Depression and early retirement: prospective population based study in middle aged men

M Karpansalo, J Kauhanen, T A Lakka, P Manninen, G A Kaplan, J T Salonen

Background: Mental depression is an important health problem in many countries. It reduces productivity at work and is the fastest increasing reason for early retirement.

Methods: This study followed up a Finnish cohort of 1726 men from 1984 to 2000. Depression was assessed at baseline by HPL depression score. Pension records were obtained from the national pension registers. Cox’s regression analysis was used to estimate the associations of depression with the risk of all disability pensions combined, separately for different causes of disability, and non-illness based pension.

Results: During the follow up, 839 men (48.6%) received a disability pension. A total of 142 men (16.9% of all disability pensions) retired because of mental disorder and of these, 75 (52.8%) because of depression. After adjustment for the potential confounders, men in the highest third of depression score had an increased risk of non-illness based pension (RR 1.86 95% CI 1.37 to 2.51) and disability pension attributable to mental disorders (RR 2.74, 95% CI 1.68 to 4.46), chronic somatic diseases (RR 1.68, 95% CI 1.05 to 2.71), cardiovascular diseases (RR 1.61, 95% CI 1.12 to 2.32). The mean age of retirement for men with a high and low depression score was 57.6 years (SD 3.87) and 59.1 years (SD 3.65) (p<0.001) respectively.

Conclusions: A high depression score predicted disability attributable to any cause, especially mental disorders, and non-illness based pensions. Depressed people retired on average 1.5 years younger than those without depression. Further studies are needed to elucidate the pathways of how mental depression leads people to seek retirement pension.
the 20 items were eliminated. A score is generated by assigning one point for each “often” or “never” response (whichever is appropriate). The remaining 18 items inquired whether a subject felt depressed or very unhappy, lonely or remote from other people, on top of the world, too tired even to do things they normally enjoy, pleased about accomplishing something, bored, too restless to sit still long, left out even in a group, excited or interested in something, vaguely uneasy without knowing why, or if the subject found it difficult to feel close to others. Also subject’s poor appetite, difficulty to relax, not liking being in a crowd, not having much interest in something, feeling old, feeling like crying, feeling blue, feeling not close to others at all, feeling nervous, feeling tense, feeling depressed, not liking being alone, feeling guilty, feeling uncomfortable, feeling that things were going exactly as they should, feeling that things were going wrong, feeling that life was hopeless, or feeling that life was meaningless.

**Assessment of early retirement**

The cohort was linked to the pension registers of the Social Insurance Institution, the Central Pension Security Institute, and some smaller pension institutions covering all the pensions of these subjects from baseline until the 31 May 2000. The Social Insurance Institution is responsible for the basic social security provision for disability of every Finnish citizen from the age of 16 to 65 years, whereas the Central Pension Security Institute is the statutory central body of the private sector pension institutions.

When a person becomes disabled, the first step is to claim disability pension. Disability pension includes both regular disability pension and some smaller pension institutions covering all the pensions of these subjects from baseline until the 31 May 2000. The Social Insurance Institution is responsible for the basic social security provision for disability of every Finnish citizen from the age of 16 to 65 years, whereas the Central Pension Security Institute is the statutory central body of the private sector pension institutions.

**Table 1** Depression score and background factors

<table>
<thead>
<tr>
<th>Depression score</th>
<th>Whole study population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (n = 567)</td>
<td>Medium (n = 559)</td>
</tr>
<tr>
<td>Age (y)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Body mass index (kg/m2)</td>
<td>26.4 (3.0)</td>
</tr>
<tr>
<td>Alcohol (g/week)</td>
<td>57.8 (78.4)</td>
</tr>
<tr>
<td>Smoking (cigarettes/day)</td>
<td>3.8 (8.3)</td>
</tr>
<tr>
<td>Maximal oxygen uptake (ml/kg/min)</td>
<td>2.67 (0.61)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>High school or above (n = 147)</td>
<td>9.2</td>
</tr>
<tr>
<td>Middle school (n = 655)</td>
<td>44.7</td>
</tr>
<tr>
<td>Elementary school or less (n = 923)</td>
<td>46.1</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
</tr>
<tr>
<td>Farmer (n = 331)</td>
<td>18.2</td>
</tr>
<tr>
<td>Blue collar worker (n = 627)</td>
<td>32.4</td>
</tr>
<tr>
<td>White collar worker (n = 743)</td>
<td>49.4</td>
</tr>
<tr>
<td>Illness (at baseline)</td>
<td>Musculoskeletal A(n = 745)</td>
</tr>
<tr>
<td>Cardiovascular A (n = 870)</td>
<td>26.4</td>
</tr>
<tr>
<td>Mental A (n = 67)</td>
<td>11.9</td>
</tr>
<tr>
<td>Other chronic disease A (n = 581)</td>
<td>27.9</td>
</tr>
</tbody>
</table>

*Includes back problems and osteoarthritis. Includes coronary heart disease, cardiac insufficiency, hypertension, claudication, and stroke. Includes mental disorders. Includes chronic bronchitis, bronchial asthma, farmer’s lung or other pneumoconioses, lung tuberculosis, diabetes, epilepsy, liver or pancreatic diseases, cancer, and rheumatoid arthritis.

The two disease categories used were: musculoskeletal disorders (including lower back problems and osteoarthritis), cardiovascular disorders (including lower back problems and osteoarthritis), and mental disorders.
cardiovascular diseases (including coronary heart disease, chronic heart failure, hypertension, claudication, and stroke), and mental disorders. Minor disease groups were not analysed separately.

### Statistical methods

The endpoint during the follow-up was defined as the date when the early pension was awarded, whether that was the reason for the pension, or when a person began to receive an old age pension, or the end of the follow-up on 31 May 2000, whichever came first. Other outcomes were censored. The analysis was two-step: firstly we analysed the risk of leaving from work life on any type of early pension. Then we focused on disability and calculated the risk in different categories of disability. The association between depression and early retirement was analysed using Cox's regression analysis adjusting for possible confounders. Men in the lowest third of the depression score were compared with men in the middle and highest third. The results were expressed as risk ratios (RR) and their 95% confidence intervals.15

Age, education, maximal oxygen uptake, alcohol consumption, smoking, body mass index, and the most prevalent baseline diseases (musculoskeletal disorders, cardiovascular diseases, mental disorders, and other chronic illnesses) were added into the model as potential confounding variables. Age, maximal oxygen uptake, alcohol consumption, smoking, and body mass index were used as continuous variables and other confounders were categorised. SPSS 10.0 for Windows was used for statistical analyses.

### RESULTS

#### Characteristics of the subjects

Main illness categories, smoking, and alcohol consumption were directly associated, and maximal oxygen uptake and education were inversely associated with the depression score (table 1). Men who retired because of disability and men who were granted a non-illness based pension were older, less educated, and had a lower maximal oxygen uptake. The disability retirees had more illnesses, and non-illness based retirees had fewer illnesses at the baseline compared with those who kept working until 65 years of age or who were still working at the end of the follow-up (table 2).

### Retirement during the follow up

During the follow-up, 839 (48.6%) men were awarded a disability pension and 329 men (19.1%) got a non-illness based pension. The mean age at the time of retirement was 58.2 (SD 3.88) years. Only 273 (32.1%) of 1755 men had retired at the official retirement age of 65 years. The main reasons for disability were musculoskeletal disorders (n = 330, 39.3%), cardiovascular diseases (n = 237, 28.2%), mental disorders (n = 142, 16.9%), and other diseases (n = 130, 15.5%). Of those who had retired because of mental disorders, a total of 75 men (52.8%) retired because of depression. At the end of the follow-up, 287 (16.6%) men were still working.

### Depression score and the risk of retirement

The range of the depression score was from 0 to 13, and the mean score for the whole cohort was 1.71 (SD 1.98).

Mean depression score was 1.91 (SD 1.98) among disability retirees, 1.80 (SD 2.04) among non-illness based pension retirees, 1.29 (SD 1.75) among unretded men, and 1.40 (SD 1.78) among old age retirees. The mean age of retirement for those with high depression score was 57.6 years (SD 3.87); for those with low depression score it was 59.1 years (SD 4.04) for disability and 58.2 (SD 3.88) years. Only 273 (32.1%) of 1755 men had retired at the official retirement age of 65 years. The main reasons for disability were musculoskeletal disorders (n = 330, 39.3%), cardiovascular diseases (n = 237, 28.2%), mental disorders (n = 142, 16.9%), and other diseases (n = 130, 15.5%). Of those who had retired because of mental disorders, a total of 75 men (52.8%) retired because of depression. At the end of the follow-up, 287 (16.6%) men were still working.

### Table 2 Baseline characteristics

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Body mass index (kg/m²)</th>
<th>Alcohol (g/day)</th>
<th>Smoking (cigarettes/day)</th>
<th>Maximal oxygen uptake (ml/kg/min)</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 1611</td>
<td>n = 946</td>
<td>n = 118</td>
<td>n = 661</td>
<td>n = 329</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>52.5</td>
<td>26.9</td>
<td>4.7</td>
<td>30.3</td>
<td>High school or above</td>
</tr>
<tr>
<td>(SD)</td>
<td>(4.1)</td>
<td>(3.6)</td>
<td>(9.9)</td>
<td>(7.3)</td>
<td>(n = 147)</td>
</tr>
<tr>
<td>Mean</td>
<td>53.9</td>
<td>26.6</td>
<td>27.0</td>
<td>31.8</td>
<td>Middle school</td>
</tr>
<tr>
<td>(SD)</td>
<td>(2.9)</td>
<td>(3.5)</td>
<td>(15.9)</td>
<td>(7.2)</td>
<td>(n = 661)</td>
</tr>
<tr>
<td>Mean</td>
<td>49.4</td>
<td>26.4</td>
<td>75.6</td>
<td>34.7</td>
<td>Elementry school</td>
</tr>
<tr>
<td>(SD)</td>
<td>(6.3)</td>
<td>(3.1)</td>
<td>(116.0)</td>
<td>(7.4)</td>
<td>(n = 946)</td>
</tr>
</tbody>
</table>

**Table 3 Relative risk (RR) of early pensions by depression score, Cox’s regression modelling. Adjusted for age.**

<table>
<thead>
<tr>
<th>Depression score</th>
<th>All disability pensions (n = 861)</th>
<th>Mental disorder (n = 118)</th>
<th>Musculoskeletal disorder (n = 342)</th>
<th>Cardiovascular disease (n = 236)</th>
<th>Other reason for disability (n = 165)</th>
<th>Non-illness based pension (n = 331)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RR (95% CI)</td>
<td>RR (95% CI)</td>
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<td>RR (95% CI)</td>
<td>RR (95% CI)</td>
<td>RR (95% CI)</td>
</tr>
<tr>
<td>III tertile</td>
<td>1.89 (1.58 to 2.25)</td>
<td>3.63 (2.36 to 5.59)</td>
<td>1.74 (1.29 to 2.33)</td>
<td>2.24 (1.61 to 3.11)</td>
<td>1.98 (1.28 to 3.06)</td>
<td>1.85 (1.39 to 2.47)</td>
</tr>
<tr>
<td>II tertile</td>
<td>1.18 (1.01 to 1.40)</td>
<td>1.39 (0.89 to 2.17)</td>
<td>1.28 (0.99 to 1.64)</td>
<td>1.25 (0.91 to 1.70)</td>
<td>1.04 (0.67 to 1.57)</td>
<td>1.17 (0.90 to 1.52)</td>
</tr>
<tr>
<td>I tertile</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

*Includes back problems and osteoarthritis. Includes coronary heart disease, cardiac insufficiency, hypertension, claudication, and stroke. Includes mental problems and mental illnesses diagnosed by a physician.*
third. Most depressive men had a 3.6-fold risk of early retirement because of mental disorders, a 1.7-fold risk because of musculoskeletal disorders, a 2.2-fold risk because of cardiovascular diseases, and a 1.9-fold risk because of other chronic somatic diseases. They also had a 1.8 times higher risk of retirement because of other reasons than diseases (table 3). After adjustment for age, education, occupation, body mass index, alcohol consumption, smoking, maximal oxygen uptake, and chronic diseases at baseline, the risks were 1.4-fold, 2.7-fold, 1.4-fold, 1.6-fold, 1.6-fold, and 1.8-fold, respectively (table 4).

**DISCUSSION**

A high depression score, measured in the beginning of the follow up, was an independent predictor of early retirement. In addition to disability that was specifically attributable to mental disorders, depression significantly predicted all disability pensions combined, as well as non-illness based pensions. Depressed subjects ended up in a disability pension on average 1.5 years earlier than those without depression.

Depression was measured by using a questionnaire. Although the measure is somewhat crude, it is well validated, and it has been used to examine the association of depression with various outcomes. In this study we did not define depression as a clinical entity, or diagnosis, but rather as a dimensional characteristic. Despite this, it predicted clinical depression, as measured by disability pensions awarded because of mental disorders. On the other hand, self reported mental disorders at baseline may not comprehensively catch all psychiatric morbidity, so adjustment for this variable may have left room for some residual confounding.

The size of this cohort is fairly large and represents middle aged men, at least in eastern Finland. Unfortunately, no women were included at that time, so the results can be generalised only to men. A prospective study design and a long follow up enables the assessment of causality at least to some extent. The measure of retirement is comprehensive and reliable because the pension data come from the pension institutions covering all Finnish citizens. The pension data are accurate when all disability pensions are considered as a whole, but things are not as clear with respect to various disease specific pensions. The reason for this is that disability is seldom caused by just one disease; usually it is an outcome of many interrelated health problems.

Several studies have shown that depression potentially causes disability and decreases functional ability. In these studies depression and disability were associated with the physical and social disability as well as difficulties in coping mechanisms and motivation. However, little is known about risk factors for early retirement attributable to depression even if psychological distress has been observed to predict disability pension. Our study was the first prospective study to actually examine the relations between depression and early retirement, measured with the comprehensive pension register data.

Roberts et al concluded that healthy older adults with normal functional capacity are not at a greater risk for depression than younger adults, but the age related effects on depression are attributable to physical health problems and related disability. A stronger relation has been observed between aging and physical symptoms than between aging and depressive symptoms. Instead, a direct association has been found between depression and chronic physical illnesses, cardiovascular diseases, Parkinson’s disease, and musculoskeletal disorders. In this study, depression was associated with an increased risk of disability pensions attributable to mental disorders, as well as attributable to somatic chronic diseases. Depression may increase feelings of pain and inhibit coping with some chronic diseases. Also, non-compliance with medical recommendations, as well as the presence of other risk factors such as smoking, alcohol overuse, or reduced physical activity among depressive persons may lead to a physical illness or an existing illness may worsen, which then may cause disability or even disability pension. In our study, depression also increased the risk of non-illness based pensions. One explanation to this may be the lack of energy and motivation to work because there is no feeling of satisfaction. Also, reduced coping mechanisms may result in a situation in which demands at work are too exhausting.

These findings are potentially important, especially for experts in occupational health services, because depression is known to be commonly under-recognised or misdiagnosed in primary care. The early recognition of depression is extremely important because childhood depressive symptoms predict psychiatric problems in young adults, work capacity of young depressive adults is associated with their long term prognosis of working capacity and hence untreated depression even in childhood may lead to an early retirement in later life. As the HPL scores predicted mental disorders as the final cause of disability, and as clinical depression forms the largest diagnostic category in this group, HPL scores can be seen to predict actual clinical depression as a disability diagnosis. This is no surprise, however; more interesting is to notice how the high HPL score often precedes disability pensions that manifest themselves through somatic diagnoses.

Depression has been shown to be an important public health problem causing society large expenses in lost work days, and especially so if another common illness is connected to it. In our study depression associated with increased risk of early retirement, and depressed subjects retired at a significantly younger age than those without depression. The findings suggest that depression, and its consequences, may be even more expensive for society than has previously been expected. This sends an important message to the policy makers.

**Authors’ affiliations**

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**Table 4** Relative risk (RR) of early pensions by depression score. Cox’s regression modelling. Adjusted for age, education, occupation, body mass index, alcohol consumption, smoking, maximal oxygen uptake, and chronic diseases at baseline.

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</tr>
</thead>
<tbody>
<tr>
<td>II tertile</td>
<td>1.40 (1.01 to 1.95)</td>
<td>1.40 (0.89 to 2.10)</td>
<td>1.17 (0.89 to 1.53)</td>
<td>1.07 (0.76 to 1.51)</td>
<td>0.93 (0.60 to 1.45)</td>
<td>1.04 (0.78 to 1.37)</td>
</tr>
<tr>
<td>I tertile</td>
<td>1.04 (0.89 to 1.26)</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>III tertile</td>
<td>1.43 (1.21 to 1.79)</td>
<td>2.74 (1.68 to 4.46)</td>
<td>2.74 (1.68 to 4.46)</td>
<td>1.61 (1.12 to 2.32)</td>
<td>1.68 (1.05 to 2.71)</td>
<td>1.86 (1.37 to 2.51)</td>
</tr>
</tbody>
</table>

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REFERENCES

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