



Scand J Work Environ Health 1999;25(1):42-49

<https://doi.org/10.5271/sjweh.382>

Issue date: Feb 1999

Predictors and consequences of unemployment in construction and forest work during a 5-year follow-up

by [Liira J](#), [Leino-Arjas P](#)

The following articles refer to this text: [2003;29\(1\):15-21](#);
[2013;39\(2\):125-133](#); [2013;39\(3\):233-240](#)

Key terms: [employment](#); [job satisfaction](#); [life-style](#); [musculoskeletal symptom](#); [stress symptom](#)

This article in PubMed: www.ncbi.nlm.nih.gov/pubmed/10204670



This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

Predictors and consequences of unemployment in construction and forest work during a 5-year follow-up

by Juha Liira, MD,^{1,2} Päivi Leino-Arjas, MD^{1,2}

Liira J, Leino-Arjas P. Predictors and consequences of unemployment in construction and forest work during a 5-year follow-up. *Scand J Work Environ Health* 1999;25(1):42—49.

Objectives The study investigated whether indicators of health, work conditions, or life-style predict subsequent unemployment and also the unemployment consequences related to health or life-style.

Methods A questionnaire was administered to 781 male construction and 877 male forest workers (aged 20—49 years and working at the beginning of the study) in 1989 and 1994. Employment status during follow-up was ranked into the following 4 categories according to the employment status and unemployment time: continuously employed, re-employed, short-term (≤ 24 months) unemployed and long-term (≥ 24 months) unemployed.

Results The following base-line factors were associated with long-term unemployment during follow-up among the construction workers: age >40 years, poor subjective health, smoking, frequent heavy use of alcohol, low job satisfaction, marital status (single), and unemployment during the year preceding the initial survey. Among the forest workers, age >40 years, frequent stress symptoms, and preceding unemployment entered the model. In addition smoking predicted unemployment among the forest workers with no preceding unemployment. The proportion of regular smokers decreased among the long-term unemployed. Physical exercise was more frequent at the time of follow-up than it was initially, particularly among the unemployed. Stress symptoms increased among the construction workers, but musculoskeletal symptoms decreased significantly among the long-term unemployed. Among the forest workers stress symptoms decreased among the continuously employed and re-employed persons, but musculoskeletal symptoms decreased significantly for them all.

Conclusions Unemployment among construction workers is to some extent dependent on life-style, health, and job satisfaction in addition to age, marital status, and unemployment history. For forest workers, unemployment is less determined by individual factors. Changes in distress and musculoskeletal symptoms are dependent on employment, particularly among construction workers.

Key terms employment, job satisfaction, life-style, musculoskeletal symptoms, stress symptoms.

An association between unemployment and ill-health seems evident in that a higher level of mental distress or depression, more frequent use of health services, and increased mortality among unemployed persons than among employed persons has repeatedly been described (1, 2). Whether job loss is the cause of ill-health or an indicator of health-based selection in the labor market is being debated, however (3). An unhealthy life-style seems also to be associated with unemployment (4), but, again, it is not clear whether such a life-style predates or follows unemployment.

Job loss could plausibly be deleterious to health via its negative psychosocial and economic consequences for

the person. Unemployment can be a powerful stressor, threatening identity and self-image (1), with a decline in mental health (5, 6) or physical ill-health (7) as a consequence in vulnerable persons. Economic hardship resulting from unemployment may be deleterious to physical and mental health and functioning (8).

On the other hand, persons with poor health or, for example, addictive behavior may lose their job more easily than others, or be less successful in finding a new one. In Finland, higher excess mortality was observed among the unemployed in the 1980s when unemployment was rare than during the deep economic recession of the 1990s when unemployment increased rapidly (9). The

1 Finnish Institute of Occupational Health, Helsinki, Finland.

2 LEL Employment Pension Fund, Helsinki, Finland.

Reprint requests to: Dr Juha Liira, Centre for Work Ability, Finnish Institute of Occupational Health, Topeliuksenkatu 41 a A, FIN-00250 Helsinki, Finland. [E-mail: juha.liira@occuphealth.fi]

finding suggests a health-related selection mechanism out of or into the labor market and a variation in the selection force according to the unemployment rate.

In construction and forest work recurrent periods of unemployment are common. The deep economic recession in the first half of the 1990s in Finland led to a high general unemployment rate (about 20%) with an extraordinarily high rate (up to 50%) in construction occupations. Periods of unemployment became longer, and many older workers were permanently left without a job.

In this study, we examined a cohort of male construction and forest workers to determine (i) whether indicators of subjective health, work conditions or life-style predict later unemployment and (ii) whether consequences of unemployment related to life-style or health can be discerned. A consideration of the mediators of the possible associations was beyond the scope of this study.

Subjects and methods

Data collection

The data were collected in 2 surveys with a 5-year interval in between. In 1989 all the blue-collar employees of 3 companies in the construction industry and 2 companies in forestry were initially surveyed (10). A total of 1594 male construction workers (response rate 65%) and 1556 male forest workers (response rate 84%) responded to the questionnaire. Five years later 1180 construc-

tion workers and 1165 forest workers responded to the follow-up questionnaire.

The month-by-month occupational activity status (employed, unemployed, out of work force) of the subjects is shown in figure 1. The unemployment rate of the construction workers rose rapidly and almost linearly, whereas more seasonal fluctuation was observed for the forest workers. The occupational activity data were based on questionnaire responses made in the follow-up; due to a relatively high nonresponse rate, these data were not used in the definition of unemployment in the subsequent analyses.

We studied the 781 construction and 877 forest workers who still belonged to the work force (employed or unemployed) and were less than 50 years of age in 1989. The age restriction was made to exclude the elderly unemployed subjects eligible for unemployment pension according to a special national pension scheme.

Employment status

At the time of the first survey the respondents were employed. The occurrence of unemployment during the 12 months preceding the survey was inquired about (yes, no); we refer to this information as "preceding unemployment" in the following presentation.

At the time of the follow-up, the employment status was determined (employed, unemployed). Based on this information and the response to the question "How long have you been unemployed during the past 5 years?", the following 4 categories of employment status were

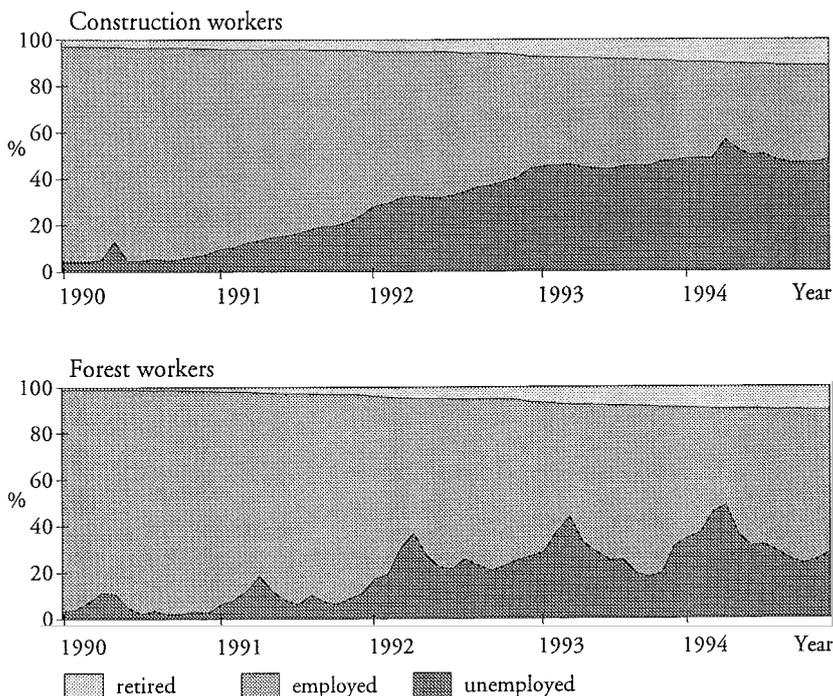


Figure 1. Month-by-month employment status of the construction and forest workers during the 5 years of follow-up (percentage of all respondents).

constructed: (i) continuously employed: those working during the entire follow-up period; (ii) re-employed: those working at the time of the follow-up after having been unemployed for any period of time during the past 5 years; (iii) short-term unemployed: those who were without a job at the time of follow-up and who had been out of work ≤ 24 months during the follow-up; and (iv) long-term unemployed: those who were without a job at the time of follow-up and who had been out of work > 24 months during the follow-up (table 1). A cut-point of 24 months was used for unemployment because compensation is set at a lower level for this time independent of former wage.

Education and marital status

The length of basic education (2 classes) and occupational training was dichotomized as none (none or a short vocational course) versus some (apprenticeship, vocational school, high school), whereas marital status was dichotomized as married (married or cohabiting) versus single (single, separated, widower).

Health

Subjective health was assessed in relation to the health of others of the same age (0=very good, good or moderate; 1=poor or very poor).

The following question was used to determine musculoskeletal symptoms: "Have you had pain, tenderness in movement, stiffness or numbness in joints or muscles in the following regions during the past 12 months, and how often?: neck-shoulder area, low back, upper limbs, lower limbs". All the items were scored from 1 = never or seldom to 4 = very often or continuously (Cronbach's alpha coefficient of the sum score 0.88, range 4–16, frequent symptoms 10–16).

Distress symptoms were inquired about with the question "Have you had any of the following symptoms during the past 12 months, and how often?: dyspepsia, abdominal pain, diarrhea, insomnia, nightmares, headache, dizziness, arrhythmias, lack of energy, nervousness, irritability". All the items were scored from 1 = never or

seldom to 4 = very often or continuously (Cronbach's alpha coefficient of the sum score 0.91, range 11–44, frequent symptoms 18–44).

The Beck Depression Inventory (BDI) (11) was included in the follow-up questionnaire.

Work conditions and income

Physical work load was inquired about with the question "How much strain is due to the following factors in your work?: muscle work due to lifting or constant movement, static muscle work, awkward postures and insufficient opportunity to change posture". All the items were scored from 1 = none to 5 = very much (Cronbach's alpha coefficient of the sum score 0.82, range 4–20, high physical work load 12–20).

The work environment score described the strain from noise, vibration, dusts, skin-irritating agents, hot or cold environments and draft; the inquiry about these factors was carried out as for work conditions and income. All the items were scored from 1 = none to 5 = very much and summed. (Cronbach's alpha coefficient 0.82, index range 6–30, poor work environment 20–30).

The job satisfaction of the workers was assessed by 3 questions: "How satisfied are you with how interesting your work is?" (scored from 1 = very content to 5 = very discontent); "Does your present job correspond with your capacities and qualities?" (scored from 1 = very well to 4 = very poorly); "If possible, would you change your job to another with an equal salary?" (scored from 1 = no to 3 = immediately) (Cronbach's alpha coefficient of the sum score 0.66, range 3–12, low job satisfaction 9–12).

The adequacy of income was assessed with the question "Does your salary, pension, or insurance compensation provide you with a reasonable personal economy?" The responses ranged from 1 = very well to 5 = badly; inadequate income = 4–5.

Life-style

Current smoking ("Do you smoke regularly?"; 1 = yes, 0 = no or have quit) and heavy use of alcohol ("How often do you use alcohol in such an amount that you get drunk?"; 1 = at least once a week, 0 = less than once a week) were assessed. Leisure-time physical exercise was inquired about with the question "Do you engage in leisure-time activities to improve your physical fitness (eg, running, brisk walking, cycling, skiing, ball games, swimming, gymnastics, etc?"; 1 = less often than weekly, 0 = at least once a week).

Statistical methods

A logistic regression analysis was used in predicting unemployment during follow-up. Both age-adjusted odds ratios and multivariate models are presented. The inter-correlations of the original (noncategorized) symptom

Table 1. Employment status by occupation of the construction and forest workers in 1989–1994.

| Employment status group | Construction workers | | Forest workers | |
|-------------------------|----------------------|-----|----------------|-----|
| | N | % | N | % |
| Continuously employed | 74 | 9 | 134 | 15 |
| Re-employed | 273 | 35 | 493 | 56 |
| Short-term unemployed | 239 | 31 | 183 | 21 |
| Long-term unemployed | 195 | 25 | 67 | 8 |
| Total | 781 | 100 | 877 | 100 |

scores and the 3 sum variables on work conditions were $r=0.49$ at the highest. A stepwise analysis (backward conditional selection, probability for removal $P=0.10$ and for entry 0.05; age included in all the models) was used to find statistically significant variables for the final model, which was then estimated separately.

The multivariate analyses were made both for the total material and for those with no unemployment during the 12 months preceding the initial survey.

When the consequences of unemployment were studied, both continuous (distress and musculoskeletal symptoms and the responses to the BDI) and dichotomous (economic difficulties, subjective health, smoking, alcohol use, exercise) variables were used. Paired t-tests, the McNemar chi-square test, and an analysis of variance were used in the comparisons, both within and between employment status groups.

The SAS (statistical analysis system, version 6.07) and SPSS (statistical package for the social sciences, version 7.5) statistical packages were used in the computing.

Results

While all the respondents were working at the time of the first survey in 1989, 11% of the construction workers and 7% of the forest workers reported unemployment during the preceding 12 months. During the 5 years of follow-up nearly 90% of the respondents experienced unemployment. At the follow-up in 1994, 44% of the construction workers and 71% of the forest workers were employed. Long-term unemployment was more common in the construction sector; 25% of the construction workers and 8% of the forest workers had been unemployed for more than 24 months during the follow-up (table 1). Unemployment was slightly more prevalent in the older age groups (figure 2). Education was not associated with unemployment in either occupation.

Predictors of short-term unemployment

Among the construction workers, the variables associated with short-term (≤ 24 months) unemployment in a multivariate model were age over 40 years [odds ratio (OR) 2.1, 95% confidence interval (95% CI) 1.3–3.4], frequent heavy use of alcohol (OR 2.9, 95% CI 1.6–5.1), single marital status (OR 2.1, 95% CI 1.4–3.0), and frequent distress symptoms (OR 1.5, 95% CI 1.1–2.2); for the forest workers single marital status (1.8; 1.2–2.6) was associated with short-term unemployment. When those unemployed before the beginning of the study were excluded, distress symptoms did not enter the model for the construction workers — otherwise the models remained practically unchanged.

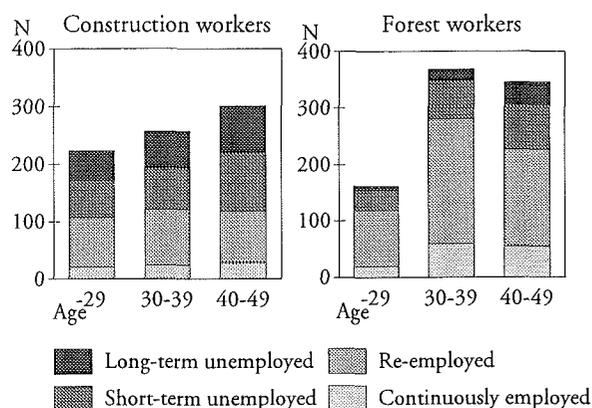


Figure 2. Follow-up employment status of the construction and forest workers by 1989 age groups.

Predictors of long-term unemployment

Several factors measured in the first survey were associated with long-term unemployment during the follow-up in the age-adjusted analyses (table 2). In the multivariate analysis among the construction workers, smoking, frequent heavy use of alcohol, poor subjective health, low job satisfaction, and single marital status were associated with long-term unemployment in addition to unemployment during the year preceding the base-line survey (table 2). For the forest workers, age >40 years, frequent stress symptoms, and preceding unemployment were included in the multivariate model.

After the exclusion of workers who had been unemployed in 1989, the multivariate analyses were repeated. Low job satisfaction was excluded for the construction workers, as was frequent stress symptoms among the forest workers. In addition smoking among the forest workers was included among the statistically significant predictors (table 2).

Consequences of unemployment

Inadequate income was reported more often in the follow-up survey than in the initial survey in all the employment categories among the construction workers; the difference was greater in the unemployed groups (figure 3). Among the forest workers the continuously employed were more satisfied with their income at the time of the follow-up than in the initial inquiry, and the unemployed were less satisfied.

The development in the occurrence of distress and musculoskeletal symptoms was dependent on employment category. For the construction workers, distress symptoms increased among the long-term unemployed, and musculoskeletal symptoms decreased among the unemployed. For the forest workers musculoskeletal symptoms decreased for all the respondents, while distress symptoms were reduced for those who were working at the time of the follow-up (table 3).

Table 2. Initial health indicators, perceived work conditions, and life-style variables as predictors of long-term unemployment (>24 months) during 1990–1994.

| Variable | Construction workers (cases=195, total=781) ^a | | Forest workers (cases=67, total=877) ^b | |
|---|--|-----------|---|-----------|
| | OR | 95% CI | OR | 95% CI |
| Bivariate analysis (age-adjusted) | | | | |
| Preceding unemployment | 3.63 | 2.29–5.75 | 3.35 | 1.67–6.70 |
| Marital status (single) | 2.12 | 1.50–3.00 | 1.53 | 0.91–2.58 |
| Poor subjective health | 2.15 | 1.30–3.56 | 1.49 | 0.67–3.28 |
| Frequent stress symptoms | 1.62 | 1.17–2.25 | 1.76 | 1.06–2.94 |
| Frequent musculoskeletal symptoms | 1.11 | 0.80–1.55 | 1.24 | 0.72–2.08 |
| Poor work environment | 1.54 | 1.08–2.19 | 0.70 | 0.41–1.19 |
| High physical workload | 1.40 | 0.99–1.96 | 1.06 | 0.64–1.75 |
| Low job satisfaction | 1.98 | 1.41–2.79 | 0.77 | 0.46–1.29 |
| Frequent heavy alcohol use | 2.99 | 1.95–4.58 | 1.03 | 0.36–2.98 |
| Smoking | 2.69 | 1.91–3.79 | 1.80 | 1.09–2.99 |
| Lack of exercise | 1.57 | 1.11–2.22 | 1.60 | 0.91–2.81 |
| Multivariate analysis (all cases included) | | | | |
| Age (years) | | | | |
| ≤29 | 1.00 | reference | 1.00 | reference |
| 30–39 | 1.06 | 0.66–1.70 | 0.92 | 0.39–2.17 |
| ≥40 | 1.63 | 1.02–2.55 | 2.70 | 1.20–6.08 |
| Preceding unemployment | 2.96 | 1.77–4.95 | 3.82 | 1.85–7.88 |
| Marital status (single) | 1.71 | 1.17–2.51 | . | . |
| Poor subjective health | 1.83 | 1.03–3.24 | . | . |
| Frequent stress symptoms | . | . | 1.94 | 1.13–3.35 |
| Low job satisfaction | 1.54 | 1.06–2.24 | . | . |
| Smoking | 2.27 | 1.57–3.30 | . | . |
| Frequent heavy alcohol use | 1.99 | 1.24–3.17 | . | . |
| Multivariate analysis^c (without those unemployed in 1989) | | | | |
| Age (years) | | | | |
| ≤29 | 1.00 | reference | 1.00 | reference |
| 30–39 | 1.01 | 0.60–1.71 | 0.75 | 0.29–1.97 |
| ≥40 | 1.53 | 0.94–2.51 | 2.27 | 0.97–5.32 |
| Marital status (single) | 1.91 | 1.26–2.89 | . | . |
| Poor subjective health | 2.64 | 1.44–4.86 | . | . |
| Smoking | 2.18 | 1.46–3.27 | 2.21 | 1.25–3.91 |
| Frequent heavy alcohol use | 2.19 | 1.31–3.65 | . | . |

^a 25%. ^b 8%. ^c Construction workers (cases/total = 151/692=22%), forest workers (cases/total = 55/814 = 7%).

The BDI score increased systematically from the continuously employed to the long-term unemployed (table 3).

Unemployment was not associated with changes in subjective health. Of the life-style variables, frequent

leisure-time physical activity was reported more often in the follow-up than in the initial survey, particularly among the unemployed. The proportion of regular smokers decreased among the long-term unemployed (table 4).

Discussion

Our material enabled us to consider the predictors and consequences of unemployment, particularly those related to health, life-style, and work conditions, for men in physically strenuous occupations. The material was not originally gathered in order to study unemployment; its prospective nature and the deep economic recession in the first half of the 1990s in Finland provided us with this opportunity however.

Two definitions of unemployment were used — short-term and long-term — based on different levels of economic compensation. However, both groups reported significantly increased economic hardship at the time of the follow-up.

The results give some limited support to both hypotheses concerning the direction of the relevant causality of associations (ie, unemployment leading to a deterioration in health or life-style versus unemployment being selective according to the person's characteristics).

In support of the first directionality assumption, the occurrence of distress symptoms increased among the long-term unemployed construction workers and did not improve among the unemployed forest workers, as was the case among others in this occupation. However, the magnitude of this effect was small. Symptoms of depression were more common among the unemployed than among the others and more common among the long-term than the short-term unemployed, but we had no data available from the initial survey on this aspect.

Not all the health-related changes associated with unemployment were negative, however. Musculoskeletal symptoms were reduced among the long-term

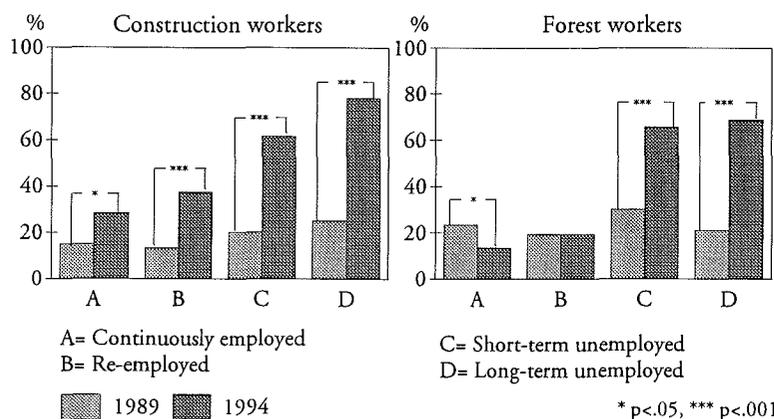


Figure 3. Proportion of construction and forest workers with inadequate income in the initial survey (1989) and at follow-up (1994) by employment status (percentage of all respondents).

* $p < .05$, *** $p < .001$

unemployed in the construction sector. It is possible that the decrease in physical work load brought about by unemployment was reflected in the occurrence of symptoms. In forest work the increased usage of wood harvesters and forest tractors has greatly reduced dynamic physical work load and exposure to adverse climatic conditions; these changes may have contributed to the favorable development with respect to musculoskeletal symptoms, observed for all forest workers independent of work status — and perhaps also to the decreased distress of the employed.

The other possible direction of causation, that leading from health to unemployment, also received some support. Poor subjective health predicted long-term unemployment among the construction workers and frequent stress symptoms acted as the predictor for the forest workers.

Life-style factors seemed, however, to be more important predictors of unemployment than the available measures of health. Addictive behavior such as smoking and heavy alcohol consumption were associated with a higher risk of job loss or continued unemployment. Smoking was a predictor of unemployment also when alcohol use was allowed for. Findings connecting smoking with employment outcome have been reported before (12, 13). An explanation may be that addictive behavior is regarded by the employer as an indicator of risk taking at work. The association of addictive behavior (eg, smoking) and the stability of employment is probably complex and intertwined with the social and occupational history of the respondent (14).

When changes in health behavior were considered, the unemployed reported improvement in terms of increased leisure-time physical activity and a reduced proportion of regular smokers. The former could be explained by the discontinuation of musculoskeletal loading among the subjects used to physical labor. The decline in the number of smokers may have been a direct

Table 3. Distress and musculoskeletal symptoms in the initial survey (base line) (1989) and at follow-up (1994) and score on the Beck Depression Inventory at follow-up, in four employment status groups, by occupation. (I = continuously employed, II = re-employed, III = short-term unemployed, IV = long-term unemployed between 1989 and 1994)

| Employment status group | N | Base line | | Follow-up | | Change (P-value ^a) |
|-----------------------------|-----|-----------|--------------------|-----------|--------------------|--------------------------------|
| | | Mean | SD | Mean | SD | |
| Construction workers | | | | | | |
| Distress symptoms | | | | | | |
| I | 71 | 15.6 | 3.8 | 15.9 | 3.8 | 0.430 |
| II | 268 | 16.1 | 4.5 | 16.4 | 4.2 | 0.476 |
| III | 236 | 17.2 | 4.9 | 17.6 | 5.1 | 0.124 |
| IV | 191 | 17.8 | 5.1 | 18.9 | 5.8 | 0.002 |
| | | | 0.001 ^b | | 0.001 ^c | |
| Musculoskeletal symptoms | | | | | | |
| I | 72 | 7.7 | 2.9 | 7.4 | 2.6 | 0.350 |
| II | 270 | 8.2 | 2.8 | 8.0 | 2.5 | 0.207 |
| III | 235 | 8.2 | 2.9 | 7.9 | 2.8 | 0.048 |
| IV | 188 | 8.5 | 2.9 | 7.8 | 2.8 | 0.001 |
| | | | 0.401 ^b | | 0.315 ^c | |
| Beck depression Inventory | | | | | | |
| I | 74 | . | . | 9.9 | 3.0 | . |
| II | 272 | . | . | 10.1 | 3.3 | . |
| III | 239 | . | . | 11.4 | 4.5 | . |
| IV | 194 | . | . | 12.5 | 4.7 | . |
| | | | | | 0.001 ^b | |
| Forest workers | | | | | | |
| Distress symptoms | | | | | | |
| I | 132 | 16.0 | 4.0 | 15.5 | 3.6 | 0.010 |
| II | 488 | 16.5 | 4.2 | 16.1 | 3.8 | 0.005 |
| III | 177 | 16.8 | 4.6 | 17.1 | 4.4 | 0.407 |
| IV | 66 | 17.8 | 4.4 | 18.1 | 4.8 | 0.569 |
| | | | 0.022 ^c | | 0.001 ^d | |
| Musculoskeletal symptoms | | | | | | |
| I | 133 | 8.8 | 2.7 | 7.9 | 2.6 | 0.001 |
| II | 487 | 8.9 | 2.7 | 8.0 | 2.4 | 0.001 |
| III | 179 | 8.9 | 2.8 | 8.3 | 2.6 | 0.001 |
| IV | 63 | 9.2 | 3.1 | 8.5 | 2.7 | 0.025 |
| | | | 0.735 ^b | | 0.821 ^c | |
| Beck Depression Inventory | | | | | | |
| I | 134 | . | . | 9.3 | 2.7 | . |
| II | 493 | . | . | 9.9 | 3.2 | . |
| III | 181 | . | . | 11.1 | 4.0 | . |
| IV | 67 | . | . | 11.7 | 3.6 | . |
| | | | | | 0.001 ^b | |

^a P = paired t-test. ^b P = analysis of variance, adjusted for age. ^c P = analysis of variance, adjusted for age and analogous 1989 variable.

Table 4. Prevalence of poor subjective health, smoking, frequent heavy alcohol use, and frequent physical exercise by employment status in the initial survey and at follow-up, by occupation.

| Employment status group | Continuously employed | | Re-employed | | Short-term unemployed | | Long-term unemployed | |
|-----------------------------|-----------------------|------|-------------|------|-----------------------|-------|----------------------|-------|
| | 1989 | 1994 | 1989 | 1994 | 1989 | 1994 | 1989 | 1994 |
| Construction workers | | | | | | | | |
| Poor subjective health | 5 | 7 | 6 | 5 | 9 | 11 | 14 | 14 |
| Smoking | 42 | 38 | 39 | 37 | 49 | 44 | 67 | 59** |
| Frequent heavy alcohol use | 6 | 10 | 7 | 10 | 17 | 14 | 24 | 26 |
| Frequent physical exercise | 50 | 62 | 42 | 52** | 45 | 60*** | 35 | 56*** |
| Forest workers | | | | | | | | |
| Poor subjective health | 5 | 4 | 8 | 5 | 9 | 11 | 11 | 9 |
| Smoking | 28 | 32 | 32 | 32 | 36 | 35 | 46 | 37* |
| Frequent heavy alcohol use | 2 | 1 | 6 | 7 | 10 | 11 | 6 | 9 |
| Frequent physical exercise | 52 | 54 | 50 | 52 | 46 | 63*** | 37 | 51 |

* P<0.05, ** P<0.01, *** P<0.001 (chi-square).

result of economic constraints or of smoking being less incorporated into daily routines at home than at work. It is evident that smoking was not mainly used by the unemployed construction workers as a coping method under stress since distress and smoking developed in opposite directions.

In addition to health related-variables, low job satisfaction also predicted long-term unemployment among the construction workers. Experiencing one's work as interesting and suitable for oneself may be a prerequisite for active job seeking when jobless, or it may be reflected in the quality of work as assessed by the employer.

Single or separated men in construction work had a higher risk of long-term unemployment than men with families. This finding can be interpreted in several ways. For instance, an employer may see it as easier to cease to employ a single man as compared with a family supporter. Or, with no necessity to secure a family's livelihood, one aspect of the motivation to get re-employed is lacking.

In summary, older single men who have an addictive life-style and poor subjective health and who are dissatisfied with their work were at a higher risk of being laid off than others in the construction sector. A conclusion as to whether or not these features represent a group with a shared experience would benefit from qualitative, biographical data.

There were fewer statistically significant predictors of unemployment among the forest workers than among the construction workers. The main factor that may have contributed to this finding is that there was less unemployment and more variation in the unemployment rate during the follow-up among the forest workers than among the construction workers. Alcohol consumption (less common among the forest workers) is probably not compatible with forest work, due to the high demands for precision and vigilance in tree-felling work.

As individual-related factors evidently predicted unemployment, we must wonder about the extent to which this was the case. We do not of course want to claim that unemployment could be explained exhaustively in individual terms. In another Finnish study of construction workers individual-level variables explained about 20% of the total variation in the length (months) of unemployment during a 4-year follow-up (15). This finding shows that unemployment was, to a high extent, dependent on factors other than those within the reach of the subject himself — on hard economic and social realities. It is possible, however, that under lower unemployment rates, the relative importance of individual characteristics increases (9).

The study was exclusively based on questionnaire surveys. This was a limitation, especially in regard to the objectivity of the life-style data in that normative expectations may affect the responses. As we were

not interested in the actual frequency of, say, alcohol consumption or sports activity, but instead, in their prospective relationship with unemployment, this limitation probably did not cause major bias with respect to the results on predictors of unemployment. The reports of behavior after job loss may be less reliable. Studying the subjects' perceptions of their work or health prior to unemployment seems acceptable; what is regrettable is that we had no objective measures of change in health available.

The strongest predictor of unemployment in both occupational cohorts was previous unemployment. Similarly in another study, made during a "normal" prevalence of unemployment, an unstable work history was the most powerful predictor of job loss (16). In the group of construction workers with no immediate previous unemployment, subjective health was the strongest predictor of unemployment. When persons with previous unemployment were included, subjective health was less important. This finding suggests a cumulative process of occupational marginalization, where health may actually be a more primary selective factor than was first indicated.

Acknowledgments

We thank Helena Rytönen and Pirkko Lindborg from the LEL Employment Pension Fund for their technical assistance.

References

1. Ezzy D. Unemployment and mental health: a critical review. *Soc Sci Med* 1993;37:41—52.
2. Jin RL, Shah CP, Svoboda TJ. The impact of unemployment on Health: A review of the evidence. *Can Med Assoc J* 1995;153:529—40.
3. Bartley M. Unemployment and ill health: understanding the relationship. *J Epidemiol Community Health* 1994;48:333—7.
4. Blaxter M. Health and lifestyles. London: Routledge and Keegan Paul, 1990.
5. Dooley D, Catalano R. Unemployment as a stressor: findings and implications of a recent study. In: Badura B, Kickbusch I, editors. *Health promotion research: towards a new social epidemiology*. Copenhagen: World Health Organization (WHO), 1991:313—39. WHO regional publications, European series, no 37.
6. Lahelma E. Unemployment and mental well-being: elaboration of the relationship. *Int J Health Serv* 1992;22:261—74.
7. Moser KA, Fox AJ, Goldblatt PO. Stress and heart disease: evidence of association between unemployment and heart disease from the OPCS longitudinal study. *Postgrad Med J* 1986;62:797—9.
8. Lynch JW, Kaplan GA, Shema SJ. Cumulative impact of

- sustained economic hardship on physical, cognitive, psychological, and social functioning. *New Engl J Med* 1997;337:1889—5.
9. Martikainen PT, Valkonen T. Excess mortality of unemployed men and women during a period of rapidly increasing unemployment. *Lancet* 1996;348:909—12.
 10. Leino P, Hänninen K, Kivekäs J. Työolot, terveydentila ja varhaiskuntoutuksen tarve LEL-alojen työntekijöillä [Work conditions, health and need for early rehabilitation among LEL-insured employees]. Helsinki: LEL Employment Pension Fund, 1991. Publications 18. Summary in English.
 11. Beck AT, Rial WY, Rickels K. Short form of depression inventory: cross-validation. *Psychol Rep* 1974;34:1184—6.
 12. Waldron I, Lye D. Employment, unemployment and smoking. *Am J Prev Med* 1989;5:142—9.
 13. Ryan J, Zerwling C, Jones M. Cigarette smoking at hire as a predictor of employment outcome. *J Occup Environ Med* 1996;38:928—33.
 14. Lee AJ, Crombie IK, Smith WCS, Tunstall-Pedoe HD. Cigarette smoking and employment status. *Soc Sci med* 1991;33:1309—1312.
 15. Leino-Arjas P, Liira J, Mutanen P, Malmivaara A, Matikainen E. Rakennustyöntekijöiden työttömyys, terveys ja terveyskäyttäytyminen [Unemployment, health, and life-style among Finnish construction workers] *Työ ja ihminen*. In press. English summary.
 16. Arrow IO. Estimating the influence of health as a risk factor on unemployment: a survival analysis of employment durations for workers surveyed in the German socio-economic panel (1984—1990). *Soc Sci Med* 1996;42:1651—9.

Received for publication: 4 February 1998