previous finding that well-being has an association with survival among very old people [10]. The theories about how well-being increases survival could be relevant for morale including behaviour aspects such as increased engagement in social networks and self-care behaviour, psychological aspects such as more efficient coping strategies and psychological resilience, and physiological aspects such as influence on the immune and endocrine systems [26].

The Kaplan–Meier curve suggests a two-leveled morale model, since low and moderate levels of morale partly overlapped. Cox regression analyses were performed to further explore this two-level model, with high morale as a reference point compared with the combined low and moderate levels of morale. The results provide some support for a dichotomised classification of morale, but not in the multi-variable confounder model. Classification with morale divided into two levels could be useful in future research efforts.

The strength of this study was the use of a representative sample from the three age groups. The inclusion of not only those living in the community but also those living in institutional care, almost one-third in the present study which is similar to the Swedish population of the same age [18], should lead to a study population that represents the age group of very old people. A relatively high proportion of those eligible agreed to participate. Considering the advanced age, with

Figure 1. Kaplan–Meier curves showing the cumulative survival for 646 participants (mean age 89.1 ± 4.4, range 85–104 years) who answered 12 or more PGCMS questions according to the three levels of morale. The x-axis denotes follow-up time in years, and the y-axis denotes the cumulative survival of the participants. The 5-year survival rate for high morale (1) was 55.6%, for moderate morale (2) 39.4% and for low morale (3) 31.9%. A line at 50% shows median survival. Those alive after 5 years were censored. PGCMS, Philadelphia Geriatric Center Morale Scale.
possible age-related health problems and concomitant disease, a high proportion, 76% (646/850), of the study population answered the PGCMS. In addition, the register-based mortality data from Sweden and Finland are thought to be very reliable. There are limitations to this study. It was not noted why 24% (204/850) of the older people did not answer the PGCMS, which may affect its generalisability. The selection of confounding factors used in this study can affect the result, and there are variables known to affect morale such as personality traits not measured in the present study [27, 28].

The clinical implication of these results is that if low and moderate levels of morale could be improved by appropriate intervention, it would not only improve well-being but it might also increase survival. Interventions should not only be targeted at treating diseases or other factors associated with low morale among old frail individuals, but also target factors that would boost the morale, or future-oriented optimism, of the very old.

Conclusion

High morale measured with the PGCMS is independently associated with survival among the very old.

Key points

- Three out of four very old individuals answered the PGCMS, which seems to be a feasible instrument for measuring morale among very old people.
- The curve for high morale on the Kaplan–Meier curve was separated from low and moderate morale that partly overlapped.
- High morale seems to be independently associated with increased survival in very old people.

Conflicts of interest

None declared.

Funding

This work was supported by funds from the Interreg III A Kvarken-MittSkandia Program (2005–07) and the Bothnia-Atlantica Program, both funded by the European Union and the European Regional Development Fund. This work was also supported by the Umeå University Foundation for Medical Research, King Gustav V’s and Queen Viktoria’s Foundation of Freemasons, Västerbotten County Council, the Strategic Research Program in Care Sciences, Norrbotten County Council, Sweden, Joint Committee of County Councils in Northern Sweden “Visare Norr”, the Swedish Research Council for Health, Working Life and Welfare [grant number 2013-1512] and the Swedish Research Council [grant number K2014-99X-22610-01-6].

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Supplementary data

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

References

Mortality rates in community-dwelling Tanzanians with dementia and mild cognitive impairment: a 4-year follow-up study

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Abstract

Background: we have previously conducted a community-based prevalence study of dementia in older adults living in the rural Hai district of Tanzania. The aim of this study was to record mortality rates at 4 years post-diagnosis, of those with dementia, mild cognitive impairment (MCI) and no cognitive impairment.

Methods: during Phase I of the prevalence study, 1,198 people aged 70 years and over were screened, and a stratified sample of 296 was assessed for the presence of dementia or MCI in Phase II. Seventy-eight people had dementia and 46 had MCI. Four years after diagnosis, we attempted to follow-up all those seen in Phase II and record all deaths.