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Abstract

Background: the functional status is one of the most important health measurements in the elderly. This study aimed to investigate the prevalence of self-reported physical and mental conditions among Finnish Second World War veterans during 1992–2004. We also aimed to study the ability of these conditions in 1992 to predict the functional status impairment in 2004 and to determine whether the worsening of symptoms or the onset of new diseases during 1992–2004 was associated with impaired basic activities of daily living (BADL) and instrumental activities of daily living (IADL) in 2004.

Methods: the study population was 4,999 veterans living in Finland participating in both the Veteran Project 1992 and 2004. Logistic regression models were employed to identify predictors for impaired BADL and IADL. Analyses were
conducted separately for men with and without disability and for women. **Results:** the highest risk estimate for impaired BADL in 2004 was in men without disability who had a neurological disease in 1992 [odds ratios (OR): 5.78, 95% CI: 2.49–13.43], in men with disability with walking difficulties in 1992 (OR: 2.41, 95% CI: 1.79–3.25) and in women with a musculoskeletal disease in 1992 (OR: 2.39, 95% CI: 1.58–3.62). For impaired IADL, walking difficulties had the highest risk estimate in all veteran groups. **Conclusion:** mental and physical conditions, especially walking difficulties, can predict veterans’ future functional impairment even 12 years in advance, and worsening of these conditions is associated with impaired ADL.

**Keywords:** war veterans, functional capacity, activities of daily living, longitudinal study, older people

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**Introduction**

The functional status is one of the most important health measurements in the elderly. Its decline has been defined as having difficulties in the activities of daily life (ADL), such as difficulties in the basic activities of daily living (BADL), including appropriate upper and lower extremity function, and difficulties in the instrumental activities of daily living (IADL), including self-care and household chores; tasks needed to live independently in the community [1]. The functional status decline in older adults can compromise living at home and lead to social isolation. It may be accelerated by personal risk factors, or slowed down by external support and interventions [2, 3]. The proportion of subjects with functional dependence in ADL increases with age [4], and associated chronic conditions may lead to the functional status decline [3, 5].

Only a few studies have addressed long-term functional capacity in World War II veterans, most of them focusing on veterans’ mental disorders, particularly on post-traumatic stress disorder and its association with the functional status [6–9]. The aim of this study was to investigate the prevalence of self-reported physical and mental conditions among Finnish Second World War veterans during 1992 to 2004. We also aimed to study the ability of these conditions in 1992 to predict the functional status impairment in 2004 and to determine whether the worsening of symptoms or the onset of new diseases during 1992–2004 was associated with impaired BADL and IADL in 2004.

**Material and methods**

**Subject and procedure**

In 1992, the Council of State of Finland made a decision in principle to determine Finnish Second World War veterans’ state of health, living conditions and their use of rehabilitation services. Details of the subjects and procedures have been published elsewhere [10].

The baseline survey, the Veteran 1992 Project, was conducted from November 1992 to November 1993. A postal questionnaire was sent to all 242,720 veterans (191,525 men and 51,195 women) living in Finland. The number of respondents in the baseline survey was 177,989 men and 48,745 women (a participation rate of 93%). The follow-up study, the Veteran 2004 Project, was conducted in April 2004 as a postal survey for a stratified random sample of 5,750 war veterans living in Finland (3,000 men without disability, 2,000 men with disability and 750 women). This study population comprised 4,348 men and 651 women participating in both surveys. The participation rate was 87%.

The definition ‘war veteran’ is used to refer to both men and women who served in the Finnish Defence Forces between 1939 and 1944 and were awarded a front military code. ‘Men with disability’ are veteran men who were injured or fell severely ill during the Second World War.

In 1992, the self-administered questionnaire comprised 36 multiple-choice questions, including questions about the veterans’ state of health and disorders, functional capacity, use of technical aids, health care, rehabilitation, social services, living conditions and the veterans’ own views on their requirements for further services. The questionnaire in 2004 comprised 30 identical and 27 additional questions. Questions concerning ADL were only asked in 2004. The validity of the questions was studied in 1992 by two means: the structure of the questionnaire and the division of the answers were compared with previous geriatric studies in Finland where similar questions have proven reliable [11, 12], and a general practitioner conducted health examinations on 100 veterans who completed the questionnaire in 1992 [13].

The variables chosen for our study have been shown in previous studies to be significant predictors for the functional decline [1, 3–5, 12, 14–24]. Self-rated recurrent or continuous pain during the past month was assessed with the alternatives ‘no pain’, ‘slight pain’, ‘moderate pain’ or ‘severe pain’. Ability to walk 500 m outdoors was assessed with the alternatives ‘yes, without difficulty’, ‘yes, but it is difficult’, ‘yes, but I have to rest many times’ or ‘no, I cannot’, where ‘walking difficulties’ was used to refer to the last three categories. ‘Vision impairment’ refers to subjects who were unable to read. ‘Hearing impairment’ was present when a person with poor hearing had extensive difficulties in conversation with other people. ‘Memory impairment’ was defined as severe cognitive impairment diagnosed by a doctor. Depression and fatigue were classified into four categories: ‘never’, ‘sometimes’, ‘often’ or ‘always’, and subjects with ‘depression’ and ‘fatigue’ are those who reported suffering from the conditions ‘often’ or ‘always’.
Information on diseases was based upon the replies to the question: ‘In the past year, have you been diagnosed with or treated for the following illnesses by a doctor?’ In this study, the definition ‘cardiovascular disease (CVD)’ is used to refer to heart attack, coronary disease or heart failure, but also diabetes, because diabetes substantially increases the risk of CVD [25]. ‘Musculoskeletal disease’ refers to rheumatoid arthritis, osteoarthritis in the hip, knee, shoulder joint or back or other back disorders and ‘neurological disease’ to Parkinson’s disease or stroke. ‘Increased pain, walking difficulties or fatigue’ and ‘impaired vision, hearing or memory problems’ refer to the subject experiencing deteriorated function during the follow-up. ‘Onset of depression, a new CVD or musculoskeletal or neurological disease’ refers to subjects with a new onset of the disease during the follow-up.

Functional capacity was assessed using scales for BADL and IADL. The BADL checklist in this study included bathing, dressing, toileting, transferring, eating unaided and continence, according to the Katz BADL scale [26]. Five IADL tasks from the Lawton-Brody IADL scale [27] considered to enable an independent life in the community were chosen: the ability to use the telephone, shopping, doing light housework, self-management of medication and handling finances. Because of the skewness of the distributions, the sum scores in BADL and IADL were dichotomised into two outcome variables: no decline in any of the items constituting the sum score, coded as 0, and declined ability in performing one or more of the items, coded as 1.

**Statistical analysis**

Statistical analyses were carried out using IBM SPSS Statistics for Windows version 19.0. Because men with disability had more dependencies in ADL than men without disability, the groups were examined separately. Women were analysed as one group, because only 2% of women who answered the questionnaire in 1992 had a disability. Categorical variables adjusted for age were reported as proportions in 1992 and 2004. Comparisons between the proportions were performed by using the Chi-squared test for independent groups, and the difference between men without disability and women was also analysed. A multivariate logistic regression model adjusted with age and baseline variables (pain, walking difficulties, vision, hearing and memory impairment, fatigue, depression, CVD, musculoskeletal and neurological disease) was employed to predict the effect of self-reported physical and mental conditions in 1992 on the impaired BADL and IADL in 2004. To assess the association of worsening symptoms or the onset of a new disease during the follow-up with the impaired BADL and IADL, we used a logistic regression model where each variable separately then all variables simultaneously were adjusted with its baseline value and age. Odds ratios (OR) and 95% confidence intervals (CI) were given for dichotomous (yes/no) variables. Increasing age was a continuous variable.

**Results**

In 2004, the mean age for veteran men without disability was 82.2 years, men with disability 83.2 years and women 82.3 years. The prevalence of self-reported physical and mental conditions, excluding musculoskeletal diseases, increased during the follow-up (Table 1). Examining musculoskeletal diseases separately, the prevalence of rheumatoid arthritis and osteoarthritis in the hip, knee or shoulder

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**Table 1.** The age-adjusted prevalence of self-reported physical and mental conditions among Finnish war veterans in 1992 and 2004

<table>
<thead>
<tr>
<th>Number of subjects</th>
<th>Men without disability</th>
<th>Men with disability</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>2,615</td>
<td></td>
<td>651</td>
</tr>
<tr>
<td>2004</td>
<td>1,733</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70.5</td>
<td>71.5</td>
<td></td>
<td>70.5</td>
</tr>
<tr>
<td>82.2</td>
<td>83.2</td>
<td></td>
<td>82.3</td>
</tr>
<tr>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe pain</td>
<td>4.1</td>
<td>7.0</td>
<td>8.3</td>
</tr>
<tr>
<td>Walking difficulties</td>
<td>17.4</td>
<td>26.1</td>
<td>19.1</td>
</tr>
<tr>
<td>Vision impairment</td>
<td>5.6</td>
<td>8.4</td>
<td>8.4</td>
</tr>
<tr>
<td>Hearing impairment</td>
<td>5.1</td>
<td>10.9</td>
<td>1.6</td>
</tr>
<tr>
<td>Memory impairmenta</td>
<td>2.4</td>
<td>5.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Fatigue</td>
<td>10.8</td>
<td>16.1</td>
<td>15.2</td>
</tr>
<tr>
<td>Depression</td>
<td>4.3</td>
<td>6.1</td>
<td>6.1</td>
</tr>
<tr>
<td>Cardiovascular diseaseb</td>
<td>47.3</td>
<td>52.0</td>
<td>54.1</td>
</tr>
<tr>
<td>Musculoskeletal diseasec</td>
<td>53.0</td>
<td>65.6</td>
<td>60.7</td>
</tr>
<tr>
<td>Neurological diseased</td>
<td>2.1</td>
<td>2.3</td>
<td>1.4</td>
</tr>
</tbody>
</table>

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*aAge-adjusted P-values for the difference of change between men without disability and women.

*bMemory impairment covers severe cognitive impairment diagnosed by a doctor.

*cCardiovascular diseases cover heart attack, coronary disease, heart failure and diabetes.

*dMusculoskeletal diseases cover rheumatoid arthritis, osteoarthritis in the hip, knee or shoulder joint or back, and other back disorders.

*eNeurological diseases cover Parkinson’s disease and stroke.
Prevalence, predictors and covariates of functional status impairment

Concerning IADL, the highest risk estimates were for the association with memory impairment and impaired IADL in all groups (Table 3). In the multivariate model, these associations remained similar to Table 3. However, the risk of impaired IADL in men with disability and the risk of impaired BADL in women associated with a new neurological disease, as well as the risk of impaired BADL associated with impaired hearing in men with disability and impaired vision in women were no longer significant (data not shown).

Table 2. An age-adjusted multivariate model for self-reported physical and mental conditions in 1992 as predictors for declined basic (BADL) and instrumental (IADL) activities of daily living among Finnish war veterans in 2004

<table>
<thead>
<tr>
<th>Number of subjects</th>
<th>Men without disability</th>
<th>Men with disability</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Impaired Boolean</td>
<td>Impaired Binary</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BADL</td>
<td>IADL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2,615</td>
<td>1,733</td>
<td>651</td>
</tr>
<tr>
<td>Severe pain</td>
<td>1.35 (0.81–2.27)</td>
<td>0.90 (0.51–1.60)</td>
<td></td>
</tr>
<tr>
<td>Walking difficulties</td>
<td>2.07 (1.58–2.70)</td>
<td>2.82 (2.04–3.89)</td>
<td></td>
</tr>
<tr>
<td>Vision impairment</td>
<td>2.08 (1.35–3.22)</td>
<td>2.10 (1.24–3.56)</td>
<td></td>
</tr>
<tr>
<td>Hearing impairment</td>
<td>1.61 (1.04–2.50)</td>
<td>2.08 (1.21–3.57)</td>
<td></td>
</tr>
<tr>
<td>Memory impairmenta</td>
<td>1.25 (0.63–2.47)</td>
<td>1.58 (0.71–3.53)</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>1.60 (1.20–2.37)</td>
<td>2.35 (1.53–3.57)</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>1.73 (1.04–2.86)</td>
<td>1.53 (0.87–1.69)</td>
<td></td>
</tr>
<tr>
<td>Cardiovascular diseaseb</td>
<td>1.40 (1.16–1.69)</td>
<td>1.33 (1.09–1.61)</td>
<td></td>
</tr>
<tr>
<td>Musculoskeletal diseasec</td>
<td>1.24 (1.03–1.49)</td>
<td>1.44 (1.19–1.75)</td>
<td></td>
</tr>
<tr>
<td>Neurological diseasec</td>
<td>5.78 (2.49–13.43)</td>
<td>2.34 (1.02–5.38)</td>
<td></td>
</tr>
</tbody>
</table>

Odds ratios (95% confidence intervals).

Impaired BADL covers decline in at least one of the following activities: eating, toileting, dressing, moving in and out of bed, bathing and continence.

Impaired IADL covers the decline in at least one of the following activities: using the telephone, shopping, doing light housework, self-management of medication and handling finances.

Odds ratios are given for dichotomous (yes/no) variables.

NA, not analysed. Number of cases is too low to calculate.

aMemory impairment covers severe cognitive impairment diagnosed by a doctor.

bCardiovascular diseases cover heart attack, coronary disease, heart failure and diabetes.

cMusculoskeletal diseases cover rheumatoid arthritis, osteoarthritis in the hip, knee or shoulder joint or back and other back disorders.

dNeurological diseases cover Parkinson's disease and stroke.

Discussion

Functional limitations increase with age [4], but in the last decades, disability has been pushed to the later decades of life [28]. In our study, after adjustments, walking difficulties and impaired memory were significant covariates of both impaired IADL and BADL and these associations were even stronger than those with increasing age. Severe walking difficulties and musculoskeletal diseases predicted impairment in both IADL and BADL in all study groups. IADL is a more sensitive predictor of the functional decline than BADL, and its limitations typically develop before those of BADL [19]. Also in the present study, fewer people were able to perform IADL tasks than those of BADL.

Cognitive and functional decline appear to influence each other's development [18], and changes in cognitive functioning can be an early indicator of functional disability [5, 29]. Previously, functionally independent older adults

Joint increased, but the prevalence of osteoarthritis in back or other back disorders decreased (data not shown). Compared with men without disability, the age-adjusted increase in the prevalence of hearing impairment and neurological diseases was significantly higher, but the prevalence of walking difficulties was lower in women. In 2004, 54.3% of men without disability reported to be independent in all BADL, 42.0% were dependent in 1–5 BADL and 3.7% in all BADL. In men with disability, the proportions were 43.0, 51.9 and 5.1%, and in women 52.2, 44.2 and 3.6%, respectively. In men without disability, 40.1% were independent in all IADL, 45.9% were dependent in 1–4 and 14.0% in all IADL. In men with disability, the proportions were 26.1, 54.8 and 19.1%, and in women 39.6, 50.6 and 9.8%, respectively.

In multivariate analysis, the presence of a neurological disease (OR: 5.78, 95% CI: 2.49–13.43) in men without disability, walking difficulties (OR: 2.41, 95% CI: 1.79–3.25) in men with disability and a musculoskeletal disease (OR: 2.39, 95% CI: 1.58–3.62) in women in 1992 had the highest risk estimates for impaired BADL in 2004 (Table 2). For impaired IADL, walking difficulties had the highest risk estimates in all groups.

In the age-and baseline-adjusted model, the highest estimates for the association between worsening of self-reported symptoms or the onset of a new disease and impaired BADL in 2004 were for a new neurological disease (OR: 9.89, 95% CI: 5.88–16.66) in men without disability, for the onset of depression (OR: 4.25, 95% CI: 2.48–7.27) in men with disability and for memory impairment (OR: 8.98, 95% CI: 3.44–23.42) in women.

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who became depressed during the follow-up, but not those with depression at baseline were found to be at an increased risk for the BADL decline [21]. However, older adults with a greater number of ADL limitations at baseline and declining ADL were shown to be at risk of developing depression [22]. In our study, being depressed in 1992 predicted significantly impaired BADL in men without disability and impaired IADL in men with disability. Unfortunately, there is no information about veterans’ functional status in 1992.

In the present study, walking difficulties in 1992 predicted BADL and IADL impairment, and increased walking difficulties during the follow-up were associated with impaired BADL and IADL in all groups. Among non-disabled older persons, objective measures of lower-extremity function and the ability to walk 0.25 miles have been found to predict subsequent functional capacity [1, 15]. Difficulties in mobility tasks have been independently associated with age and female sex, and may reflect the effects of chronic disease and fewer resources that have not yet caused disability [16]. Chronic conditions exert an effect on disability depending on their severity, and it is plausible that some chronic diseases could result in compensatory strategies in performing a task [3, 5, 23]. Diseases and traumas of the nervous system and degenerative muscle diseases often result in significant physical impairment and disability [24]. In the present study, a new neurological disease was associated with impaired BADL and IADL. A new CVD had no association with impaired ADL, even though the prevalence of the diseases increased among veterans during 1992–2004, indicating that diseases may be less disabling now than in the past.

Subjects with daily pain have higher rates of functional limitation than subjects without pain, and the risk of disability increases with pain severity and the number of painful sites [14]. Fatigue is associated with functional deficits that persist for years. Elderly people who report fatigue are shown to have functional impairment significantly more often than those without this symptom [20]. In our study, the prevalence of pain and fatigue increased during the follow-up in all veteran groups, and increased pain and fatigue were associated independently with BADL and IADL limitations. Vision impairment appears to have a greater impact on ADL than hearing impairment [17], which was also stated in our study.

Our study describes the functional status decline in older Finnish war veterans. Its strength is the large veteran population and the follow-up survey, which enables the examination of longitudinal ageing effects. The high response rates in both surveys indicate the high external validity of the findings. The limitation of our study is the lack of information about ADL in 1992. Thus, assessing the change in the functional status during the follow-up is not possible. Worsening symptoms or the onset of new diseases during the follow-up may be the reason for the functional decline, but functional status impairment may also give rise to certain diseases, such as depression. In the model, we measured the change of the variables during the follow-up and adjusted each variable with its baseline value and age to better explain the change. Some CIs show extremely wide ranges because of the small number of
persons having the predicting factor, and this can be considered a limitation of the study. War experiences may have influenced the veterans’ interpretations of their functional capacity, and being a war veteran may have involved in the trajectories of health, especially among veterans with disability. Our study is limited by the lack of a non-veteran control group of the same age, because practically every man capable for the activities at the front served in the Finnish Defence Forces between 1939 and 1944. The National Public Health Institute has conducted a biennial postal survey among 65–84-year-old Finnish citizens since 1985 [12], but it shares the same population as our study. Therefore, it is not possible to assess whether the changes were the consequence of ageing but also of intervention for veterans or other simultaneous changes in elderly care. Self-reported measures may give a more optimistic view of physical abilities than performance-based measures [30]. Self-reported chronic conditions may also introduce a source of error.

The present study shows that mental and physical conditions, especially walking difficulties, can predict veterans’ future functional impairment even 12 years in advance, and worsening of these conditions is associated with impaired ADL. In older veterans, the influence of a new CVD or musculoskeletal disease was weak. Our study highlights the importance of early identification and treatment of veterans and any older person at high risk for future disability.

Key points
- 54.3% of men without disability, 43.0% of men with disability and 52.2% of women reported to be independent in all BADL.
- The highest risk estimate for impaired BADL in 2004 was in men without disability who had a neurological disease in 1992.
- For impaired IADL, walking difficulties in 1992 had the highest risk estimate in all veteran groups.

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Conflicts of interest
None declared.

References
Increased risk of hip fracture among older people using antidepressant drugs: data from the Norwegian Prescription Database and the Norwegian Hip Fracture Registry

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Abstract

Background: Hip fractures are usually caused by a combination of reduced bone mineral density and falls; using antidepressant drugs may affect both of these.

Objective: We aimed to examine associations between exposure to antidepressant drugs and the risk of hip fracture among older people, and, provided associations found, to estimate the attributable risk of hip fracture.

Conclusions: The study showed an increased risk of hip fracture among older people using antidepressant drugs, with a significant attributable risk of hip fracture.