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TRENDS AND DETERMINANTS OF
SUBJECTIVE HEALTH

Analyses from the national FINRISK surveys.

ACADEMIC DISSERTATION

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1. ABSTRACT

During the past decades, the health of the general population as measured by many objective indicators – especially those related to premature mortality and many chronic diseases – has improved in most industrialised countries, including Finland. The life expectancy is nowadays longer than ever. This study was initiated to evaluate whether people also feel healthier than earlier: there are more years in life, but is there more life in those years?

The high rates of cardiovascular diseases, especially coronary heart disease, in Finland in the beginning of the 1970s led to the launch of the North Karelia Project in 1972. The Project carried out repeated population surveys (the FINRISK surveys) for its evaluation, collecting data on cardiovascular diseases and their risk factors, socioeconomic and psychosocial variables, medical history, health behaviour and subjective health. Since 1972, comparable cross-sectional surveys have been carried out in eastern Finland every fifth year, and since 1982 the surveys have been gradually extended to other parts of Finland and in 1992 also to Russian Karelia.

We analysed trends and determinants of self-rated health and back pain over a 20-year period in Finland and compared measures of subjective health between North Karelia, Finland, and Pitkäranta, Russian Karelia. We also analysed the association between self-rated health and mortality. Self-rated health is a central measure of subjective health status.

Self-rated health improved markedly in eastern Finland during the period from 1972 to 1992. The development was more favourable for women than for men. High education and high household income were associated with good subjective health status, but among men the socioeconomic differences diminished during the study period.

There was a slightly decreasing trend in the prevalence of back pain among men, but among women the prevalence rates remained stable. The prevalence rates differed considerably between subgroups of the population. The trends varied markedly between categories of some suspected risk factors for back pain, such as overweight and leisure-time physical activity.
In North Karelia, Finland, people reported better self-rated health and less symptoms than people in the neighbouring region of Pitkäranta, Republic of Karelia, Russia. Socioeconomic differences in subjective health were less clear in the Republic of Karelia.

Self-rated health was a strong predictor of mortality. Its predictive power was only partly explained by medical history, cardiovascular disease risk factors, and education. This association existed in both sexes for all-cause and cardiovascular mortality and, especially among men, for mortality due to external causes. There was a clear gradient from “good” through “average” to “poor” self-rated health in relation to all-cause and cardiovascular mortality.

The goal for health promotion in the industrialised world has been to increase the amount of healthy years, i.e. to postpone the age-related diseases into the later years of life while simultaneously increasing life expectancy. Our results provide some indications that when objective health status improves people also feel healthier.
2. INTRODUCTION

Health has several dimensions (Ware 1987, Litva and Eyles 1994, Smith et al. 1994), and the contents of “good health” vary for different people (Tornstam 1975, Jylhä 1994, Krause and Jay 1994, Wiseman 1999). During the past decades, the health of the general population, as measured by many objective indicators, has improved in most industrialised countries, especially with respect to premature mortality and many chronic diseases. This improvement has occurred also in Finland. Nowadays life expectancy is longer than ever has been the case in most countries. However, there is one important question: do people also subjectively feel healthier than earlier? There are more years in life, but is there more life in those years?

Self-reports are an economical and illustrative way of assessing people’s health (LaRue et al. 1979, Fylkesnes and Førde 1991, McCallum et al. 1994, Fayers and Sprangers 2002). They reflect the more “objective” measures of health, like data from health registers or physicians’ assessments, but can supplement this data with the subjective perspective of health. Self-reports provide an indication of how people assess their own health, but they are also correlated with medical and biological measures of health.

Furthermore, only individuals themselves are able to report pain and other symptoms and, more generally, their subjective health status. With these considerations in mind and due to the apparent simplicity of collecting data by self-reports on health, standard questions on self-reported health are used in practically all health surveys.

In this work, the term “self-reported health” includes both reports on medical history, e.g. previous diseases, and reports on subjective health status, including general or global health and different symptoms. “Subjective” or “perceived” health reflects personal assessments of an individual’s health status. “Self-rated health” is a specific term for “general” or “global” health assessed by respondents themselves.

In Finland, active interventions to improve public health have been implemented since the beginning of the 1970s. The rates of cardiovascular diseases and most cancers among working-age population are known to have decreased. This has been well documented and evaluated (Puska et al. 1993(a), Vartiainen et al. 1994(a), Vartiainen et
al. 1995, Puska et al. 1998, Vartiainen et al. 2000). Much less is known about trends in subjective health, i.e. general health and symptoms, in the Finnish population as a whole as well as in its subgroups. One of the most common symptoms in the general population is back pain. Musculoskeletal pains, such as back pain, are important contributors to subjective health status (Molarius and Janson 2002) and also a cause for notable economic costs at the population level.

The high rates of cardiovascular diseases, especially coronary heart disease, in Finland in the beginning of the 1970s (Keys 1970) led to the launch of the North Karelia Project in 1972. The aim of the Project was to lower the cardiovascular disease rates in North Karelia by raising awareness in the population of the major medical risk factors, via the implementation of a comprehensive, community-based intervention programme.

The North Karelia Project carried out repeated population surveys as an integral part of its evaluation, collecting data on cardiovascular diseases and their risk factors, socioeconomic and psychosocial variables, medical history, health behaviour and subjective health. Since 1972, comparable cross-sectional surveys have been carried out in eastern Finland every fifth year. Since 1982, these “FINRISK” surveys have been gradually extended to other parts of Finland and in 1992 also to Russian Karelia.

In Russian Karelia, an area neighbouring eastern Finland, much less preventive health activities have taken place. At the beginning of the 1990s, the risk factor and mortality figures there resembled those found in Finland 20 years previously. Very little has been known about the patterns of subjective health in Russian Karelia which, because of its geographical and historical links, forms an interesting comparison with Finland, especially with the region of North Karelia.

The general aim of this study was to assess measures of subjective health in Finland where major public health activities have taken place to reduce premature mortality and the incidence of major chronic diseases. We wanted to determine whether the great improvement in public health in Finland was reflected also in people’s subjective health status.

Therefore, we analysed trends and determinants of self-rated health, a central measure
of subjective health status, and back pain over 20 years in Finland. Furthermore, we compared measures of subjective health in North Karelia, Finland, and Pitkäranta, Russian Karelia. Finally, we analysed the association between self-rated health and mortality.
3. LITERATURE REVIEW

3.1 Self-reports on health

Self-reports on medical history and previous illnesses seem to be reasonably valid if they are compared with other sources, such as health examinations (Heliövaara et al. 1993). Furthermore, self-reports are the only methods available if one wishes to assess subjective aspects of health. The observed association between self-rated health and mortality in many studies (Mossey and Shapiro 1982, Kaplan and Camacho 1983, Idler et al. 1990, Wannamethee and Shaper 1991, Grant et al. 1995, Idler and Benyamini 1997, Jylhä et al. 1998, Martikainen et al. 2002) provides a sound foundation for evaluations of subjective health. Of course, cultural background and factors such as prevailing general welfare and health expectations have to be taken into account, especially in international comparisons (Jylhä et al. 1998, Lynch et al. 2001, Sen 2002).

Doubts about the validity and significance of self-reports on health have been expressed (Tissue 1972, McCallum et al. 1994, Sen 2002). Nonetheless, measures on self-reported health status do correlate reasonably well with the individual’s health status as assessed by a physician (Nagi 1969, Maddox and Douglass 1973, LaRue et al. 1979, Hunt et al. 1980, Kivinen et al. 1998). Statements of physicians or other professionals, which are often regarded as the most objective measures of health, also have their problems with objectivity and reliability (Markides et al. 1993).

Various indicators of physical capability are sometimes used as objective measures of health. However, they are also limited in their capacity to reflect health as a whole. The strength of subjective health status lies in that it reflects how a person actually feels (Ware 1987, Blaxter 1989).

3.2 Socioeconomic factors and health

Socioeconomic status is associated with mortality, morbidity, and subjective health. This association has been shown in different countries, e.g. Finland (Häkkinen 1991, Pekkanen et al. 1995, Arinen et al. 1998), Scandinavian countries (Lundberg 1986, Vägerö and Lundberg 1989, Rahkonen et al. 1993, Lahelma et al. 1994, Osler and

Socioeconomic status can be measured and described by various indicators. Education is a stable determinant of socioeconomic status (Klein-Hesselink and Spruit 1992, Winkleby et al. 1992, Lahelma et al. 1994): it is individual and does not fluctuate with time in the way that occupation or income can do. Education also avoids the problems in assessments caused by unemployment. Household income is another widely used variable when assessing the associations between socioeconomic factors and health. Occupational status and income may be affected by illness, which makes them perhaps less valid indicators than education.

In many countries education has been found to be an especially powerful factor determining health outcomes (Valkonen 1989, Winkleby et al. 1992, Cavelaars et al. 1998) but not universally so in some countries, e.g. Russia (Palosuo et al. 1998, Carlson 2000). A high level of education is strongly associated with good subjective health (Mossey and Shapiro 1982, Moum 1992). Socioeconomic status in general (Morrell 1972, Gyntelberg 1974, Walsh et al. 1992, Croft and Rigby 1994, Latza et al. 2000) and, again, especially the degree of education (Nagi et al. 1973, Deyo and Tsui-Wu 1987, Pincus et al. 1987, Dionne et al. 2001, Muller 2002), also seem to be inversely associated with complaints of back pain, a major symptom causing ill-health.

The association between socioeconomic factors and health has remained fairly stable in Finland during the past years (Manderbacka et al. 2001), though in men, educational differences in health decreased in the period 1979-1993 (Lahelma et al. 1997(a)). There is, furthermore, some evidence that health inequalities due to employment status narrowed among men in Finland between 1986 and 1994 (Lahelma et al. 1997(b), Lahelma et al. 2000). On the contrary, in Britain the inequalities seemed to have widened or remained stable during the same period of time. In Norway (Dahl and Elstad...
and Sweden (Lundberg et al. 2001) the associations between low socioeconomic position and health remained constant from the mid-1980s to the mid-1990s.

3.3 Self-rated health

Self-rated health is a widely used measure of the population’s health (Krause and Jay 1994). A single-item question such as “How would you describe your present health status? Is it very good, quite good, average, quite poor, or very poor?” has been shown to be a useful tool in population surveys. Subjective health status measured in this manner is a strong predictor of future health problems (Weinberger et al. 1986, Weisen et al. 1999, Lee 2000, Idler et al. 2000), utilisation of health care services (Miilunpalo et al. 1997, Bath 1999), and mortality among the elderly (Mossey and Shapiro 1982, Idler et al. 1990, Grant et al. 1995, Jylhä et al. 1998, Helmer et al. 1999) and even among younger age groups (Kaplan and Camacho 1983, Wannamethee and Shaper 1991).

The association between self-rated health and mortality has been partly explained to be caused by previous illnesses and socioeconomic factors, but in almost all of the studies some part of the association has remained unexplained. Self-rated health is claimed to predict mortality better among men than among women (Jylhä et al. 1998, Helmer et al. 1999, Idler et al. 2000).

Self-rated health has proved to be reliable in test-retest analysis (Lundberg and Manderbacka 1996, Martikainen et al. 1999), and it forms a continuum from poor through average to good in relation to most risk factors and ill-health indicators (Manderbacka et al. 1998, Manor et al. 2000). Slightly different formulations on the question on self-rated health are used, e.g. the number and definition of response alternatives may vary, but the differences between parallel measures seem to be only marginal (Eriksson et al. 2001, Fayers and Sprangers 2002).

Many studies conclude that self-rated health mainly reflects physical health status (Ratner et al. 1998, Cott et al. 1999), especially the presence or absence of long-standing diseases (Goldstein et al. 1984, Fylkesnes and Førde 1991, Kaplan et al. 1996(b), Manor et al. 2001). Indeed, self-rated health has a stronger association with chronic conditions than acute illnesses (Goldstein et al. 1984, Fylkesnes and Førde...
1991, Shadbolt 1997, Damian et al. 1999, Manor et al. 2001). A study from Tromsø, Norway (Fylkesnes and Førde 1991) indicated that somatic symptoms, mainly those connected with the musculoskeletal system, were most strongly associated with poor or fair subjective general health. The authors suggested these symptoms would be connected with the individual’s perception of his or her physical functional capabilities. The structure of health status is, however, a complex construction including diseases, disability, functional limitations (Jylhä et al. 2001), and health behaviour (Johansson and Sundquist 1999, Manderbacka et al. 1999), and these factors also interact with each other (Johnson and Wolinsky 1993, Leinonen et al. 2001(a)).

Overall, women report more symptoms than men (Tibblin et al. 1990, Rahkonen et al. 1993, Ross and Bird 1994, Gijsbers van Wijk et al. 1995, Sweeting 1995). Nonetheless, Finnish women’s self-rated health has been found to be slightly better than that of Finnish men (Lahelma et al. 1997(a)), and women live longer. The contents of “good health” may be different for the sexes (Leinonen et al. 1999). In the Finnish Healthy Village Study (Kumpusalo et al. 1992), subjective general health was associated with physical capabilities among men, whereas among females it was more closely correlated with other subjective health variables, in particular with pain symptoms. However, some other studies (Krause and Jay 1994, Jylhä et al. 1998) have detected no significant differences in the reference frames used by men and women.

Subjective health usually reveals a deterioration with advancing age (House et al. 1990, Fylkesnes and Førde 1991, Lahelma et al. 1997(a)). This is understandable as most diseases and functional limitations are more prevalent in older age groups (Rahkonen et al. 1993), and these impairments cause feelings of ill-health, for example by limiting physical activities of daily living (Leinonen et al. 1999, Jylhä et al. 2001). Adjusted for medical conditions, age may show no relation to self-rated health (Kivinen et al. 1998).

Older people may also rank their present health by comparing it to their earlier health status. On the other hand, subjective health is particularly informative when measuring health among the young who do not suffer from severe illnesses (Vingilis et al. 2002). In one study on this subject (Krause and Jay 1994) older people tended to rate their general health by thinking about health problems, whereas subjects under 25 years of age more frequently used health behaviours as a referent.
Some researchers have assessed self-rated health related to the respondents’ age peers (Maddox and Douglass 1973, Weinberger et al. 1986, Eriksson et al. 2001). This changes the composition quite substantially, because the concept of “good health” and health expectations are not the same for different age groups (Leinonen et al. 1998). Older, as well as chronically ill, people tend to adapt to the worsening of their health (Manderbacka and Lundberg 1996, Leinonen et al. 2001(b)). In a recent German study (Heindrich et al. 2002), self-ratings of health in comparison to those of the same age were more consistently associated with mortality than global self-ratings of health.

There are some studies describing trends in self-rated health in Finland (Lahelma et al. 1997(a), Lahelma et al. 1997(b), Arinen et al. 1998, Aromaa and Koskinen 2002). They suggest that the general health of Finnish adults has slightly improved in the past few decades, especially among the middle-aged or older persons. The FINRISK data offers unique possibilities for analysing these trends in the Finnish population and in its subgroups since 1972. Furthermore, the present data with measured risk factors is most suitable for analysing the association between self-rated health and mortality.

3.4 Back pain and other symptoms

There is a range of common symptoms present in the general population that have received relatively little attention. These include somatic symptoms like swelling of lower limbs, varicose veins, constipation, recurrent stomach complaints plus a variety of psychosomatic symptoms. It is difficult to associate these symptoms with diagnoses of specific diseases in epidemiological studies. Nevertheless, these symptoms have a major role in the deterioration of people’s quality of life and they are a common cause for individuals to seek assistance from health care professionals.


The social costs of back problems are high (Frank 1993) because of early retirement, sick leaves, and a frequent use of health care services (Nagi et al. 1973, Gyntelberg 1974, Cypress 1983, Heliövaara et al. 1989, Rekola et al. 1993, Carey et al. 1996). There are various etiological causes for back pain. In many cases clinical tests and examinations may reveal no clearly identifiable cause, such as sciatica (Heliövaara et al. 1989), for these symptoms. Some interventions to address the back pain problem at a population level have been tried (Buchbinder et al. 2001, Linton and van Tulder 2001), but so far preventive methods are rare.


Some Finnish studies assessing the trends of back pain have been published (Leino et al. 1994, Manninen et al. 1996). They suggest that the prevalence of back pain in the population has remained constant or shown a slight downward trend. Our data from five comparable, cross-sectional surveys, however, provide a new perspective on the trends and background factors of back pain over the 20-year period.
The health of the inhabitants of Russian Karelia, a region which borders Finland

The states of the former Soviet Union have been undergoing rapid economic, social and political change during the past years. It is obvious that the great challenges which accompany the change that Russia is experiencing are being reflected in people’s health (Bobak et al. 1998, Kawachi et al. 1999).

During most of the Soviet period a fairly closed border separated Finland from the Soviet Union and their two very different systems of society. Major differences are now known to exist between eastern Finland and the neighbouring Republic of Karelia, Russia, e.g. in mortality and cardiovascular disease risk factors as well as lifestyles (Puska et al. 1993(b), Matilainen et al. 1994, Puska 1995, Matilainen et al. 1996). In many respects, especially concerning the high rates of chronic diseases, the rather unfavourable health situation in the Republic of Karelia, Russia, resembles that found in eastern Finland a few decades ago (Puska 1995(a)) before active interventions to improve public health were initiated in North Karelia. Thus Russian Karelia forms an interesting comparison to Finland, especially to North Karelia in Finland.

Little is known about the differences in subjective measures of health between these two closely neighbouring areas. Do they reflect the differences in mortality or in chronic disease rates? The survey which was carried out in both areas in 1992 offers a good opportunity to compare subjective health variables across the former East-West border.
4. AIMS OF THE STUDY

The aim of this study was to find out whether the great improvement in public health in the national targets has been reflected in the subjective health of people – another important goal in our health work.

Generally, the aim was to learn more about subjective health of individuals in Finland where major public health activities have taken place to reduce premature mortality and the incidence of major chronic diseases. The large data collected in the FINRISK surveys provides unique possibilities for such an evaluation. More specifically, the aims of the study were to address the following questions:

- has the self-rated health of the population improved during the period 1972-1992, and how has this development impacted on different population groups?
- how has the development been with respect to back pain – a major contributor to prevalent ill-health – taking into account socioeconomic status and behavioural risk factors of back pain?
- is there a difference in subjective health between Finnish and Russian Karelia that would be in agreement with the mortality difference, and are the differences in self-rated health in Russian Karelia similar to those in Finland?
- how does self-rated health predict mortality and to what extent can this be explained by medical history, cardiovascular disease risk factors, and education?
5. MATERIALS AND METHODS

5.1 The FINRISK surveys

Comparable cross-sectional studies have been carried out every fifth year since 1972 in the eastern provinces of North Karelia and Kuopio, the latter being a reference area during the initial 5-year period of the North Karelia Project. During the following years, these surveys were extended to other areas of Finland in order to facilitate risk factor monitoring at a national level (the “FINRISK” surveys). A third area in southwestern Finland, including the city of Turku, the town of Loimaa, and 12 minor rural municipalities, was included in 1982.

The fifth survey in 1992 was also conducted in the district of Pitkäranta, Russia, based on an agreement between the Ministry of Health of the Republic of Karelia, Russia, and the Finnish National Public Health Institute. The Republic of Karelia is an autonomous part of the Russian Federation with 802,000 inhabitants (1991) and the district of Pitkäranta (28,000 inhabitants) is one of the Republic’s 17 districts. Pitkäranta was chosen as the study area because its population was well-representative of the whole population of the Republic of Karelia (Kellera 1990). Of the population of the Pitkäranta district, 50% live in the town of Pitkäranta on the shores of Lake Ladoga.

5.2 Samples

For each of the five surveys, independent random samples were drawn from the population register. In 1972 and 1977, a random sample of 6.6% (except in article IV, 13.2% in the city of Joensuu in North Karelia) of the population born during 1913-47 was drawn in the North Karelia and Kuopio provinces. In 1977, an additional 6.6% random sample of the population born between 1948 and 1952 was drawn in North Karelia (included only in the article IV study).

In 1982, 1987 and 1992 the target population consisted of people between the ages of 25 and 64 years in the three areas, and in these three surveys at least 250 persons of each sex and ten-year age group were randomly chosen for the sample in each of the three areas. In the Pitkäranta sample in 1992, each sex-specific, ten-year age group had 125
persons.

For article IV, mortality data until 1995 were collected from the national mortality register using personal identification numbers.

The age range considered in the longitudinal analyses in articles I and II was 30 to 59 years, this being the common range in all five surveys. Sample sizes and participation rates in North Karelia and Kuopio provinces are given in Table 1. The response rates were over 90% in the 1972 survey but somewhat lower in the later surveys. In women, the response rates were higher than in men. The response rates in southwestern Finland varied between 75-82% among men and between 83-87% among women during 1982-1992. In Pitkäranta in 1992, the response rate was 77% among men and 92% among women.

Table 1. Samples (n) and participation rates (%) by year, sex and area, age range 30 to 59 years.

<table>
<thead>
<tr>
<th>Year</th>
<th>North Karelia</th>
<th>Kuopio Province</th>
<th>North Karelia</th>
<th>Kuopio Province</th>
</tr>
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<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
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<tr>
<td>1972</td>
<td>1959</td>
<td>94</td>
<td>2918</td>
<td>91</td>
</tr>
<tr>
<td>1977</td>
<td>2063</td>
<td>87</td>
<td>2933</td>
<td>89</td>
</tr>
<tr>
<td>1982</td>
<td>1599</td>
<td>77</td>
<td>1459</td>
<td>83</td>
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<tr>
<td>1987</td>
<td>1521</td>
<td>79</td>
<td>762</td>
<td>82</td>
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<tr>
<td>1992</td>
<td>759</td>
<td>69</td>
<td>768</td>
<td>76</td>
</tr>
</tbody>
</table>

5.3 Methods of collecting data

The surveys were carried out by mailing a self-administered questionnaire to the subjects. A member of a trained research team took standardised risk factor measurements, e.g. blood pressure, height, weight, and blood samples. In 1992, the main risk factor measurements were carried out by the same Finnish study nurses both in North Karelia and in Pitkäranta. The research team also checked whether the questionnaires were properly completed and, if necessary, helped the subjects to complete them. The subjects usually filled in the questionnaire at home but in Pitkäranta this was done at the local health centre prior to the examination.
Education was measured as the total number of school years. Because the mean length and the structure of the Finnish education system had changed markedly during the 20th century, we divided the respondents into educational tertiles according to their birth years, by sex. For example, all those born in 1930, independent of which survey(s) they had taken part in, were divided into three educational groups of equal size, according to the number of their school years. The questionnaire defined “school years” as all education beginning with elementary school. In article III, the respondents were divided into educational tertiles in their respective 10-year age groups in both areas, North Karelia and Pitkäranta, the two areas and sexes separately.

The respondents were also sorted into separate groups by their household income. They were asked to choose one of the provided alternative income groups, determined by gross household income per year. The participants of each of the five surveys were then assigned to one of the two income groups of roughly equal sizes. In the Pitkäranta study (article III), the respondents were sorted into three income groups by area.

The subjects were asked to rate their present general health status along a five-point scale: “very good” to “quite good” to “average” to “quite poor” to “very poor”. Self-rated health measured in this manner has proved to be reliable in test-retest analysis (Lundberg and Manderbacka 1996, Martikainen et al. 1999). The participants’ self-reported physical condition was assessed using a similar five-point scale.

Furthermore, the participants were asked whether they had had the following somatic symptoms during the preceding month (30 days): rheumatic complaints, joint pain, back pain or backache, swelling in lower limbs, varicose veins, constipation, recurrent stomach complaints, malaise, powerless lower limbs, dry mouth or a stuffy nose. The response alternatives were “yes” and “no”.

The respondents were also asked how often 13 given psychosomatic symptoms had occurred or had bothered them during the preceding month (30 days). The symptoms listed were accelerated heart beat, becoming confused when doing a task quickly, trembling hands, excitedness and nervousness, frightening thoughts, tiredness and overstrain, irregular heartbeats, dizziness (vertigo), nightmares, depression,
sleeplessness (insomnia), headache and sweating of hands. There were three response alternatives: “often”, “sometimes” and “not at all”. All the questions concerning somatic or psychosomatic symptoms remained identical over the five surveys.

Data on the subjects’ medical history were collected by asking if a physician had diagnosed or treated the following diseases during the past 12 months: myocardial infarction, stroke, elevated blood pressure, heart failure, angina pectoris, bronchial asthma, emphysema/bronchitis, and rheumatoid arthritis. The questionnaire also had questions about the respondents’ smoking status, occupation, workload, and leisure time physical activity.

5.4 Statistical methods and data analysis

Prevalence rates are presented for self-rated health, back pain and other symptoms in the descriptive analyses. The analysis of variance was used to assess the continuous variables. Logistic regression models were the main statistical methods used to analyse the trends and differences in the population and its subsamples, and proportional hazards (Cox) regression was used in the survival analyses in article IV. All statistical analyses were done using SAS programs (SAS Institute Inc. 1989).

5.5 Further analyses in the results section

In order to assess the trends and determinants of self-rated health more thoroughly, we present some new analyses on self-rated health using the same FINRISK material 1972-1992. We again pooled together the data collected in North Karelia and Kuopio provinces 1972-1992 and excluded the subjects with missing data on self-rated health, survey year, survey area, age, education, smoking, measured systolic blood pressure, serum cholesterol, body mass index, and leisure time physical activity. Furthermore, concerning the diseases diagnosed or treated by a doctor, somatic and psychosomatic symptoms, we replaced the missing values by the alternative “no disease/symptom”. This meant that we had a total of 13,076 men and 13,600 women for whom we had complete data.

We used logistic regression models to analyse how potential changes in the background
variables might have influenced the observed improvement in self-rated health between 1972 and 1992, and to assess the stability and strength of these background factors as determinants of less-than-good self-rated health. Age, systolic blood pressure, serum cholesterol, and body mass index were used as continuous variables, showing adequate linearity in relation to self-rated health.
6. RESULTS

The results are presented in detail in articles I to IV.

6.1 Trends in self-rated health (Article I)

The aim of article I was to evaluate trends in self-rated health in different subgroups of the population during 1972-1992. Self-reported general health improved clearly among both sexes during the follow-up (Figure 1). In 1972, 34% of men reported good health status, and the corresponding rate in 1992 was 50%. Among women, the development was even more favourable. The levels of self-rated health among both sexes were equal in 1972 and 1977, but by 1982 already 51% of women reported good health status compared to 45% of men. In 1992, there was a ten per cent gap between men and women, 50 and 60%, respectively.

Figure 1. The percentages of those who reported “good” health status, North Karelia and Kuopio Province, age range 30 to 59 years.

Men in southwestern Finland reported somewhat better health status than men in eastern Finland during 1982-1992. In southwestern Finland, also women reported slightly higher rates of good health in 1982 and 1987 than in the eastern survey areas.
general health improved in all age groups among both sexes. The improvement was somewhat more marked among those aged 40 to 49 years.

Education had a strong association with subjective health among both sexes. In men this was most evident in the 1970s, and if one assesses the whole period from 1972 to 1992 the educational differences diminished statistically significantly. The difference between the groups with low and middle education observed in the 1970s disappeared during the 1980s. In women, the two lower educational groups differed from each other only slightly between 1972 and 1982, with a clear but somewhat narrowing gap favouring the group with the highest education. There were also considerable differences in subjective health according to household income, though in men the gap reduced statistically significantly between 1972 and 1992.

In summary, self-rated health improved considerably among both sexes, more among women than men. Low socioeconomic status was associated with less-than-good self-rated health, but in men its importance as a predictor of less-than-good health diminished.

6.2 Trends of back pain (Article II)

The aim of this article was to analyse the trends in back pain during 1972-1992 in different population subgroups determined by sociodemographic factors and potential behavioural risk factors of back pain. Nearly half of the study population reported that they had experienced back pain during the preceding month (Figure 2).

Over the 20-year period, the overall prevalence of back pain exhibited a downward trend when both sexes were assessed together. Controlled for age alone, the declining trend was statistically significant among men but not among women. However, the sex differences in the 20-year prevalence or in the 20-year trend were not statistically significant. The age group differences remained stable during 1972-1992.
Figure 2. Age-adjusted prevalence rates of back pain during the preceding month among men and women, North Karelia and Kuopio Province, age range 30 to 59 years.

Those with the highest education had statistically significantly less back pain than the groups with middle or low education, and this difference remained stable over the 20 years among both sexes. Low household income was inversely associated with back pain. This disparity between the two income categories, however, diminished during 1972-1992.

Occupation and workload showed obvious and time-stable associations with back pain, i.e. those who did physically more demanding work experienced more back pain. Leisure-time physical activity was associated with less back pain among both sexes, but this association was more stable among men than among women. Body mass index was directly proportional to the prevalence of back pain among women but not among men, even when the other risk determinants were controlled. However, in 1987 and 1992, the body mass index category differences also seemed to become obvious among men.
Male smokers and ex-smokers of both sexes reported statistically significantly more back pain than never-smokers. In men this association was consistent over the 20 years. In women, the trends were statistically significantly different for never-smokers and ex-smokers.

6.3 North Karelia and Pitkäranta (Article III)

The aim of article III was to assess different measures of subjective health in North Karelia, Finland, and in the neighbouring district of Pitkäranta, Russia. In North Karelia 50% of men reported quite good or very good health, while the corresponding rate was 34% in Pitkäranta. Among women, the percentages were 58% in North Karelia and 22% in Pitkäranta. The differences between the areas were statistically significant in all sex-age groups, except among men over 45 years of age.

Household income was related to good self-rated health among women in North Karelia and in Pitkäranta. Among men, the relationship was not as clear. The association between self-rated health and household income was similar in the two areas among both sexes. Education was positively associated with good self-rated health among both sexes in North Karelia, as well as among women but not men in Pitkäranta.

North Karelians, particularly women, reported their physical condition as good more often than subjects in neighbouring Pitkäranta. Psychosomatic symptoms were statistically significantly more prevalent in Pitkäranta among both sexes.

Many somatic symptoms were statistically significantly more prevalent in Pitkäranta including rheumatic complaints, back pain, constipation and recurrent stomach complaints among women and joint pain, malaise, powerless lower limbs and dry mouth among both sexes. North Karelian men reported swollen limbs, constipation and stuffy noses statistically significantly more frequently, while North Karelian women reported varicose veins and stuffy noses more often than Pitkäranta women.

To summarise, most subjective health indicators favoured North Karelia, Finland. The socioeconomic differences in self-rated health were less pronounced in Pitkäranta, Russia.
6.4 Self-rated health and mortality (Article IV)

The aim of article IV was to analyse the association between self-rated health and mortality in a large cohort of individuals in eastern Finland. For self-rated health, the age-adjusted “poor” to “good” relative risk for all-cause mortality during 1972/1975-1995 was 2.36 (2.10-2.64) for men and 1.90 (1.63-2.22) for women, and for cardiovascular mortality 2.29 (1.96-2.68) for men and 2.34 (1.84-2.96) for women. Adjusted for the selected potentially fatal diseases from the medical history, cardiovascular disease risk factors, and education, the corresponding relative risks for all-cause mortality were 1.66 (1.47-1.88) for men and 1.50 (1.26-1.78) for women, and for cardiovascular mortality 1.54 (1.29-1.82) for men and 1.63 (1.26-2.10) for women (Figure 3).

A gradient from “good” through “average” to “poor” self-rated health in relation to all-cause and cardiovascular mortality was found. Among women, the relative risks for the “average” group were only marginally statistically significant after the adjustments.

The association between self-rated health and mortality due to external causes was fairly strong among men. For women, the relative risk for “average” self-rated health was greater than that for “poor” health (Figure 3).

Assessing a shorter period, 1972/1977-1985, among men the association between self-rated health and mortality was slightly stronger than during the longer follow-up 1972/1977-1995. The relatively small number of deaths among women may explain that the association was not so strong as during the longer follow-up. Combining men and women, the association between self-rated health and all-cause and cardiovascular mortality was statistically significant, and there was a gradient from “good” through “average” to “poor” health.
6.5 Further analyses

These additional analyses aimed to assess the trends and determinants of self-rated health in more depth. Table 2 shows how the odds ratio for a 5-year change in self-rated health changed when certain blocks of background variables were fitted into the model. The basic model was adjusted only for survey area, age, and education. Block 1 consists of conditions diagnosed or treated by a doctor, block 2 of somatic symptoms, block 3 of psychosomatic symptoms, and block 4 of (cardiovascular disease) risk factors. The contents of the blocks are presented in detail in Table 3.

Table 2. Trends for self-rated health 1972-1992, logistic regression models by sex. North Karelia and Kuopio provinces, 1972, 1977, 1982, 1987, and 1992 samples pooled together, age range 30 to 59 years. All the models were adjusted for survey area, age (continuous variable), and education. The odds ratios represent the average change for a 5-year period between two successive surveys.

MEN (n=13,076)

<table>
<thead>
<tr>
<th>Models</th>
<th>Odds Ratio for Survey Year</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>0.806</td>
<td>(0.782-0.830)</td>
</tr>
<tr>
<td>+ Block 1</td>
<td>0.804</td>
<td>(0.779-0.829)</td>
</tr>
<tr>
<td>+ Block 2</td>
<td>0.815</td>
<td>(0.789-0.843)</td>
</tr>
<tr>
<td>+ Block 3</td>
<td>0.865</td>
<td>(0.835-0.896)</td>
</tr>
<tr>
<td>+ Block 4 (full model)</td>
<td>0.887</td>
<td>(0.854-0.921)</td>
</tr>
</tbody>
</table>

WOMEN (n=13,600)

<table>
<thead>
<tr>
<th>Models</th>
<th>Odds Ratio for Survey Year</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>0.722</td>
<td>(0.701-0.743)</td>
</tr>
<tr>
<td>+ Block 1</td>
<td>0.731</td>
<td>(0.710-0.754)</td>
</tr>
<tr>
<td>+ Block 2</td>
<td>0.721</td>
<td>(0.697-0.745)</td>
</tr>
<tr>
<td>+ Block 3</td>
<td>0.743</td>
<td>(0.718-0.770)</td>
</tr>
<tr>
<td>+ Block 4 (full model)</td>
<td>0.788</td>
<td>(0.759-0.819)</td>
</tr>
</tbody>
</table>

As shown in Table 2, the changes in the background variables (blocks 1 to 4) included explained only a part of the improvement in self-rated health during 1972-1992.

Table 3 shows the full model with all the variables (blocks 1 to 4) included simultaneously in the same model, separately for men and women. Most selected items
of diagnosed diseases and somatic or psychosomatic symptoms were independently associated with less-than-good self-rated health. However, this was not the case concerning so called silent risk factors, serum cholesterol (among men) and systolic blood pressure (among both sexes).

The relationship between symptoms and conditions was mainly as expected, i.e. they were associated with less-than-good health. The exceptions were that nightmares among men and frightening thoughts among women seemed to be associated with better self-rated health. Education and leisure time physical activity were strongly associated with good health among both sexes. Higher body mass index was associated with poorer health among both sexes, but smoking only among men.

In these adjusted models, the area difference between North Karelia and Kuopio provinces was statistically non-significant among both sexes.

The odds ratio for back pain, adjusted with only survey, survey area, age, and education, was 2.714 (2.510-2.934) among men and 2.753 (2.550-2.973) among women (not shown in the tables). Thus back pain was a strong contributor to subjective ill-health.

*Table 4* shows the statistical significances for the interactions between survey year and each variable to reveal the stability of the association between self-rated health and that particular variable. The interactions of each block from 1 to 4 were modeled separately because of the large size of the models. The stability was evident for most of the variables selected, which means that they were associated with self-rated health in a stable manner over the 20 years.
### Table 3.


**MEN (n=13,076)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio</th>
<th>(95% CI)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey (1. to 5.)</td>
<td>0.887</td>
<td>0.854, 0.921</td>
<td>0.000</td>
</tr>
<tr>
<td>Area (Kuopio vs. North Karelia)</td>
<td>0.960</td>
<td>0.880, 1.048</td>
<td>ns</td>
</tr>
<tr>
<td>Age (a)</td>
<td>1.068</td>
<td>1.062, 1.074</td>
<td>0.000</td>
</tr>
<tr>
<td>Education (classes 1,2,3)</td>
<td>0.808</td>
<td>0.764, 0.856</td>
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</table>

**Block 1 (yes/no)**

<table>
<thead>
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<th>Variable</th>
<th>Odds Ratio</th>
<th>(95% CI)</th>
<th>p Value</th>
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</thead>
<tbody>
<tr>
<td>Elevated blood pressure</td>
<td>1.711</td>
<td>1.467, 1.996</td>
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</tr>
<tr>
<td>Heart failure</td>
<td>2.954</td>
<td>1.926, 4.532</td>
<td>0.000</td>
</tr>
<tr>
<td>Angina pectoris</td>
<td>1.947</td>
<td>1.452, 2.609</td>
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</tr>
<tr>
<td>Asthma bronchiale</td>
<td>3.794</td>
<td>2.205, 6.526</td>
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</tr>
<tr>
<td>Emphysema/Bronchitis</td>
<td>1.631</td>
<td>1.281, 2.077</td>
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</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>2.528</td>
<td>1.520, 4.204</td>
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**Block 2 (yes/no)**

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<th>Odds Ratio</th>
<th>(95% CI)</th>
<th>p Value</th>
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</thead>
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<tr>
<td>Rheumatic complaints</td>
<td>1.334</td>
<td>1.157, 1.538</td>
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</tr>
<tr>
<td>Joint pain</td>
<td>1.520</td>
<td>1.353, 1.707</td>
<td>0.000</td>
</tr>
<tr>
<td>Back pain</td>
<td>1.723</td>
<td>1.576, 1.885</td>
<td>0.000</td>
</tr>
<tr>
<td>Swollen lower limbs</td>
<td>1.742</td>
<td>1.319, 2.300</td>
<td>0.000</td>
</tr>
<tr>
<td>Varicose veins</td>
<td>1.028</td>
<td>0.858, 1.232</td>
<td>ns</td>
</tr>
<tr>
<td>Constipation</td>
<td>1.250</td>
<td>1.038, 1.506</td>
<td>0.019</td>
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<tr>
<td>Recurrent stomach complaints</td>
<td>1.798</td>
<td>1.580, 2.046</td>
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**Block 3 (no, sometimes, often)**

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<th>Variable</th>
<th>Odds Ratio</th>
<th>(95% CI)</th>
<th>p Value</th>
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</thead>
<tbody>
<tr>
<td>Accelerated heart beat</td>
<td>1.250</td>
<td>1.139, 1.371</td>
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</tr>
<tr>
<td>Confusion in thought processes</td>
<td>1.185</td>
<td>1.074, 1.308</td>
<td>0.001</td>
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<td>Trembling hands</td>
<td>1.388</td>
<td>1.265, 1.524</td>
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</tr>
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<td>Excitedness, nervousness</td>
<td>0.967</td>
<td>0.879, 1.064</td>
<td>ns</td>
</tr>
<tr>
<td>Frightening thoughts</td>
<td>1.066</td>
<td>0.952, 1.194</td>
<td>ns</td>
</tr>
<tr>
<td>Exhaustion, overstrain</td>
<td>1.497</td>
<td>1.376, 1.629</td>
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<td>Irregular heartbeats</td>
<td>1.378</td>
<td>1.239, 1.533</td>
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<td>Vertigo (Dizziness)</td>
<td>1.424</td>
<td>1.289, 1.575</td>
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<td>Nightmares</td>
<td>0.889</td>
<td>0.810, 0.976</td>
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<td>Depression</td>
<td>1.195</td>
<td>1.079, 1.325</td>
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<tr>
<td>Insomnia</td>
<td>1.230</td>
<td>1.124, 1.345</td>
<td>0.000</td>
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<td>Headache</td>
<td>1.162</td>
<td>1.078, 1.252</td>
<td>0.000</td>
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<tr>
<td>Sweating hands</td>
<td>1.020</td>
<td>0.930, 1.119</td>
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**Block 4**

<table>
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<th>Odds Ratio</th>
<th>(95% CI)</th>
<th>p Value</th>
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<tr>
<td>Smoker/non-smoker</td>
<td>1.367</td>
<td>1.250, 1.494</td>
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<tr>
<td>Systolic blood pressure (b)</td>
<td>1.001</td>
<td>0.999, 1.004</td>
<td>ns</td>
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<tr>
<td>Serum cholesterol (c)</td>
<td>1.016</td>
<td>0.979, 1.054</td>
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<td>Body mass index (d)</td>
<td>1.040</td>
<td>1.026, 1.054</td>
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<tr>
<td>Leisure time physical activity (e)</td>
<td>0.654</td>
<td>0.612, 0.699</td>
<td>0.000</td>
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</tbody>
</table>

(a per one year
(b per one mmHg
(c per one mmol/L
(d per one kg/m2
(e low, moderate, high

37
<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio</th>
<th>(95% CI)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey (1. to 5.)</td>
<td>0.788</td>
<td>0.759, 0.819</td>
<td>0.000</td>
</tr>
<tr>
<td>Area (Kuopio vs. North Karelia)</td>
<td>0.991</td>
<td>0.909, 1.079</td>
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<tr>
<td>Age (a)</td>
<td>1.062</td>
<td>1.056, 1.069</td>
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<td>Education (classes 1,2,3)</td>
<td>0.771</td>
<td>0.730, 0.814</td>
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<td><strong>Block 1 (yes/no)</strong></td>
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<tr>
<td>Elevated blood pressure</td>
<td>1.384</td>
<td>1.204, 1.592</td>
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<tr>
<td>Heart failure</td>
<td>3.423</td>
<td>2.198, 5.332</td>
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<td>Angina pectoris</td>
<td>1.596</td>
<td>1.143, 2.230</td>
<td>0.006</td>
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<td>2.444</td>
<td>1.632, 3.659</td>
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</tr>
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<td>Emphysema/Bronchitis</td>
<td>1.743</td>
<td>1.371, 2.217</td>
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<tr>
<td>Rheumatoid arthritis</td>
<td>3.391</td>
<td>2.367, 4.858</td>
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<td>Rheumatic complaints</td>
<td>1.265</td>
<td>1.106, 1.447</td>
<td>0.001</td>
</tr>
<tr>
<td>Joint pain</td>
<td>1.679</td>
<td>1.512, 1.865</td>
<td>0.000</td>
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<tr>
<td>Back pain</td>
<td>1.580</td>
<td>1.446, 1.726</td>
<td>0.000</td>
</tr>
<tr>
<td>Swollen lower limbs</td>
<td>1.196</td>
<td>1.073, 1.334</td>
<td>0.001</td>
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<td>Varicose veins</td>
<td>0.973</td>
<td>0.883, 1.073</td>
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<td>Constipation</td>
<td>1.084</td>
<td>0.953, 1.232</td>
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<tr>
<td>Recurrent stomach complaints</td>
<td>1.876</td>
<td>1.657, 2.125</td>
<td>0.000</td>
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<td><strong>Block 3 (no, sometimes, often)</strong></td>
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<tr>
<td>Accelerated heart beat</td>
<td>1.082</td>
<td>0.987, 1.187</td>
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</tr>
<tr>
<td>Confusion in thought processes</td>
<td>1.173</td>
<td>1.074, 1.281</td>
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<td>Trembling hands</td>
<td>1.355</td>
<td>1.233, 1.490</td>
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<td>Excitedness, nervousness</td>
<td>0.985</td>
<td>0.896, 1.084</td>
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</tr>
<tr>
<td>Frightening thoughts</td>
<td>0.890</td>
<td>0.810, 0.979</td>
<td>0.017</td>
</tr>
<tr>
<td>Exhaustion, overstrain</td>
<td>1.638</td>
<td>1.510, 1.777</td>
<td>0.000</td>
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<td>Irregular heartbeats</td>
<td>1.267</td>
<td>1.154, 1.391</td>
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<tr>
<td>Vertigo (Dizziness)</td>
<td>1.405</td>
<td>1.291, 1.528</td>
<td>0.000</td>
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<tr>
<td>Nightmares</td>
<td>0.960</td>
<td>0.882, 1.044</td>
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<tr>
<td>Depression</td>
<td>1.132</td>
<td>1.033, 1.241</td>
<td>0.008</td>
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<tr>
<td>Insomnia</td>
<td>1.305</td>
<td>1.202, 1.416</td>
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<tr>
<td>Headache</td>
<td>1.309</td>
<td>1.218, 1.405</td>
<td>0.000</td>
</tr>
<tr>
<td>Sweating hands</td>
<td>0.967</td>
<td>0.876, 1.068</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Block 4</strong></td>
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</tr>
<tr>
<td>Smoker/non-smoker</td>
<td>1.124</td>
<td>0.992, 1.274</td>
<td>ns</td>
</tr>
<tr>
<td>Systolic blood pressure (b)</td>
<td>1.002</td>
<td>1.000, 1.005</td>
<td>ns</td>
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<tr>
<td>Serum cholesterol (c)</td>
<td>1.059</td>
<td>1.020, 1.099</td>
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<tr>
<td>Body mass index (d)</td>
<td>1.040</td>
<td>1.029, 1.052</td>
<td>0.000</td>
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<tr>
<td>Leisure time physical activity (e)</td>
<td>0.660</td>
<td>0.618, 0.704</td>
<td>0.000</td>
</tr>
</tbody>
</table>

(a per one year  
(b per one mmHg  
(c per one mmol/L  
(d per one kg/m2  
(e low, moderate, high
Table 4. Statistical significances (p values) for the interaction terms “survey year X variable” for potential determinants of less-than-good self-rated health, logistic regression models by sex. North Karelia and Kuopio provinces, 1972, 1977, 1982, 1987, and 1992 samples pooled together, age range 30 to 59 years. All the models were adjusted for age (continuous variable), survey area, and education.

<table>
<thead>
<tr>
<th>Variable</th>
<th>MEN (n=13,076)</th>
<th>WOMEN (n=13,600)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 1 (yes/no)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevated blood pressure</td>
<td>ns</td>
<td>0.003</td>
</tr>
<tr>
<td>Heart failure</td>
<td>ns</td>
<td>ns</td>
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<tr>
<td>Angina pectoris</td>
<td>0.020</td>
<td>0.004</td>
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<td>Asthma bronchiale</td>
<td>ns</td>
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<td>Rheumatoid arthritis</td>
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<td>0.016</td>
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<td><strong>Model 2 (yes/no)</strong></td>
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<td>Joint pain</td>
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<td>Back pain</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Swollen lower limbs</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Varicose veins</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Constipation</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Recurrent stomach complaints</td>
<td>0.018</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Model 3 (no, sometimes, often)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerated heart beat</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Confusion in thought processes</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Trembling hands</td>
<td>ns</td>
<td>0.005</td>
</tr>
<tr>
<td>Excitedness, nervousness</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Frightening thoughts</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Tiredness, overstrain</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Irregular heartbeats</td>
<td>ns</td>
<td>0.017</td>
</tr>
<tr>
<td>Vertigo (Dizziness)</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Nightmares</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Depression</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Insomnia</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Headache</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Sweating hands</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Model 4</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoker/non-smoker</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Systolic blood pressure (b)</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Serum cholesterol (c)</td>
<td>0.030</td>
<td>ns</td>
</tr>
<tr>
<td>Body mass index (d)</td>
<td>0.011</td>
<td>ns</td>
</tr>
<tr>
<td>Leisure time physical activity (e)</td>
<td>ns</td>
<td>ns</td>
</tr>
</tbody>
</table>

(a per one year
(b) per one mmHg
(c) per one mmol/L
(d) per one kg/m²
(e) low, moderate, high

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7. DISCUSSION

We analysed trends and determinants of subjective health status in Finland and measures of subjective health in Russian Karelia using the data collected in the national FINRISK surveys during 1972-1992. The five cross-sectional population surveys with comparable data offered unique possibilities to assess time trends in subjective health variables, self-rated health and back pain. By linking the data of the two earliest surveys to data from mortality registers, we were able to analyse the association between self-rated health and mortality in a large randomly selected population cohort. The cross-sectional analyses comparing North Karelia, Finland, and Pitkäranta area, Russia, revealed subjective health differences across the former border between East and West. Our results provide some indications that when objective health status improves people also actually feel healthier.

Self-rated health improved markedly in eastern Finland between 1972 and 1992. The development was more favourable for women than for men. Among men the development was more positive in North Karelia than in Kuopio province between 1972 and 1982, which may reflect the impact of the North Karelia Project.

High education and high household income were associated with good subjective health status, but among men the socioeconomic differences diminished during the study period, which is accordant with other Finnish studies (Lahelma et al. 1997(a), Lahelma et al. 1997(b)).

Nearly half of the study population reported back pain during the preceding month. There was a decreasing trend in the prevalence of back pain among men over the survey years. The prevalence rates differed considerably between subgroups of the population. The trends varied markedly between categories of some suspected risk factors for back pain, such as overweight and leisure-time physical activity – in other words, their association with back pain was not stable. The differences in back pain prevalence according to household income diminished during 1972-1992.

In North Karelia, Finland, people reported better self-rated health and less symptoms than people in the neighbouring region of Pitkäranta, Republic of Karelia, Russia.
Socioeconomic differences in subjective health were less clear in the Republic of Karelia.

Self-rated health was a strong predictor of mortality, and its predictive power was only partly explained by medical history, cardiovascular disease risk factors, and education. The association existed for both sexes for all-cause and cardiovascular mortality and, especially among men, for mortality due to external causes. There was a clear gradient from “good” through “average” to “poor” self-rated health in relation to all-cause and cardiovascular mortality.

7.1 Comments on the materials and methods used in this work

The medical history and most other variables used in this work were self-reported. Doubts have been raised about the validity and significance of self-reports on health (Tissue 1972, McCallum et al. 1994). Self-reports on medical history, however, have proved to be quite reliable even when compared with more objective information sources, especially when the health conditions are severe and clearly defined (Heliövaara et al. 1993, Zhu et al. 1999). The validity of self-reports has been shown also with respect to the use of health services (Reijneveld and Stronks 2001). Self-reports are useful and economical when assessing people’s health (Martini and McDowell 1976, LaRue et al. 1979, Fylkesnes and Førde 1991) particularly in large population studies.

Questionnaires and interviews are in fact the only available methods of gathering information on subjective health and symptoms. Subjective health status seems to correlate rather well with the health status determined by a physician (Friedsam and Martin 1963, Maddox and Douglass 1973, Martini and McDowell 1976, LaRue et al. 1979). Assessments of physicians and other professionals, which are often regarded as the most objective measures of health, also have their problems of validity (Markides et al. 1993).

It is clear that our questions on self-rated health and symptoms are rather crude methods in assessing people’s health, and many cultural factors as well as general welfare have to be taken into account especially in international comparisons (Sen 2002). On the other
hand, these kinds of questions are simple enough to be understood similarly among respondents and they are thus valuable tools in population studies. The formulation of the questions remained the same over the study period. It is difficult to assess whether the meaning of the questions was understood in the same way over the 20-year period.

In this work the only way to measure back pain was also through self-reports given on the questionnaires. “Low back pain” is the term used to describe back pain complaints in most studies. In the Finnish language, however, the terms “back pain” or “back ache” are common language and are understood as referring to pain in the lumbar or thoracic back but not in the neck or shoulder region.

The way different persons develop and express pain symptoms varies to a great extent, for example, psychological factors (Block et al. 1996, Linton 2000) and cultural background (Honeyman and Jakobs 1996) have a role. The manner in which people express pain may even change with time, accompanied with changes in general health expectations as well as changes in the health care and social insurance systems.

Finland is a country with a relatively homogenous population. All known health indicators are changing in the same direction in different areas of Finland. Thus it is very likely that most our results from these studied areas of Finland can be extrapolated to the rest of the country.

Well-to-do population groups are perhaps more likely to participate in these kinds of surveys, leading to an upward bias in the results, especially in cross-sectional comparisons. In this respect it should be noted that in 1992, North Karelian response rates were somewhat lower than the corresponding rates in Pitkäranta. Although the response rates in Finland in the two surveys in the 1970s were somewhat higher than in the later ones, it is not likely that there is any major bias for this reason in the trend results. However, it is not possible to provide an estimate of the magnitude of the effect that this phenomenon may have had on the results.

Concerning the Pitkäranta survey in 1992, it should be noted that the language used in Pitkäranta was Russian. Although the questionnaires were carefully checked for accuracy of the translation, some items and concepts, like “physical condition”,
“malaise”, or “average”, may have different meanings in the two cultures (Palosuo 2000), and this must be taken into account when interpreting the results.

7.2 General developments of health in Finland

It has been shown that ischaemic heart disease and stroke mortality has decreased by about 50 per cent among working-age people in Finland between 1972 and 1992, with most of this decline being attributable to changes in known risk factors such as smoking, blood pressure, and cholesterol levels (Vartiainen et al. 1994(b), Vartiainen et al. 1995, Vartiainen et al. 2000). Also total and lung cancer mortality have declined (Puska et al. 1993(a)). The improvement in subjective general health found in our study can be explained at least partly by these reduced disease rates.

Generally, there was a rapid improvement in the patterns of health behaviour related to major chronic diseases in the 1970s, followed by a more steady development (Helakorpi et al. 2001). Food habits have changed for the better among Finns during the past decades. However, the consumption of alcohol has increased quite steadily, and the share of non-drinkers has decreased. Leisure-time physical activity has increased in Finland since the early 1980s. Overweight has increased in both sexes since the late 1970s to the present day.

Women may have taken more advantage of health information than men. The cardiovascular risk factors, blood pressure and cholesterol level, have developed more favourably in women (Vartiainen et al. 1994(a)) and in our study, the improvement in subjective health was more pronounced among women. The prevalence of back pain, however, decreased among men but not among women.

Among men, the more positive development in self-rated health in North Karelia than in Kuopio Province between 1972 and 1982 might reflect the effect of the community-based cardiovascular disease prevention project carried out in North Karelia since the beginning of the 1970s. Smoking, serum cholesterol, and blood pressure also decreased more in North Karelia during the same period of time (Vartiainen et al. 1994(a)) reflecting the fact that the whole population of North Karelia was exposed to the community program (Puska et al. 1995). Additionally, the prevalence of back pain was
reduced in North Karelia more than was the case in Kuopio Province during the same period of time (Heistaro et al. 1995).

### 7.3 Health and socioeconomic background

Our results point to a strong association between education and health, which is in accordance with earlier studies (Lahelma et al. 1994, Pincus and Callahan 1994). However, among men, the educational differences in self-rated health diminished during the period 1972-1992, which is concordant with other Finnish studies (Lahelma et al. 1997(a), Lahelma et al. 1997(b)).

The division into subgroups by education that we used is not totally unproblematic, though we avoided many biases by classifying the subjects according to their birth years. The overall educational level of the Finnish population improved decisively during the second half of the 20th century, which brings persons with a wide variety of school years into the same educational group. Instead of assessing school years, another possibility would be to sort by “only basic education”, “high school or vocational education”, and “university degree”. This would cause difficulties as well, again due to the improvement in the average educational level of the population. The method we used has obvious advantages since we were interested in one individual’s social position in relation to others.

Household income is not as personal an indicator as education. Yet household income is a better indicator in certain cases than personal income, e.g. the unemployed and housewives.

There has been a considerable improvement in the standard of living in Finland during the past decades. Heavy physical work has changed to lighter work, standards of housing have improved, people have more free time and can pay more attention to other things above just earning their living. Nowadays people are well aware of and interested in health and health-related items. These social changes may also contribute to how people are feeling about their health. On the other hand, one could assume current health expectations to be higher than earlier.
Socioeconomic status had a marked inverse relationship also with the prevalence of back pain. This is concordant with the results of several earlier studies (Morrell 1972, Nagi et al. 1973, Gyntelberg 1974, Croft and Rigby 1994).

7.4 Self-rated health and its association with mortality

Self-rated general health improved clearly in both sexes during the follow-up 1972-1992. Comparing these trends with other available studies on the subject (Lahelma et al. 1997(a), Lahelma et al. 1997(b), Arinen et al. 1998), our results show a slightly more positive development in self-rated health. The other studies, however, do not have data from the early years of the 1970s, and the materials, like the age range, vary between the studies. In our study, women reported better general health than men, as expected based on earlier results (Lahelma et al. 1997(a)).

Self-rated health strongly predicted mortality in the randomly selected population cohort in eastern Finland. This association was only partly explained by medical history, cardiovascular disease risk factors, and education. The relationship was strong among both men and women, and it was evident during the short-term as well as the longer follow-up period. A clear gradient was found from “good” through “average” to “poor” self-rated health in relation to all-cause and cardiovascular mortality.


The specific advantages of the present study were its large samples sizes, the wide age range of the cohort, the long follow-up with two assessment points, reliable links with the mortality register, detailed data on causes of mortality, data on several self-reported medical history items, and measured cardiovascular disease risk factors (objective indicators of health in addition to self-reported data).
It has been suggested that the predictive value of self-rated health could be partly caused by a “healthy attitude” to life: an individual attempts to achieve that high level of health that the individual has chosen (Idler and Kasl 1991, Cott et al. 1999). Thus self-rated health may reflect the level of life control (Bobak et al. 2000). It may also indicate the respondent’s personal, possibly unconscious, assessment of his or her life expectancy (Idler and Kasl 1991) taking into account all that he or she knows to have an effect on health and mortality. The association between self-rated health and external causes mortality could be partly explained by some kind of risk taking behaviour.

Self-rated health is a unique tool for population surveys (Miilunpalo et al. 1997, Manor et al. 2001), although we do not yet fully understand all that it constitutes and the ways through which it is associated with future health events. The predictive power of self-rated health confirms the importance of reports of subjective health, i.e. what people say about themselves to health professionals.

The analyses in the further analyses section were in line with earlier findings that self-rated health is a complex issue associated with several dimensions of health, such as diagnosed diseases and symptoms (Leinonen et al. 2001(b), Reyes-Gibby et al. 2002) as well as health behaviour (Johansson and Sundquist 1999, Poikolainen and Vartiainen 1999) and body mass index (Okosun et al. 2001). The changes in the selected determinants of self-rated health could explain only a part of the observed improvement in self-rated health during 1972-1992.

In our models in the further analyses section, all the variables were adjusted for each other (Table 3), which may cause some overlap due to collinearity, for example self-reported blood pressure diagnosed or treated by a doctor, and measured blood pressure. This may lead to an underestimation of the associations of both variables with self-rated health.

However, with this model we could assess independent associations of the variables with self-rated health. For example, in the case of blood pressure, we could evaluate the strength of the risk factor itself as a determinant of poor self-rated health, independent of whether the person knew whether he or she had this diagnosed disease. Many of the
psychosomatic symptoms may also have common background factors with each other.

7.5 Back pain

Nearly half of the study population reported that they had experienced back pain during the preceding month. During the 20 years of follow-up, a slight fall in the back pain prevalence was observed among men, while the prevalence remained stable among women. Our results are in line with earlier publications on trends in the prevalence of back pain in Finland (Leino et al. 1994, Manninen et al. 1996). Generally, the prevalence rates seemed to differ considerably between subgroups of the population. Back pain was also an important contributor to self-rated general health.

The consistency of replication can be considered a central criterion in testing epidemiologic evidence of disease causation. A causal association should remain stable in time within a given study design. The present study, thus, not only offered a unique opportunity to compare time trends in the occurrence of back pain between population groups, but also to test the stability of the associations between back pain and its suspected risk factors.

Low education, blue-collar occupations, and physical load at work had strong and time-stable associations with back pain among both sexes. Furthermore, stability was also noted in the way that back pain was associated with body mass index among women and with smoking among men. The differences according to household income diminished between 1972 and 1992 among both sexes.

Associations between smoking and back pain have consistently been found in a number of studies (Frymoyer et al. 1983, Deyo and Bass 1989, Heliövaara et al. 1991, Ernst 1993, Croft and Rigby 1994, Goldberg et al. 2000). The results of the present study are in line with the previous observations. In women, however, the association between smoking and back pain only became apparent towards the end of the study period, but even then female ex-smokers had the highest prevalence rates of back pain. In the early surveys, however, the female ex-smoker category was rather small, which may explain the sudden changes in this category.
7.6 Comparing North Karelia and Pitkäranta

Our study showed that unequivocal subjective health differences exist between the eastern province of North Karelia, Finland, and Pitkäranta in the Republic of Karelia, Russia, mostly in favour of eastern Finland. Self-rated health was considerably better in North Karelia than in Pitkäranta. High household income and education were associated with good self-rated health in North Karelia, and in women but not men in Pitkäranta.

Self-reported physical condition was better in North Karelia than in Pitkäranta, and psychosomatic and many somatic symptoms were more prevalent in Pitkäranta. However, potential cultural differences in these self-reports on health must be taken into account.

The observed health disparities between the areas may result directly from the more unfavourable health behaviour and/or the higher cardiovascular or other disease morbidity in the Republic of Karelia. The health gap between the two areas represents a challenge for disease prevention and health promotion activities. Some slight improvement in the risk factor profile in the Republic of Karelia has already occurred (Laatikainen et al. 2002).
8. CONCLUSIONS

Self-rated health improved considerably in Finland between 1972 and 1992. The development was more favourable for women than for men. Socioeconomic factors, namely education and household income, were unequivocal indicators of good subjective health status. Among men, but not among women, their importance as predictors of good health, however, diminished during the 20-year period.

We also found a slightly decreasing trend in the prevalence of back pain among men. The prevalence rates seemed to differ considerably between subgroups of the population. However, the trends varied markedly between the categories of some suspected risk factors for back pain, such as overweight and leisure-time physical activity.

In North Karelia, Finland, people not only have lower mortality but also feel healthier than people across the border in the neighbouring region in the Republic of Karelia, Russia. Socioeconomic differences in subjective health were less clear in the Republic of Karelia.

Self-rated health was a strong predictor of mortality in a randomly selected population cohort in eastern Finland, and its predictive power was only partly explained by a variety of items from the medical history, cardiovascular disease risk factors, and education. This association existed among both sexes for all-cause and cardiovascular mortality and, especially among men, for mortality due to external causes. A clear gradient was found from “good” through “average” to “poor” self-rated health in relation to all-cause and cardiovascular mortality.

The health gap between North Karelia and the Pitkäranta area in Russian Karelia is a challenge for effective disease prevention and health promotion activities. Since the health gap concerns a broad range of health problems, comprehensive health promotion is clearly needed. The effective heart health intervention aimed at changing unhealthy lifestyles in North Karelia has been accompanied by a general improvement in the health of the population (Puska et al. 1998).

The goal for health promotion in the industrialised world has been to increase the
number of healthy years, which means postponing the age-related diseases into later years of life while simultaneously increasing life expectancy. Our results give indications that when objective health status improves people also actually feel healthier.
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Sami Heistaro
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