Five-year change in morale is associated with negative life events in very old age

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**ABSTRACT**

Objectives: The objectives were to study changes in morale in individuals 85 years and older, and to assess the effect of negative life events on morale over a five-year follow-up period.

Method: The present study is based on longitudinal data from the Umeä85+/GERDA-study, including individuals 85 years and older at baseline (n = 204). Morale was measured with the Philadelphia Geriatric Center Morale Scale (PGCMS). Negative life events were assessed using an index including 13 negative life events occurring during the follow-up period. Linear regression was used for the multivariate analyses.

Results: The majority of the sample (69.1%) had no significant changes in morale in the five-year follow-up. However, the accumulation of negative life events was significantly associated with a greater decrease in PGCMS. A higher baseline PGCMS score did not attenuate the adverse effect of negative life events on morale.

Conclusion: Morale seemed to be mainly stable in a five-year follow-up of very old people. It seems, nonetheless, that individuals are affected by negative life events, regardless of level of morale. Preventing negative life events and supporting individuals who experience multiple negative life events could have important implications for the care of very old people.

**Introduction**

The aging population is growing rapidly in Europe, as well as worldwide, and the fastest growing age group is people aged 80 and over (Eurostat, 2012). This societal challenge has led to an increased need of conducting research focusing on very old people. One way of dealing with the challenge of an aging population is to promote health and well-being. In old age, subjective evaluations of one’s life seem to play an important role in overall well-being (Smith, Fleeson, Geiselmamn, Settersen, & Kunzmann, 1999). Increasing the understanding of subjective well-being in old age could therefore have important policy implications. A need for longitudinal studies focusing on subjective well-being in old age has also been highlighted (George, 2010). Further, due to differences in living conditions and personal resources, it is important to distinguish the very old, i.e. individuals 85 years and older, from the younger old (Baltes & Smith, 2003). Hence, by using a longitudinal design the present study aims to increase the knowledge about morale, which can be seen as a cognitive dimension of subjective well-being (Bowling, 2005), in very old people.

Morale consists of future-oriented optimism and can, according to Lawton (1975), be defined as an overall sense of well-being including a basic sense of satisfaction with oneself, and a certain acceptance of changes in life associated with aging. Morale is additionally associated with other similar concepts such as quality of life and life satisfaction (Bowling, 2005).

Previous research on morale has mainly been cross-sectional and has focused on both younger-old and older-old combined (de Guzman, Lacson, & Labbao, 2015; Mancini & Quinn, 1981; Wenger, Davies, & Shahtahmasebi, 1995). In these studies, morale in old age has been associated with a number of different physical, psychological and social factors. However, only a few studies have focused on morale in very old age. One cross-sectional study focusing on morale in very old age found morale to be most strongly associated with depressive symptoms assessed with the Geriatric Depression Scale (GDS), where lower GDS scores were associated with higher morale (von Heideken Wägert et al., 2005). Higher morale was further associated with fewer reported physical and psychological symptoms, no history of stroke, not feeling lonely and living in ordinary housing. High morale in very old people has also been associated with increased five-year survival (Niklasson et al., 2015b), and additionally seemed to be associated with reduced risk for depressive disorders in a five-year follow-up (Niklasson et al., 2017).

Existing knowledge on whether the level of morale in old age changes over time is limited, and to our knowledge no study has to this point focused exclusively on changes in morale in individuals 85 years or older. In a 12-year follow-up study conducted by Scott and Butler (1997), changes in morale in rural elderly, with a mean age of 82.2 (SD = 4.4) (range 76–99) at follow-up, were investigated. The results in their study showed a statistically significant decrease in morale from baseline to follow-up on a group level (M = 0.9, SD = 3.3 points). On an individual level, 55% of the sample showed a decline, 16% showed no change, and 30% showed an improvement in morale. Scott and Butler (1997) did not, however, separate the younger old from the very old.
Negative life events could be a potential source of influence on changes in morale in old age, since negative life events previously have been adversely associated with other measures of well-being and mental health (Cairney & Krause, 2008; Chan et al., 2012; Glass, Kasl, & Berkman, 1997; Kraaj, Arensman, & Spinhoven, 2002; Lövheim, Granheim, Jonsen, Strandberg, & Lundman, 2013; Norberg et al., 2015). Life events can be described as a change in lifestyle that requires readjustment (Murray & Zautra, 2007) or distinct changes in life patterns that generate stress and can lead to onset or worsening of illness (George, 2001). According to Murray and Zautra (2007), life events in old age can be divided into four different domains: social losses, illness events, change in social roles, and shifts in the patterns of everyday life events. Compared to life events occurring in younger age, life events in old age are more likely to involve major losses that lead to bereavement (George, 2001).

Previous research has shown that the number of negative life events, i.e., when an individual is exposed to multiple negative life events, have a cumulative negative effect on mental health and well-being in old age. For example, the exposure of cumulative negative life events seems to have a negative effect on sense of coherence (Lövheim et al., 2013) and self-transcendence (Norberg et al., 2015) over a five-year period in very old age. Negative life events have previously also been shown to have a cumulative effect on the development of depressive symptomatology and depression (Chan et al., 2012; Glass et al., 1997; Kraaj et al., 2002). Being exposed to negative life events has further seemed to reduce individuals’ mastery in all ages, but also to have a stronger negative effect on individuals in older ages (Cairney & Krause, 2008).

Furthermore, it seems like negative life events could affect individuals differently. A longitudinal study on five-year survival and negative life events conducted by Clémence, Karmaniola, Green, and Spini (2007) indicated that persons 80 years and older with better psychological resources were able to handle negative life events more efficiently and therefore had greater survival than those who lacked these resources. Adequate coping-strategies such as flexible goal adjustment have further seemed to play an important role in dealing with negative life events in old age (Bailly, Joulain, Hervé, & Alaphilippe, 2012). Since features such as better psychological resources and adequate coping seem to promote the ability to handle negative life events, it could be hypothesized that also higher morale, which has previously shown to have some protective features (Niklasson et al., 2015b; Niklasson et al., 2017), could protect the individual from the adverse effect of negative life events. However, this has to our knowledge not been previously investigated.

In conclusion, the objectives of the study were to investigate changes in morale in very old people over a five-year follow-up period. Based on previous research regarding negative life events and well-being, we hypothesized that there is an association between negative life events and reduced scores in the Philadelphia Geriatric Center Morale Scale (PGCMS) from baseline to follow-up. We aimed further to test our hypothesis that higher PGCMS scores at baseline attenuate the effect of negative life events on morale.

**Method**

**Sample**

The data were collected from the Umeå85+/Gerontological Regional Database (GERDA), which is a population-based study that has been conducted every five years since year 2000. The data were originally collected in the city of Umeå and five rural municipalities in the county of Västerbotten in northern Sweden. In the second and third wave of the study (2005–2007 and 2010–2012), Ostrobothnia in Western Finland was also included. Participants were selected from the population register, acquired from the National Tax Board in Sweden and the Population Register Centre in Finland. Every second individual aged 85, and every individual aged 90 and over was invited to participate. Baseline (T1) data were derived from the first and second wave of the study (2000–2002 & 2005–2007), and follow-up (T2) data five years later respectively, i.e. from the second and third wave (2005–2007 & 2010–2012).

Potential participants were initially sent a letter with information about the study. These individuals were later contacted by phone in order to collect informed consent to participate in the study. If necessary, due to cognitive impairment, informed consent was additionally collected from a next of kin. A structured interview including pre-defined questions and assessment scales was conducted in the home of the participant by a trained physician, medical student, nurse, or physiotherapist. To establish the occurrence of different medical conditions and diagnoses, medical records from hospitals, general practitioners and care institutions were reviewed. Additional interviews were in some cases conducted with a relative and/or with care staff for further clarification.

In total, 1,310 individuals from the two first waves were eligible to be included in the study at T1. Of these, 116 died before contact and 357 declined participation. Out of the 837 individuals accepting a home visit, 647 answered more than 12 items in the PGCMS, which was a criterion for being included in the present study (Figure 1). After five years (T2), 299 of these individuals were alive and invited to re-participate in the study. Of the 275 individuals who accepted follow-up, 71 did not, however, answer the PGCMS scale, or less than 12 items in the scale, and were therefore excluded from this study. The final sample consisted of 204 individuals.

Those who did not have a sufficient follow-up (deceased, did not accept follow-up, or were unable to answer 12 or more items in the PGCMS at follow-up; 443/647) were at baseline significantly older (M = 89.9, SD = 4.6 vs. M = 87.3, SD = 3.3 years, p < .001), and had significantly lower scores in the Mini Mental State Examination (MMSE) measuring cognitive function (M = 22.3, SD = 5.2 vs. M = 25.8, SD = 3.3, p < .001), in the Barthel’s ADL index measuring activities of daily living (ADL; M = 16.9, SD = 4.6 vs. M = 19.3, SD = 2.1, p < .001), in the Mini Nutritional Assessment measuring nutritional status (M = 23.5, SD = 3.7 vs. M = 25.3, SD = 2.9, p < .001) and in PGCMS (M = 11.4, SD = 3.1 vs. M = 12.9, SD = 2.8, p < .001), as compared to those who accepted follow-up and were able to answer 12 or more items in the PGCMS (204/647). There were no significant differences between men and women in the two groups.

**Instruments**

Morale was measured with the Philadelphia Geriatric Center Morale Scale (PGCMS) (Lawton, 1975). The validity, reliability and feasibility of the Swedish version of the scale have been found satisfactory (Niklasson et al., 2015a). The scale consists of 17 questions with ‘yes’ or ‘no’ answers. Examples of
questions included in the instrument are ‘Do things keep getting worse as you get older?’ and ‘Do you have as much pep as you had last year?’ Answers indicating high morale were given one point. Zero points were given for answers indicating low morale or if the respondent was unable to answer, according to the scale instructions (Lawton, 2003). According to Lawton (2003), 0–9 points indicate low morale, whereas 10–12 points signify moderate morale, and 13–17 points indicate high morale. To be included in this study, twelve or more items in PGCMS had to be answered. To include individuals who did not answer all items was considered appropriate, since there is a possibility that the respondent has been unable to take a stand in one or several questions in the PGCMS, but still capable to complete the whole instrument. A vast majority of the sample nevertheless answered all 17 items at T1 (85.8%; 175/204) and at T2 (88.7%; 181/204). According to Niklasson et al. (2015a), a 2.5-points change between two assessments is required to detect a significant change in PGCMS on an individual level.

Depressive symptoms were screened for using the Geriatric Depression Scale including 15 items (GDS-15) with ‘yes’ or ‘no’ answers (Sheikh & Yesavage, 1986). In some cases, where the interviewer was a physician or a specially trained medical student, the Montgomery-Asberg Depression Rating Scale (MADRS) (Montgomery & Asberg, 1979) was additionally used for assessing depressive symptoms. Other psychiatric symptoms, as well as depressive symptoms, were also assessed using the Organic Brain Syndrome Scale (OBS) (Jensen, Dehlin, & Gustafson, 1993). Depressive disorders were diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) (American Psychiatric Association, 1994). If an individual had ongoing treatment for depressive disorders, depressive disorders were considered present regardless of the results of any assessment scales. All medical diagnoses in the study were determined by the same geriatrician during the whole study period in both Sweden and Finland.

ADL were assessed using the Barthel ADL index (Mahoney & Barthel, 1965) with a maximum score of 20 points indicating total independence in personal ADL. Cognitive function was assessed using the MMSE (Folstein, Folstein, & McHugh, 1975) with a maximum score of 30 points, where higher scores indicate higher cognitive function. Impaired hearing was considered present when a person was unable to hear normal conversation at a one-meter distance with or without hearing aids. Impaired vision was considered present if the individual was unable to read words written in four-millimeter block letters with or without glasses.

The variable assessing loneliness was dichotomized so that loneliness was considered present if the respondent chose...
the answers ‘often’ or ‘sometimes’ in opposite to ‘seldom’ or ‘never’ to the question ‘Do you ever feel lonely?’ The variable living alone is a dichotomous variable where persons who did not live with a partner or close relative were considered living alone. Individuals living in institutional care were also considered living alone, since most rooms in nursing homes in both Sweden and Finland are single rooms. Years of education was assessed through self-report.

Negative life events were assessed using an index including 13 different negative life events, which has been developed for, and previously used in, the Umeå85+/GERDA-study (Table 3) (Lovheim et al., 2013; Norberg et al., 2015). The index includes variables describing different types of losses which have emerged during the follow-up period such as different impairments (loss of hearing, loss of visual function), loss of independence (according to the Barthel ADL index), decrease in cognitive function (according to MMSE) and loss of a spouse or child. The index also includes moving to geriatric institutional care, the occurrence of serious diseases (stroke, myocardial infarction, hip fracture and depression), perceived institutional care, the occurrence of serious diseases (stroke, hip fracture, and cardiac infarction), decrease in PGCMS scores from T1 to T2. Correspondingly, a negative life event was found present, the dichotomous variables gave one point whilst a small decrease in MMSE (2 to 5 points) or ADL (1 to 5 points) gave one point and a larger decrease (≥6 points) gave two points in the index. An individual can thus have a maximum of 15 points in the index.

Ethics

The study was approved by the Regional Ethical Review Board in Umeå (99-326, 05-063M, 09-178M and 14-221-31M) and the Ethics Committee of Vaasa Central Hospital in Finland (05-87 and 10-54).

Statistical analyses

Changes in PGCMS scores were calculated by subtracting the T1 PGCMS scores from the PGCMS scores at T2. A negative number in the changes in PGCMS scores variable equals a decrease in PGCMS scores from T1 to T2. Correspondingly, a positive number equals an increase in PGCMS scores from T1 to T2.

For the univariate analyses, t-test was used to compare means. Chi-square was used for assessing differences between dichotomous variables. Pearson’s correlation test was used to test the correlation between the different variables in the index of negative life events and changes in PGCMS scores. The correlation between the whole index of negative life events and changes in PGCMS scores was also tested using Pearson’s correlation.

Linear regression of the ordinary least squares type was used to test the association between the index of negative life events and changes in PGCMS scores from T1 to T2. Age, gender, country, and years of education were added as covariates. To test if higher baseline PGCMS scores attenuated the effect of negative life events on changes in PGCMS scores from T1 to T2, an interaction between the variable for the index of negative life events and changes from T1 to T2 was tested using Pearson’s correlation test.

Results

The baseline characteristics of the sample are presented in Table 1. The mean age of the sample was at baseline 87.3 (SD = 3.3) and 92.0 (SD = 3.3) at follow-up. A high proportion was at baseline living alone (73%) and almost as many were widowed (69.6%). The sample had a mean of 19.4 (SD = 2.1) in Barthel’s ADL index, indicating high independence in personal ADL and also a high mean in MMSE (M = 25.8, SD = 3.3) indicating high cognitive function. Eighteen percent of the sample was considered to have depressive disorders and over forty percent experienced loneliness at baseline.

The PGCMS assessment at T1 in the final sample showed that 62.3% (127/204) had high morale, 25.0% (51/204) moderate morale, and 12.7% (26/204) had low morale. At T2, 52.5% (107/204) were considered to have high morale, 27.5% (56/204) moderate morale and 20.1% low morale (41/204). The PGCMS assessment at T2 also showed that of those with high morale at T1, 72.4% (92/127) remained to have high morale.

Table 2 describes scores in PGCMS at T1 and T2, and changes from T1 to T2 according to age group at T1 (85, 90, and 95 years) and in the total sample. The total sample had a mean PGCMS score of 12.9 (SD = 2.8) at T1, and 12.2 (SD =
Of the individuals who had a significant change in PGCMS. There were thus 30.1% (63/204) who
changed between the high and the low morale groups (\(p = .014\)) as well as between the high and the low morale groups (\(p < .001\)), but not between the low and moderate morale groups (\(p = .90\)).

The sample had a mean change in PGCMS scores from T1 to T2 of \(-0.6 (SD = 2.9)\) points (\(p = .002\)) on a group level and the change in scores ranged between \(-11\) and \(+7\) (Figure 2). The change in PGCMS scores was larger in the oldest age group (85-year-olds) than in the two older age groups (90-year-olds and 85-year-olds) (Table 2), however, these differences were not statistically significant. When analyzing changes in PGCMS scores according to level of morale at T1, the results showed that those who had low morale at T1 had a mean change of 1.2 (SD = 3.4), those with moderate morale \(-0.1 (SD = 2.8)\), and those with high morale \(-1.2 (SD = 2.6)\). The differences were statistically significant between the high and the moderate morale groups (\(p = .014\)) as well as between the high and the low morale groups (\(p < .001\)), but not between the low and moderate morale groups (\(p = .90\)).

Of the total sample, 69.1% (141/204) had a less than 3-point change in PGCMS. There were thus 30.1% (63/204) who had a change in PGCMS that was 3 points or more, which is required to detect a significant change on an individual level. Of the individuals who had a significant change (3 points or more) from T1 to T2, 21.6% (44/204) had a significant decrease in PGCMS, and 9.3% (19/204) had a significant increase in PGCMS.

In the index of negative life events, the sample had a mean score of 3.4 (SD = 2.2) ranging from 0 to 10 points. The two older age groups, \(\geq 95\)-year-olds and 90-year-olds, had a significantly (\(p < .01\)) higher score in the index of negative life events as compared to the 85-year-olds \((M = 4.6\) and 3.9 vs. 3.0). There were no significant differences in scores in the index of negative life events between the two older age groups. There were also no significant differences between men and women regarding scores in the index of negative life events.

The occurrence of the different negative life events during the follow-up period is described in Table 3. The most common occurring negative life events in the study were a smaller decrease in ADL (\(-1\) to \(-5\) points), a smaller decrease in MMSE (\(-2\) to \(-5\) points), a larger decrease in MMSE (\(\geq 6\) points), and own assessment of having gone through a crisis during the preceding year. The index of negative life events, variables significantly correlated with changes in PGCMS were stroke, a larger decrease in ADL (\(\geq 6\) points), a larger decrease in MMSE (\(\geq 6\) points), loss of visual function, and perceived loneliness.

Figure 3 shows the correlation between the index of negative life events and changes in PGCMS scores. The correlation showed that a higher score in the index of negative life events was associated with a greater decrease in PGCMS scores from T1 to T2 (\(-0.223, p = .001\)).

Results of the regression analyses are presented in Table 4. Standardized Betas (\(\beta\)) are reported in all of the models. As seen in Model 1, the index of negative life events was significantly associated with changes in PGCMS when controlling for age, gender, country, and years of education. The results showed that a higher value in the index was associated with a larger decrease in PGCMS scores, which supports the results from the correlation analysis. One standard deviation (2.2) in the index of negative life events led thus to a change of \(-0.238\) in the PGCMS. The index of negative life events remained significant when adding PGCMS scores at T1 into the model (Model 2). The results in Model 2 also indicated that higher PGCMS scores at T1 were associated with a greater decline in PGCMS scores from T1 to T2. In Model 3 an interaction between PGCMS scores at T1 and the index was tested. The results showed that there was no significant interaction between the two variables.

Table 3. The occurrence of the different variables included in the index of negative life events and their correlation with changes in PGCMS scores from T1 to T2 (\(n = 204\)).

<table>
<thead>
<tr>
<th>Variables</th>
<th>% (n)</th>
<th>Changes in PGCMS scores from T1 to T2</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke during the last 5 years</td>
<td>13.2 (27/204)</td>
<td>(-1.88)</td>
<td>.007</td>
</tr>
<tr>
<td>Cardiac infarction during the last 5 years</td>
<td>10.8 (22/204)</td>
<td>.070</td>
<td>.320</td>
</tr>
<tr>
<td>Hip fracture during the last 5 years</td>
<td>8.3 (17/204)</td>
<td>.047</td>
<td>.505</td>
</tr>
<tr>
<td>Development of depression from 1st to 2nd investigation</td>
<td>20.6 (42/204)</td>
<td>(-1.22)</td>
<td>.082</td>
</tr>
<tr>
<td>Loss of spouse during follow-up period</td>
<td>8.3 (17/204)</td>
<td>.022</td>
<td>.753</td>
</tr>
<tr>
<td>Loss of child during follow-up period</td>
<td>7.4 (15/183)</td>
<td>(-1.07)</td>
<td>.145</td>
</tr>
<tr>
<td>Moved to institutional geriatric care during follow-up</td>
<td>23.5 (48/203)</td>
<td>.002</td>
<td>.977</td>
</tr>
<tr>
<td>Loss of independence in ADL, (-1) to (-5) points at Barthel's ADL scale</td>
<td>35.8 (73/204)</td>
<td>(-0.17)</td>
<td>.829</td>
</tr>
<tr>
<td>Loss of independence in ADL, (-6) or more points at Barthel's ADL scale</td>
<td>17.6 (36/204)</td>
<td>(-2.17)</td>
<td>.013</td>
</tr>
<tr>
<td>Decrease in cognitive function, (-2) to (-5) points at the MMSE</td>
<td>35.3 (72/204)</td>
<td>(-0.39)</td>
<td>.646</td>
</tr>
<tr>
<td>Decrease in cognitive function, (-6) or more points at the MMSE</td>
<td>30.4 (62/204)</td>
<td>(-1.92)</td>
<td>.028</td>
</tr>
<tr>
<td>Loss of visual function, ability to read 4-mm block letters, during follow-up period</td>
<td>12.7 (26/204)</td>
<td>(-1.78)</td>
<td>.011</td>
</tr>
<tr>
<td>Loss of hearing, ability to hear normal spoken language at 1 m distance, during follow-up period</td>
<td>14.7 (30/204)</td>
<td>.020</td>
<td>.773</td>
</tr>
<tr>
<td>Own assessment of have gone through a crisis in life during the preceding year</td>
<td>34.3 (70/181)</td>
<td>(-0.05)</td>
<td>.944</td>
</tr>
<tr>
<td>Occurrence of feelings of loneliness, change between 1st and 2nd investigation</td>
<td>14.7 (30/199)</td>
<td>(-2.42)</td>
<td>.001</td>
</tr>
</tbody>
</table>
The results of the present study indicate that morale is mainly stable in very old age but also that negative life events could have an adverse effect on morale, regardless of initial level of morale. Some of the variables in the index of negative life events (stroke, larger decrease in personal ADL, larger decrease in MMSE, impaired vision, and occurrence of feelings of loneliness) showed a significant correlation with changes in PGCMS scores from T1 to T2. Importantly, negative life events had a cumulative adverse effect on morale. The results also showed that negative life events were commonly occurring in very old age, and that the occurrence of negative life events was significantly higher in the 90-year-olds and ≥95-year-olds compared to the 85-year-olds.

The sample had a mean change in PGCMS scores of −0.6 (SD = 2.9) points (p = .002), which is in line with the results of Scott and Butler (1997). In our study, however, a minimum change of 2.5 points, i.e. 3 points or more, was considered to be a significant change between the two assessments on an individual level, as suggested by Niklasson et al. (2015a). Thus, only a fifth of the sample was considered to have a significant decrease in PGCMS, and as much as 69.1% had no significant change in PGCMS, supporting the notion that morale is mainly stable in very old age. The results also showed that a part of the sample (9.3%) had a significant increase in PGCMS. Future research could focus on individuals who have gained a higher morale over time and possible explanations for these findings.

Interestingly, the results also showed that higher PGCMS scores at T1 were associated with a greater decrease in PGCMS over the five-year follow-up, and that individuals with high morale at T1 had on average a negative change, whilst individuals with low morale had a positive change in PGCMS. This could possibly be explained by regression toward the mean. Importantly, a vast majority of those with high morale at baseline remained to have high morale at follow-up, i.e. 13 points or more in the PGCMS at both T1 and T2.

The results showed additionally that a higher number of experienced negative life events was associated with a greater decrease in morale, which corresponds to previous studies on negative life events and other measures of mental health and well-being (Cairney & Krause, 2008; Chan et al., 2012; Glass et al., 1997; Kraaij et al., 2002; Lövheim et al., 2013; Norberg et al., 2015). Further, our hypothesis that higher PGCMS scores at T1 could attenuate the adverse effect of negative life events was not verified. It seems that even though high morale tends to have some protective features (Niklasson et al., 2015b; Niklasson et al., 2017) cumulative negative life events affect morale adversely, regardless of initial level of morale. When experiencing several negative life events during a short time period it is possible that the individual’s ability to adapt to the new circumstance is reduced, or that the time needed to readjust is prolonged. Older individuals could further be considered more vulnerable to negative life events since the resources needed to readjust seem to be weakened in advanced age (Cairney & Krause, 2008; Clémence et al., 2007; George, 2001).

There were nevertheless individuals who had a high score in the index of negative life events without having any, or minor, changes in PGCMS scores. A possible explanation for these results could be that some negative life events might not have long-lasting effects, as previously discussed by Cairney and Krause (2008). It is possible that the individual may eventually adapt to new circumstances caused by a negative life event, suggesting that the event would not have a long-term impact on morale. It can be assumed that more recent negative life events have a greater impact on morale than those that have occurred four or five years ago. In our data we have, however, no information about time of occurrence of the negative life events. Additional research on morale and negative life event is needed for further clarification. Future studies could for example focus on those who have maintained having high morale even when several negative life events have occurred.

The results showing that some of the negative life events included in the index may have a greater impact than others, is in line with previous research on negative life events in old age (Clémence et al., 2007). It is also likely that in these age groups, the life events significantly correlated with changes in morale might require greater readjustment than others (Murray & Zautra, 2007). However, the effect of the different negative life event on morale should be further investigated in order to be able to draw any firm conclusions. The results of the study show nevertheless that a larger decrease in cognitive function is both a commonly occurring negative life event in this age group, and that it has an adverse effect on morale. Special attention on promoting cognitive function could...
therefore be recommended. Physical exercise has for example in a multidomain intervention seemed to be a promising way of promoting cognitive function (Ngandu et al., 2015) and could also improve morale (Conradsson, Littbrand, Lindelöf, Gustafson, & Rosendahl, 2010). Overall, adequate support and rehabilitation when a negative life event has occurred should be offered in order to reduce the adverse outcomes.

**Strengths and limitations**

The present study is population based, including a representative sample of individuals aged 85, 90, and ≥95 years at baseline with a longitudinal design, and adds thereby valuable knowledge to this area of research. The current study also provides information on negative life events in very old people and how negative life events affect morale in very old age. There are, however, some limitations in the current study that should be considered.

A high proportion (348/647) of the sample died during the follow-up period. There was also a proportion of the baseline sample that did not accept follow-up or were unable to answer 12 or more items in the PGCMS at T2 and were therefore not included in the study (95/299). Together, these individuals had a significantly lower cognitive function, were less independent in personal ADL, and had poorer nutritional status than the follow-up sample. Thus, the follow-up sample could be considered to be a healthier sample than the overall population aged 85 years and over. Those who were not included in the final sample had also a significantly lower score in PGCMS at T1, denoting that the final sample had on average a higher score in PGCMS than the overall sample. Due to high dropout rate, as could be expected in this age group, the generalizability of the results could be limited.

The length of the follow-up period might also affect the results. We have no information if the level of morale fluctuated during the follow-up period. A five-year follow-up period could, however, be considered appropriate when investigating long-term stability in morale.

There is a possibility that life events not included in this study, such as the loss of a close friend (Chan et al., 2012) or factors related to economic situation (Wenger et al., 1995), could affect changes in morale. Chronic stressors such as caregiving could also have a potential influence on morale, but has not been investigated in this study. Further, we have no information about the individuals’ own appraisal of the severity of the different negative life events included in the study, which could have contributed to a better understanding of the effect of different negative life events. We also have no information about positive life events, which might compensate for the negative life events experienced during the same period. The index of negative life events used in the present study has also been used in previous studies (Lövheim et al., 2013; Norberg et al., 2015) but has not yet been fully validated. The index of negative life events can nevertheless be considered giving a comprehensive view of negative life events, since it includes variables representing different dimensions of life events (Murray & Zautra, 2007).

**Conclusions**

In conclusion, this study provides novel information on changes in morale in very old people. Although morale seems relatively stable even among very old people, accumulation of negative life events is found to be associated with decreasing morale. Considering the results of this study, it would be important to raise the awareness of the adverse effect of cumulative negative life events, by taking into account health-related as well as social losses, in the care of very old people.

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