

## MENTAL SYMPTOMS AMONG FINNISH FARM ENTREPRENEURS

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**Abstract:** The prevalence of mental symptoms among Finnish farm entrepreneurs in 2004 and 1994 was examined in two cross-sectional studies. The aim was also to examine associations between symptoms and background factors. Two random samples for computer-assisted telephone interviews comprised 1,182 full-time farmers in 2004 and 928 farmers in 1992. A binary logistic regression model was used to analyze the associations in the 2004 sample. Symptoms of weakness or fatigue and insomnia or difficulties in falling asleep were the most common symptoms in the 2004 survey, and both of these symptoms increased statistically significantly when comparing with the 1992 and 2004 surveys. Strenuousness of life and agricultural work had an association with mental symptoms. Forestry as a production sector and over two weeks of pesticide usage during the previous growing season also elevated the risk of mental symptoms. Moreover, illness or injury as well as a lack of support from social relationships was associated with mental symptoms. One in four farm entrepreneurs had symptoms of weakness or fatigue in 2004. This result and the possible association between mental symptoms and pesticide usage needs special attention and further actions by health care services and other agricultural networks.

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## INTRODUCTION

From 1992–2004, the period of focus in this study, the number of active farms in Finland declined by 49,295 [9, 35, 36], and at the same time the number of persons working on farms declined by 73,451 [3] (Tab. 1). Thus, a total of 40.6% of Finnish farms ceased agricultural production during the 12-year period. Consequently, the average field size on farms increased by 13.4 ha, being 31.5 ha in 2004 [9, 35, 36]. Meanwhile, the coefficient of profitability of farm enterprises declined from 0.67 in 1992 to 0.52 in 2004 [15, 16, 17]. This coefficient is calculated by dividing entrepreneurial income by the sum of wage and interest claims. Overall, these changes have been significant and

unique in Finnish society, and they may affect the mental well-being of farm entrepreneurs.

In 2006, over a quarter (28%) of the Finnish working population reported having long-lasting and constant physical or mental symptoms during the previous six months that were caused by work, or for which the symptoms were worsened by work tasks. Among Finnish farm and forestry entrepreneurs this proportion was the highest (32%) [19]. According to statistics [5], mental health problems as a cause of retirement due to work disability, especially due to depression, have increased during recent years, and mental disorders were also the most common cause of retirement due to work disability in public and private work sectors in 2003 in Finland.



**Table 1.** Key statistics for Finnish farms in 1992 and 2004 [3, 9, 15, 16, 17, 35].

	1992		2004		Absolute difference between 1992 and 2004
	N	%	N	%	
Number of farms	121,349	–	72,054	–	-40.6%
Number of accident-insured persons on farms					
Total	166,020	–	92,569	–	-44.2%
Men	97,345	–	59,339	–	-39.0%
Women	68,675	–	33,230	–	-51.6%
Coefficient of profitability	0.67	–	0.52	–	-22.4%
Average field size on farms (ha)	18.1	–	31.5	–	+13.4 ha
Distribution of field sizes on farms (ha; number and %)					
0–4.9	18,690	15	5,971	8	-68.0%
5.0–9.9	24,451	20	9,354	13	-61.7%
10.0–19.9	38,732	32	16,914	23	-56.3%
20.0–29.9	20,960	17	12,556	17	-40.1%
30.0–49.9	13,433	11	14,574	20	+8.5%
50.0–	5,083	4	12,685	18	+149.6%
Production sector (number and % of farms)					
Dairy farms	37,874	31	17,490	24	-53.9%
–cows/farm	11.3		18.5		+63.7%
Other bovine cattle	11,872	10	4,774	7	-59.8%
Piggery	6,899	6	3,401	5	-50.7%
Poultry	2,625	2	1,034	1	-60.6%
Crop farming	47,265	39	41,737	58	-11.7%
Other <sup>a</sup>	14,814	12	3,618	5	-75.2%

<sup>a</sup> Since 1995, only those forestry farms that also have fields in agricultural production have been considered as active farms.

Relatively few studies have reported on the mental health of farmers in Finland, and the results have not been clear. Simola *et al.* [30] reported a slightly lower prevalence of mental symptoms among farmers than in other occupations. Furthermore, according to Klen and Kulmala [10] and Kulmala *et al.* [11], men on farms had better control over their lives than persons working in the forestry industry. Leskinen [12] found that mental symptoms did not worsen among men working on dairy farms between the years 1997–2001. However, contradictory results have also been reported. Viinamäki *et al.* [37] observed that farmers had more mental symptoms than Finnish men in general. Moreover, Pråhl-Ollila [20] and Kallio [7] stated that mental well-being on farms has worsened since Finland joined the European Union. Mental symptoms worsen the feeling of mental well-being and they may cause inconvenience, subjective distress and uncertainty in a person. In addition, mental symptoms may make it more difficult to cope with

every day life, and may also have negative effects on work ability [21].

The aims of this study were to: 1) determine the prevalence of mental symptoms among Finnish farm entrepreneurs in 2004; 2) compare the results with those from a reference sample year 1992; and 3) identify which factors are associated with the prevalence of mental symptoms.

## MATERIALS AND METHODS

This study formed part of a research project entitled “Occupational Health and Agriculture in Finland 2004” [Farm2004] [22]. The research data were gathered by the Finnish Institute of Occupational Health via a computer-aided telephone interview system (CATI). A random sample of 5,127 active farms was selected from the farm register of the Ministry of Agriculture and Forestry. A sufficient sample size was defined and estimated by power analysis; the aim was to interview at least 1,000 full-time farmers. A total of 2,471 farmers were contacted: 10.8% refused to participate, 2.6% could not be reached and in 0.9% cases the telephone number was not available. The resultant sample of 2,118 participants included 1,182 full-time farmers, 830 part-time farmers and 106 other persons living on the farm. In this survey, questions about mental symptoms were asked from 1,182 full-time farmers, 77% of whom were men ( $n = 911$ ) and 23% women ( $n = 271$ ). The participation rate for the telephone interview was 85.7%. As privacy protection for the participants, the interviewer informed them at the beginning of the interview that the answers were to be evaluated confidentially and that neither the identity nor the place of residence of a respondent would be published in any phase of the analysis or reporting process. The same type of cross-sectional study has been carried out 5 times: in 1979, 1982, 1986, 1992 and 2004. The sampling process of Farm2004 has been reported in detail elsewhere [8].

**Characterization of the Farm2004 sample.** The research sample Farm2004 was representative of Finnish farms in terms of regional distribution and production sector [36]. However, there were some differences between the sample and Finnish farms on average [17], which can be summarized as follows. The average farm size in the Farm2004 sample (44 hectares) was greater than on average in 2004 (31.5 hectares). Moreover, the average age of farmers in the sample (46.9 years) was slightly lower than in the general farming population (48.9 years). The proportion of farm women in 2004 was 36% (33,230 persons) according to the statistics of the Farmers’ Social Insurance Institution [3], while the respective proportion in the Farm2004 sample was 23%. In the youngest and oldest age groups the proportion of women was lower than on average. In addition, the average number of cows on dairy farms was greater in the sample (21 cows) than for Finnish dairy farms in general (18.5 cows).

**The reference sample.** The results of Farm2004 were compared with a reference sample from 1992, the previous cross-sectional study year 1992 [Farm1992] entitled "Farming and Occupational Health in Finland in 1992" [33]. The sample was gathered and analyzed by the Institute of Occupational Health and the Social Insurance Institution in Finland. The sample has been gathered from the same area since 1979. In 1992, a total of 8,200 active farmers were working in 14 Finnish municipalities where the earlier follow-up studies had been conducted. The study population of 6,530 farmers included 4,614 "old farmers" who took part in the 1979 survey and 1,916 "new farmers" who consented to take part in the study in 1992. Those farmers who had ceased agricultural production, moved away or died were removed from the sample ( $n = 775$ ). A sample of 5,000 farmers standardized by age and gender was selected from the study population. The age distribution in this sample was the same as among all insured farm entrepreneurs in 1990. The number of part-time farmers was 974, the telephone number was not found for 495 farmers and 157 farmers could not be contacted by telephone. The number of respondents who refused to be interviewed was 139. A total of 3,237 full-time farmers were interviewed by the computer assisted telephone interview system (CATI). Mental symptoms were examined among a part of this sample comprising 928 farm entrepreneurs: 59% men ( $n = 547$ ) and 41% women ( $n = 381$ ) [33]. The average age among male respondents was 42.1 years and among female respondents 42.5 years. Altogether, 52% of male respondents and 56% of female respondents worked in a dairy farm.

**Assessment of mental symptoms.** Mental symptoms were measured using a questionnaire developed by Raitasalo [21]. The questions about mental symptoms were the same in the Farm1992 and Farm2004 samples. In these surveys, the interviewees asked questions of the following type about 12 symptoms. One symptom was asked at a time. Example question: "Have you had during the previous month as long-lasting headache (occasional headache is not included in this question)?" The alternative answers were a) Yes/positive answer, b) I am not able to answer and c) No/negative answer. Later, in the analysis, the 12 symptoms asked about were classified into 5 groups:

1. Somatic symptoms, including
  - headache,
  - dizziness, trembling or palpitation.
2. Symptoms of depression and insomnia, including
  - depression or melancholy and
  - insomnia or difficulties in falling asleep.
3. Symptoms of nervousness, including
  - nervousness or strain and
  - irritability or bad-temperedness.
4. Symptoms of fear and tension, including
  - tension when meeting strange persons, which makes everyday life more difficult to get through and
  - feeling of fear.

5. Symptoms of exhaustion, including
  - weakening of the memory or ability to concentrate, which is not caused by temporary use of alcohol,
  - overstrained or a feeling that everything is overwhelming,
  - lack of initiative or indecisiveness and
  - weakness or fatigue.

Similar descriptive grouping was used in the Farm1992 and Farm2004 surveys. The respondents were classified into groups 1–5 if they reported to the interviewer having at least one of the symptoms in each of the groups. In addition, those respondents who reported at least 3 of the 12 symptoms in the list above were classified as having 'at least 3 symptoms'. Mental symptoms can be divided into external and internal symptoms [21]; the external symptoms can be perceived in the behaviour of a person, but the person may not necessarily consider this behaviour as unusual. The inner symptoms are experienced as complaints. When mental symptoms are measured as a part of a telephone survey, as in the Farm2004 study, it is possible to ask the respondents about those internal, subjective symptoms that they are aware of and experience as an inconvenience.

**Statistical methods.** The prevalence of mental symptoms was calculated and the z-test was used to statistically compare the Farm2004 and Farm1992 samples. In these analyses, age and gender were standardized and the significance level was  $p < 0.05$ . Binary logistic regression analysis was carried out, in which the response variable 'at least 3 symptoms' was used as a binary variable (1 = at least 3 symptoms, 0 = only 2 or less symptoms). The SAS/LOGISTIC procedure was used to fit the model. The predictor variables were chosen from among the range of variables gathered in the Farm2004 study. The first selection criterion was the variables used in the previous Farm1992 cross-sectional study. These variables were classified as demographic and production variables, health and working ability, health behaviour and attitude variables. This list was completed by variables related to work, family, life circumstances, support outside the family and attitude towards the European Union, which were also used in an earlier study by Leskinen [12]. In addition, some variables were chosen that had been found relevant in previous research reports: years as an agricultural entrepreneur [2, 32], changes in life during the previous year [25, 32], the number of days of pesticide usage during the previous growing period [2, 31] and the number of sick leave days during the previous 6 months [14].

The levels of the predictor variables were reclassified when the number of cases in one of the levels was too small, because in this situation the model may become unstable or might not operate at all. Predictor variables with interrelated correlations were removed from the model. Variables were dropped from the model if they did not significantly affect the response variables in the Farm2004 sample.

**Table 2.** The prevalence of mental symptoms (%) in 1992 and 2004 among Finnish full-time farm entrepreneurs.

Symptom	Year 1992 (n = 928)			Year 2004 (n = 1,182)		
	Total %	Women %	Men %	Total %	Women %	Men %
Headache	7.5	11.3	4.9	6.0	8.1	5.4
Weakening of memory or ability to concentrate	9.2	9.2	9.1	10.8	12.2	10.4
Nervousness or strain	15.7	17.6	14.4	15.5	17.3	14.9
Depression or melancholy	13.3	14.7	12.3	13.8	16.2	13.1
Weakness or fatigue	<b>21.2<sup>a</sup></b>	26.3	<b>17.7<sup>a</sup></b>	<b>25.8<sup>a</sup></b>	31.7	<b>24.0<sup>a</sup></b>
Insomnia or difficulties in falling asleep	<b>10.2<sup>a</sup></b>	<b>10.8<sup>a</sup></b>	<b>9.9<sup>a</sup></b>	<b>19.4<sup>a</sup></b>	<b>22.5<sup>a</sup></b>	<b>18.4<sup>a</sup></b>
Irritability or bad-temperedness	13.4	14.2	12.8	13.9	15.1	13.5
Tension when meeting strange persons	4.1	<b>2.1<sup>a</sup></b>	5.5	4.2	<b>5.5<sup>a</sup></b>	3.8
Feeling of fear	2.3	2.6	2.0	2.2	2.6	2.1
Dizziness, trembling or palpitation	<b>11.1<sup>a</sup></b>	<b>16.3<sup>a</sup></b>	7.5	<b>8.8<sup>a</sup></b>	<b>11.1<sup>a</sup></b>	8.1
Overstrained or a feeling that everything is overwhelming	16.3	18.9	14.4	16.3	20.3	15.2
Lack of initiative or indecisiveness	11.5	11.3	11.7	11.4	10.7	11.6

<sup>a</sup>The difference is statistically significant ( $p < 0.05$ )

Unadjusted and adjusted rate ratios and 95% confidence intervals were calculated for each variable. The confidence intervals were related to the p-values such that the odds ratio would not be statistically significant if the confidence interval contained 1 [8].

## RESULTS

**Mental symptoms.** Symptoms of weakness or fatigue (prevalence 26%) and insomnia or difficulties in falling asleep (19%) were the most common symptoms in the Farm2004 sample, and both of these symptoms increased statistically significantly when comparing the Farm1992 and Farm2004 samples (Tab. 2). The symptom of overstrained or a feeling that everything is overwhelming was also common in the Farm2004 sample (16%). Dizziness, trembling or palpitation decreased statistically significantly among all respondents and women separately. The prevalence of tension when meeting strange persons increased statistically significantly among female respondents between the Farm1992 and Farm2004 surveys. However, this symptom was not common: the prevalence was only 6% among female respondents and 4% among all respondents.

One third (34%) of the respondents in the sample reported symptoms of exhaustion (Tab. 3), indicating that they had at least one of the following symptoms: weakening of the memory or ability to concentrate, overstrain or a feeling that everything is overwhelming, a lack of initiative or indecisiveness, weakness or fatigue. A quarter of the respondents (26%) had symptoms of depression and insomnia. The proportion of respondents categorised as having 'at least 3 symptoms' was 22%, and symptoms of nervousness were approximately as common (21%). The proportion of respondents with somatic symptoms (headache, dizziness, trembling or palpitation) was 13%. The most seldom reported symptoms were fear and tension (6%).

The differences between age groups in the prevalence of symptoms were quite small (Tab. 3). The highest prevalence of various symptoms (23%) was recorded among respondents who were of working age and in the age group from 35–54 years. Older farmers had the best state of mental health: the proportion of those with 'at least 3 symptoms' was lowest (18%) in the age group 55–64 years.

Symptoms of depression and insomnia, symptoms of exhaustion and having 'at least 3 symptoms' were most common among divorced or separated persons (Tab. 3). The clearest differences were in depressive and insomnia symptoms: 45% of divorced or separated persons had these symptoms, while the average proportion in the sample was 26%. Moreover, the prevalence of symptoms of exhaustion was 45% among divorced or separated persons and 36% in the whole sample. Widows or widowers had the best state of mental health, but this respondent group was small, comprising only 16 persons. The differences between farm entrepreneurs grouped according to educational level were quite small. Nearly all mental symptoms were more common among women. For example, the prevalence of symptoms of exhaustion was 40% among women and 33% among men. Similarly, 32% of women and 25% men reported symptoms of depression and insomnia.

Differences in the prevalence of symptom groups between the Farm2004 sample and the previous Farm1992 study were quite small (Tab. 4). The exception was depressive and insomnia symptoms, which were significantly more common in the Farm2004 sample (26%) than in Farm1992 (20%). This difference and also differences among female and male respondents were statistically significant. The prevalence of depressive and insomnia symptoms among women was 32% in the Farm2004 sample and 22% in the Farm1992 sample when the age of participants was standardized. The prevalence of depressive and insomnia symptoms increased from 18% in the Farm1992

**Table 3.** Prevalence of mental symptoms in the Farm2004 sample.

Group	Symptom (%)						n	Proportion (%)
	At least 3 symptoms	Somatic symptoms	Depression and insomnia	Nervousness	Fear and tension	Exhaustion		
Whole sample	22	13	26	21	6	34	1,182	-
Gender								
Male	20	12	25	21	5	33	911	77
Female	26	17	32	23	7	40	271	23
Age group								
18–34	20	11	27	21	7	33	124	11
35–44	23	12	24	25	5	35	356	30
45–54	23	15	28	22	7	38	405	34
55–64	18	12	26	15	4	29	297	25
Marital status								
Unmarried	19	14	21	20	6	27	203	17
Married or cohabitating	22	13	27	22	6	36	932	79
Divorced or separated	29	10	45	19	6	45	31	3
Widow or widower	13	0	13	6	0	25	16	1
Higher education								
No professional schooling	20	14	25	21	6	32	381	32
Vocational school	21	13	26	21	5	36	610	52
College or university level	24	10	30	24	6	35	191	16

sample to 25% in the Farm2004 sample among male respondents.

**Risk factors for ‘at least 3 symptoms’.** The variables related to having ‘at least 3 symptoms’ could be classified into 4 main groups (Fig. 1). The first group consisted of experiences and circumstances of life. Variables in this group had the clearest association with ‘at least 3 symptoms’. The second group comprised variables related to the farm, while the third group included variables related to social relationships and the fourth group of variables were related to health problems. In addition to these main groups, physical exercise during free time also associated with ‘at least 3 symptoms’.

Categorization as having ‘at least 3 symptoms’ was most clearly associated with a very hard or hard strenuousness of life (OR 8.90, 95% CI 3.06–25.85), while a quite strenuous life was also a risk factor (OR 3.66, 95% CI 1.50–8.97), as well as mentally very or quite strenuous agricultural work (OR 4.50, 95% CI 2.17–9.31) (Tab. 5). Forestry was the only production sector that associated with ‘at least 3 symptoms’ (OR 4.94, 95% CI 1.23–19.86).

The variables related to health, such as illness or injury certified by a doctor (OR 3.02, 95% CI 1.89–4.83) and a low estimation of working ability (OR 1.42, 95% CI 1.19–1.69) also had an interconnection with ‘at least 3 symptoms’. The number of sick-leave days during the previous 6 months did not associate with ‘at least 3 symptoms’,

although this variable appeared to add to the risk of symptoms. Physical exercise during free time on only 1–2 days per week versus at least 3 days per week (OR 2.05, 95% CI 1.10–3.83) was also a risk factor for ‘at least 3 symptoms’, as was over 2 weeks of pesticide usage during the previous growing period (OR 2.71, 95% CI 1.05–7.01). As a separate variable, pesticide usage totalling 1 or 2 weeks during the previous growing period also appeared to be a predictor of symptoms. In addition, having little or no mental support from organizations, authorities, associations or other similar actors associated with ‘at least 3 symptoms’ (OR 2.55, 95% CI 1.22–5.31). Moreover, very little or no mental support and help from the spouse was an additional risk factor (OR 2.34, 95% CI 1.01–5.41). Even some support and help from the spouse was a risk factor compared to receiving a lot of support (OR 2.06 95% CI 1.30–3.28). There were also some variables that had no significant effect, although they separately added to the risk of symptoms, such as the existence of an adult person in the family with whom the respondent had difficulties speaking, receiving only little or no mental support from friends and relatives, having no friends or relatives or poor relationships with one or more neighbours.

Some effect on mental symptoms was also observable in association with a low number of years as an agricultural entrepreneur (OR 1.04, 95% CI 1.02–1.07). A negative attitude towards the EU had no independent association, although this variable seemed to add to the risk of ‘at



**Table 4.** Prevalence of mental symptoms (%) in the Farm1992 and Farm2004 samples.

Symptom	Farm1992, men	Farm2004, men	Farm1992, women	Farm2004, women	Farm1992, all respondents	Farm2004, all respondents
At least 3 symptoms	19	20	24	26	21	22
Somatic symptoms	11	12	23	17	16	13
Depression and insomnia	<b>18<sup>a</sup></b>	<b>25<sup>a</sup></b>	<b>22<sup>a</sup></b>	<b>32<sup>a</sup></b>	<b>20<sup>b</sup></b>	<b>26<sup>b</sup></b>
Nervousness	20	21	22	23	21	21
Fear and tension	7	5	4	7	6	6
Exhaustion	32	33	37	40	34	34
N	547	911	381	271	928	1,182

<sup>a</sup>The difference is statistically significant ( $p < 0.05$ ) when age is standardized

<sup>b</sup>The difference is statistically significant ( $p < 0.05$ ) when age and gender are standardized

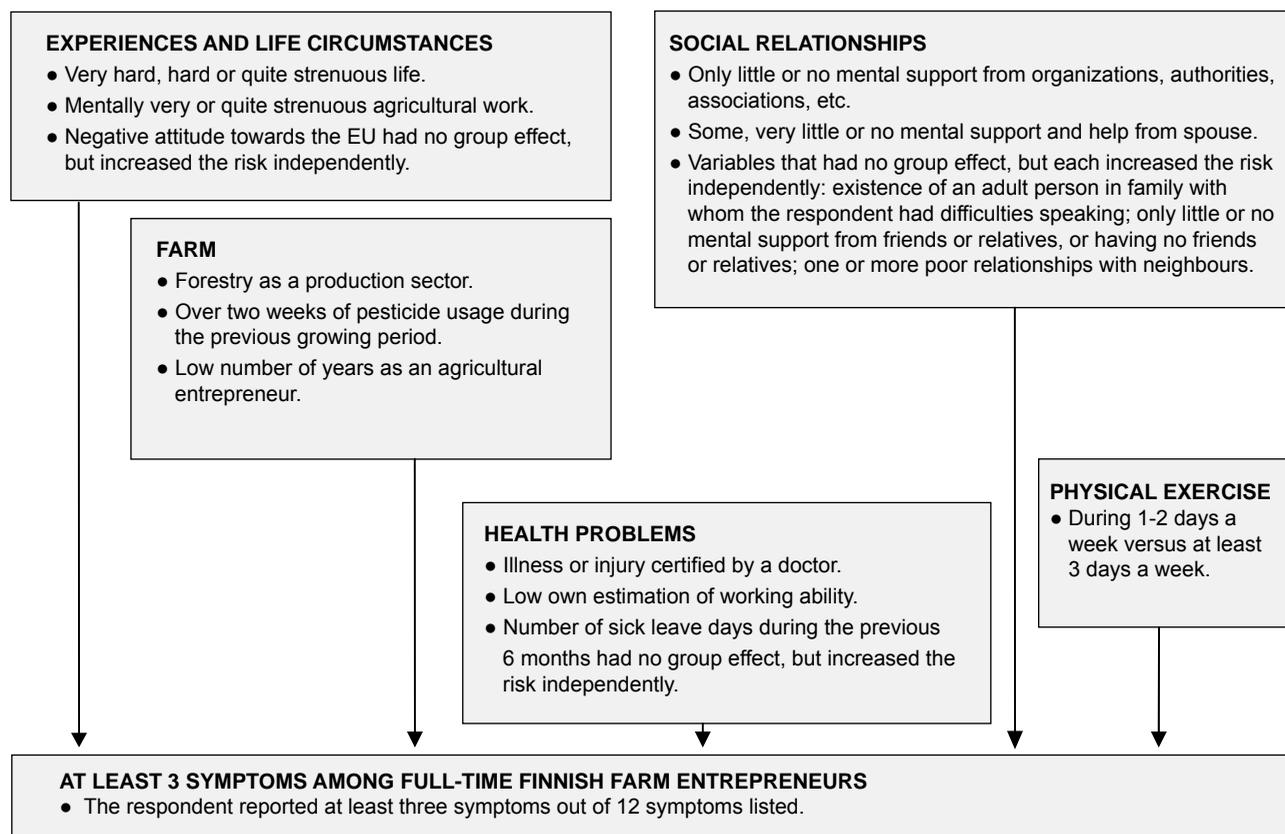
least 3 symptoms'. Meanwhile, having no need for support from friends or relatives was a variable that predicted symptoms. Variables that were not risk factors included the economic situation of the farm entrepreneur and also the size of the farm estate. Thus, variables such as the field or forest area in hectares were not associated with symptoms in the Farm2004 sample.

## DISCUSSION

The 3 most common symptoms among farm entrepreneurs in 2004 were weakness or fatigue (26%), insomnia or difficulties in falling asleep (19%) and overstrain or a

feeling that everything is overwhelming (16%). All these symptoms indicate serious tiredness and also problems with insomnia. A danger of burnout and exhaustion is possible. Burnout is a serious, gradually developing disorder that may include physical and mental exhaustion, a cynical attitude towards work and a reduction in professional self-respect [26]. During the 12-year period between the Farm1992 and Farm2004 surveys, the number of farm entrepreneurs declined by 44%, and those who have continued in farming have faced significant changes in their operational environment.

Working ability is defined as the unity of physical, psychological and social abilities and as well as vocational

**Figure 1.** Background factors related to 'at least 3 symptoms' among Finnish full-time farm entrepreneurs.

**Table 5.** Relationship between response variable 'at least 3 symptoms' and predictor variables. Bold font indicates a statistically significant association.

	Odds ratio (OR) point estimate (95% Wald Confidence Limits):	Adjusted OR estimates	Un-adjusted OR estimates
Years as an agricultural entrepreneur: 0–50 years		<b>1.04 (1.02–1.07)</b>	1.01 (0.99–1.02)
Gender: female/male		1.87 (1.00–3.47)	1.34 (0.98–1.84)
Illness or injury certified by a doctor: yes/no		<b>3.02 (1.89–4.83)</b>	<b>2.55 (1.92–3.38)</b>
Number of sick leave days during the previous 6 months		0.99 (0.98–1.00)	<b>1.01 (1.01–1.02)</b>
Working ability 1–10 points, own estimation: low–high		<b>1.42 (1.19–1.69)</b>	<b>1.67 (1.49–1.86)</b>
Change in life during last two years			
Moving to another place, change of profession, unemployment; yes/no		2.54 (0.92–7.00)	1.19 (0.59–2.38)
Building project yes/no		1.13 (0.73–1.76)	1.29 (0.97–1.73)
Production sector			
Dairy/cereal or other crop production		1.26 (0.72–2.20)	1.19 (0.86–1.65)
Forestry/cereal or other crop production		<b>4.94 (1.23–19.86)</b>	1.48 (0.67–3.29)
Other animal husbandry or bovine cattle/cereal or other crop production		1.58 (0.77–3.27)	1.49 (0.96–2.33)
Piggery/cereal or other crop production		0.84 (0.38–1.90)	1.26 (0.75–2.14)
Number of days of pesticide usage during the previous growing period			
At most three days/no usage		1.33 (0.70–2.54)	0.71 (0.47–1.06)
3–6 days/no usage		0.97 (0.51–1.86)	1.11 (0.75–1.63)
A week or two weeks/no usage		0.70 (0.28–1.73)	<b>0.54 (0.32–0.91)</b>
Over two weeks/no usage		<b>2.71 (1.05–7.01)</b>	<b>1.92 (1.15–3.20)</b>
Physical exercise during free time			
On 1–2 days a week/on at least 3 days a week		<b>2.05 (1.10–3.83)</b>	1.10 (0.74–1.64)
1–3 times a month or few times a year or seldom/at least three days a week		1.30 (0.69–2.46)	1.06 (0.71–1.57)
Drinking of alcohol			
At least twice a week or more often/at most a few times a year or never		1.54 (0.86–2.77)	1.32 (0.91–1.91)
Once a week/at most a few times a year or never		1.33 (0.73–2.43)	1.11 (0.75–1.64)
At least once a month/at most a few times a year or never		0.89 (0.48–1.65)	0.91 (0.61–1.37)
Mental strenuousness of agricultural work			
Somewhat strenuous/light or quite light		1.66 (0.81–3.40)	<b>1.69 (1.04–2.77)</b>
Quite or very strenuous/light or quite light		<b>4.50 (2.17–9.31)</b>	<b>5.99 (3.72–9.62)</b>
Strenuousness of life: Quite easy/easy		1.28 (0.53–3.12)	<b>2.13 (1.04–4.36)</b>
Quite strenuous/easy		<b>3.66 (1.50–8.97)</b>	<b>9.24 (4.55–18.77)</b>
Hard or very hard/easy		<b>8.90 (3.06–25.85)</b>	<b>17.27 (7.75–38.49)</b>
Mental support and help from spouse			
No spouse or no need for support/a lot of support		1.91 (0.96–3.80)	1.08 (0.74–1.58)
Very little or none at all/a lot of support		<b>2.34 (1.01–5.41)</b>	<b>3.93 (2.15–7.17)</b>
Some support/a lot of support		<b>2.06 (1.30–3.28)</b>	<b>1.45 (1.04–2.01)</b>
Do you believe that destiny has a considerable effect on your life? no/yes		0.76 (0.50–1.16)	0.83 (0.62–1.11)
Is there some adult person in your family with whom you have difficulties speaking? yes/no		1.77 (0.77–4.05)	<b>3.35 (2.02–5.57)</b>
Do you have some difficulties in your relationship with neighbours? Yes, one or more/none		1.13 (0.68–1.86)	<b>1.63 (1.18–2.26)</b>
Mental support from friends or relatives			
No need for support/some or a lot of support		<b>0.57 (0.33–0.98)</b>	<b>0.44 (0.31–0.62)</b>
Only little, none at all or no friends or relatives/some or a lot of support		1.69 (0.86–3.29)	<b>1.96 (1.30–2.94)</b>
Mental support from organizations, authorities etc.			
No need/some or a lot of support		1.61 (0.84–3.08)	<b>0.67 (0.45–0.99)</b>
Only little or none at all/some or a lot of support		<b>2.55 (1.22–5.31)</b>	<b>1.60 (1.01–2.54)</b>
Attitude towards the EU			
No positive or negative attitude/positive attitude		0.77 (0.40–1.51)	1.00 (0.64–1.58)
Negative/positive attitude		1.25 (0.70–2.34)	<b>1.62 (1.07–2.45)</b>



proficiency related to work demands [4]. In a recent study by Saarni *et al.* [24], working ability, the subjective quality of life and health-related quality of life were compared among Finnish salary-earners, entrepreneurs and farmers. In that study, farm entrepreneurs ( $n = 129$ ) had the lowest rates in all measured factors [24]. Furthermore, in a study by the Finnish Ministry of Employment and the Economy [18], the working ability of farm entrepreneurs was on average 10% lower than among salary earners and other entrepreneurs in Finland. The possible reasons for these results may be the uncertain future of farming in Finland, long working days and greater physical work on farms [18]. Psychosocial problems and features such as high demands combined with a lack of support and control may also describe the situation of Finnish agriculture [24]. On the other hand, in an earlier report based on the Farm2004 sample it was found that farm entrepreneurs experienced less stress (34%) than the general working population (44%) in Finland [8]. A comparison between the Farm2004 sample and the Finnish working population in general in 2003 ( $n = 3,331$ ) indicates that the prevalence of depression in both samples was on the same level (14%), as the prevalence was measured using one question [29]. This indicates that stress and depression cannot be described as farmers' symptoms.

In the Farm2004 sample, problems with physical health such as illness or injury certified by a doctor and a low estimation of working ability had an association with 'at least 3 symptoms'. Similar results have also been found in other studies [2, 14, 25]. A farmers' occupational health service is available in Finland, but in 2007 only 38% of all insured farmers were involved in this voluntary system [34]. Physical exercise during free time on only 1–2 days a week versus at least 3 days a week was also a risk factor. According to the results of Finnish population study ( $n = 3,403$ ) [6], those who exercised at least 2–3 times a week had fewer symptoms of depression, anger, cynical distrust and stress compared to those who exercised more seldom or hardly ever. Both sets of results provide evidence of the association between regular physical exercise and a reduction in mental symptoms.

In the Farm2004 sample, women had more mental symptoms than men. The same tendency has also been observed in other studies related to mental health. Schmitt *et al.* [27] suggested that there may be differences between genders in the ability to perceive, handle and seek help for mental health problems. In addition, there may be biological and socio-economic differences. Women have many roles to fulfill in society. The biggest differences between genders were seen for symptoms of psychological capacity: 40% of farm women as compared to 33% of men had experienced symptoms of weakening of the memory or ability to concentrate, overwork, a lack of initiative or indecisiveness, weakness or fatigue. Farms are usually passed on to a male inheritor [29], and women having a farmer as a partner must consequently move to a new home where the home and working place are located in the same place.

According to the logistic regression analysis, experiences and life circumstances had the strongest associations with symptoms. A person who has mental symptoms probably considers life and work as strenuous. This result may also indicate that respondents had found it too difficult to adapt themselves to the new demands and circumstances. Forestry was the only production sector that associated with the category 'at least 3 symptoms'. In Finland, 260 000 private forest owners own 59% of the forest land, and an average Finnish farmer owns 48 hectares of forest [39]. The negative features of forestry may include the new legislation and rules on the methods of forest treatment and also environmental impacts [23].

Over 2 weeks of pesticide usage during the previous growing period had an association with 'at least 3 symptoms' in the Farm2004 sample. Beseler *et al.* [1] concluded that exposure to pesticides could possibly contribute to depressive symptoms among farmer applicators ( $n = 17,585$ ). Other studies have also reported an interconnection between exposure to pesticides and depressive symptoms [2, 31]. In addition, variables related to social relationships were associated with the prevalence of 'at least 3 symptoms'. In particular, receiving only little or no support from organizations and authorities, and as well some, very little or no mental support and help from the spouse were clear risk factors. The existence of some person in the family with whom the respondent had difficulties speaking also added to the risk of having 'at least 3 symptoms' as an independent factor. Traditionally, farm families have been bigger than on average in Finnish society [38]. A contract for a farm property may include an agreement whereby the former farm owners have permission to live on the farm [13]. The characteristics of farming families have also been examined in a study by Silvasti and Laitalainen [28], in which the most important reasons for giving up agricultural production were economic factors and family reasons, including divorce and conflicts among relatives. Loneliness was related to mental health problems among male farmers in Norway [14], while the existence of a successor and good relationships with relatives, neighbours and friends had a positive effect on their mental health.

The strength of this study is that both the Farm1992 ( $n = 928$ ) and Farm2004 ( $n = 1,182$ ) samples were large. The Farm2004 sample was representative of Finnish farms in terms of regional distribution and production sector. The differences between the Farm2004 sample and the Finnish farming population mainly exist because only full-time farmers were included in this study. In the Farm2004 study a wide range of questions were asked at the same time, so it was possible to analyze associations between symptoms and other background variables. The reference sample Farm1992 ( $n = 928$ ) was representative in terms of age and gender distribution. However, it cannot be considered as a fully representative of all farm entrepreneurs in 1992 because of 2 points. First, the size of the sample was not adequate and second, the prevalence of dairy farmers

(56% of female and 52% of male respondents) was higher in the sample than on average in Finland at the time (31%). A personal interview might be considered a better tool to gather information about mental symptoms and mental health. However, a telephone interview is a method that is able to reach a large number of entrepreneurs rather rapidly, with a rather high participation rate. In a computer-assisted telephone interview it is possible to control and adjust the questions asked according to the previous answers. In addition, the interviewer may explain and define the questions for the interviews if needed, so they all understand the questions in the same way. Furthermore, earlier experiences are available from telephone surveys. This method makes possible to gather information from persons who, for example, find it too difficult to complete questionnaires. A further study on positive resources and methods to enhance positive work engagement among farm entrepreneurs would provide information to support and to help them cope with the dynamic operational environment of the farming sector. The possible neurological influence of agricultural chemicals would be an interesting subject for further research.

## CONCLUSIONS

Symptoms of weakness or fatigue (26%) and insomnia or difficulties in falling asleep (19%) were higher in the 2004 survey than in the previous 1992 survey. Feeling overstrained or that everything is overwhelming (16%) was quite a common symptom in the 2004 survey. One in 3 (34%) of the full-time farm entrepreneurs reported symptoms classified as symptoms of exhaustion. These results indicate serious tiredness. The possible association between mental symptoms and pesticide usage requires special attention and further action by health care services and other agricultural networks. Means to strengthen social interaction and possibilities for farm entrepreneurs to obtain mental support from other people and various organizations should be encouraged. Farm entrepreneurs are recommended to join the farmers' occupational health service, which has tools to help with mental health problems. In addition, farm entrepreneurs should be informed that over 2 weeks usage of pesticides during the growing period may have an association with mental symptoms, and about the importance of protecting themselves when using pesticides to avoid exposure.

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