SOCIAL AND PSYCHOSOCIAL DETERMINANTS OF SELF-RATED HEALTH IN SEVEN COUNTRIES OF CENTRAL AND EASTERN EUROPE

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Abstract

Life expectancy in countries of Central and Eastern Europe (CCEE) is substantially shorter than in Western Europe, and similar divide exists in self-rated health. The project described in this thesis was set up to study the effects of socio-economic factors (such as material deprivation, education and inequalities) and psychosocial factors (perceived control, psychosocial work environment) on self-rated health (a predictor of mortality in prospective studies).

Cross-sectional surveys were conducted in seven CCEE: Russia, Lithuania, Latvia, Estonia, Poland, Czech Republic and Hungary. Data were collected by interviews in randomly selected national samples in all seven countries (total 7,599 subjects), and by questionnaires in random community samples in 4 countries (total 6,642 subjects). The data included socio-economic and psychosocial factors, self-rated health (SRH) and behavioural risk factors.

Overall, 17% of men and 23% of women rated their health as worse than average. In the national samples, perceived control, material deprivation and education were strongly related to poor SRH. In the pooled data, adjusted odds ratio (OR) of poor health for 1 standard deviation (SD) increase in perceived control was 0.59 (95% CI 0.54-0.63). The OR for 1 SD increase in the material deprivation score was 1.35 (95% CI 1.26-1.46). The ORs for vocational, secondary and university education, compared with primary education, were 0.75, 0.58 and 0.53, respectively. We also examined the ecological effects of income inequality; the OR for the most versus the least unequal populations (using the Gini coefficient of income inequality) was 1.88 (95% CI 1.55-2.28). In multivariate analyses, however, the effect of inequality was eliminated by adjustment for material deprivation and perceived control. In the community samples, the results were similar. Among psychosocial factors at work, the effort-reward imbalance appeared to be the strongest predictor of self-rated health; work variety was also a predictor of self-rated health. Job strain was not associated with SRH.

Our results suggest that (a) the prevalence of poor SRH in CCEE is high, and (b) socio-economic and psychosocial factors are strongly related to self-rated health in these populations. The gradients were present in all populations, and were of the same direction and similar magnitude as in the West. Prospective studies are needed to address the problems of temporality and reporting bias, which are the major problems of these results.

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List of abbreviations

CCEE	countries of Central and Eastern Europe
CHD	coronary heart disease
CHEWE	Coronary Heart disease across Eastern and Western Europe
CVD	cardiovascular disease
CI	confidence interval
GDP	gross domestic product
NBB	New Baltic Barometer
NDB	New Democracies Barometer
NRB	New Russia Barometer
OR	odds ratio
SD	standard deviation
SDR	standardized death rate
SE	standard error
SRH	self-rated health
UNICEF	United Nations Children's Fund
WHO	World Health Organization

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Chapter 1

Introduction

1.1 East-west difference

Health status in the countries of Central and Eastern Europe (CCEE), including the former Soviet Union, is substantially worse than in the west (Bobak and Marmot, 1996). Current life expectancy in the CCEE is some six years shorter than in western Europe, although the gap was much smaller in 1970 (Figure 1.1.1 and 1.1.2). In countries such as Poland, Hungary or the former Czechoslovakia life expectancy was similar to that in neighbouring Western countries (Austria, Germany) in the 1950's but the trends diverged during 1960's. The main group of diseases responsible for this excess mortality in the CCEE are cardiovascular diseases (CVD) and external causes (violence and accidents) (Table 1.1.1).

The east-west difference exists not only in mortality but in most other health outcomes, for example cardiovascular morbidity (Tunstall-Pedoe et al, 1994), birth weight (Koupilova et al, 1998) and self-rated health (Carlson, 1998).

Although several studies have attempted to investigate the reasons for poor health status in CCEE, the answers are not clear. Classical risk factors, such as smoking, alcohol, obesity or diet, blood cholesterol or blood pressure, explain only a part of the east-west health divide. It has been suggested that psychosocial factors play an important role (Bobak and Marmot, 1996; Watson, 1995; Cornia, 1997).

Large differences in life expectancy (both current and in the past) can also be seen within CCEE (Figures 1.1.3, 1.1.4). In 1986, male life expectancy in Russia was approximately three years lower than in the Czech Republic and almost the same in women. By 1998, however, Russian men and women lived on average ten and five years less, respectively, than Czechs. As with the east-west differences, several

possible explanations were proposed, such as the quality of medical care, alcohol consumption, poor diet, life style and stress, environmental pollution, socioeconomic circumstances, and psychosocial factors. Evaluation of these factors, and their contribution to poor health, has been hampered by the lack of data on distribution of health as well as on the suspected risk factors in the CCEE (Uemura and Pisa, 1988; Bobak and Marmot, 1996).

The research described in this thesis has been set up to contribute to the study of the causes of poor health in the CCEE. For several reasons (described later in the thesis), self-rated health was chosen as the main outcome for the analysis.

Table 1.1.1: Contribution to the East-West difference in life expectancy (CCEE and rest of Europe, 1992) by cause of death (in years)

Cause of death	*Contribution to the difference (years)*
Cardiovascular disease	3.28
External causes	1.41
Respiratory disease	0.97
Other disease	0.40
Total	6.06

Source: WHO, 1995

1.2 Main interest and hypotheses

The specific research questions are described in the **Objectives** chapter. In general, this research concentrates on issues that so far have not been investigated in detail in these countries; specifically on the socioeconomic gradient in self-rated health, and on the effects of psychosocial factors on health status within CCEE, taking available life-style factors into account. Among the socioeconomic factors, the main focus was on education, material deprivation of individuals, and material inequality. Among psychosocial factors, this project concentrated on work-related factors (decision latitude, job demands, social support at work, effort at work and job reward), perceived

control over own life and health, social support at home and marital status.

The two main hypotheses of the project were: (a) socioeconomic status[1] of individuals influences self-rated health in CCEE; and (b) psychosocial factors influence self-rated health in CCEE, possibly as mediators of poor social circumstances. In addition, we tested whether psychosocial and socioeconomic factors may explain differences in SRH between populations used in this project.

1.3 Study design and data

All data used in this thesis come from cross-sectional studies. The data were collected in twelve surveys in seven Central and Eastern European countries: the Czech Republic, Hungary, Poland, Russia, Latvia, Estonia, Lithuania. In each country, we had data from a national sample of the population. In addition, we also had data from five community samples from Poland, Lithuania, the Czech Republic and Hungary. The data will be described in detail in the **Methods** section.

1.4 My contribution to the project

The work described in this thesis is based on existing data from several sources, collected by different people for partly different purposes (see the **Methods** section). The Department of Epidemiology and Public Health, University College London, served as a communicating and coordinating centre. We could, to some extent, influence the contents of the data collection but the scope of the datasets was relatively limited.

Some of the data were already collected when I started the PhD, but I participated in formulating the study hypothesis/questions. I designed and conducted the analyses. After discussions with my supervisor, I performed additional analyses and tested in more details the findings from the initial calculations.

In summary, the literature review, statistical analysis and interpretation of the results are mostly my own work, but I had only a limited role in the design of the surveys and in the data collection.

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[1] Throughout the whole thesis, the term "socioeconomic status" is used to indicate individuals' socioeconomic circumstances in the wide sense. It refers to the socioeconomic position in terms of both resource-based and prestige-based components of economic and social well being.

1.5 Structure of the thesis

The thesis starts with a **Background** section, covering a general overview of health status in countries of Central and Eastern Europe, the concept of self-rated health, socioeconomic factors as risk factors for self-rated health and other health outcomes in general, and a description of psychosocial factors and their role as risk factors for self-rated health and other health outcomes.

Objectives describe the main hypothesis of the thesis, and the specific questions addressed by the project.

Methods describe the populations under study, data available for analysis, the statistical power of the study, and steps in the statistical analysis of the data.

Results are presented in several parts:

1. Descriptive characteristics of study subjects and populations
2. Socioeconomic factors at the individual level
3. Psychosocial factors not related to work
4. Measures of socioeconomic inequality at the ecological level
5. Psychosocial factors at work
6. Analysis using other endpoints

Discussion starts with general methodological issues and then follows the findings in the same sequence as in **Results.**

Finally, **Conclusions** summarize the findings of the project.

At this point, an important issue needs to be clarified. This project did not examine the reasons for differences in self-rated health between CCEE and Western Europe. We did not have data to address this important question. However, using data from several countries of the CCEE region can be one step forward to understanding the east-west gap. We tested hypotheses which can be relevant to east-west differences in health, but we could use only data from eastern and central Europe. We focussed on social and psychosocial factors as potential determinants of self-rated health in CCEE. We investigated whether they account for differences between countries in the region; only by implication these factors may have also contributed to east-west differences.

Figure 1.1.1: Life expectancy at birth in selected countries (men)

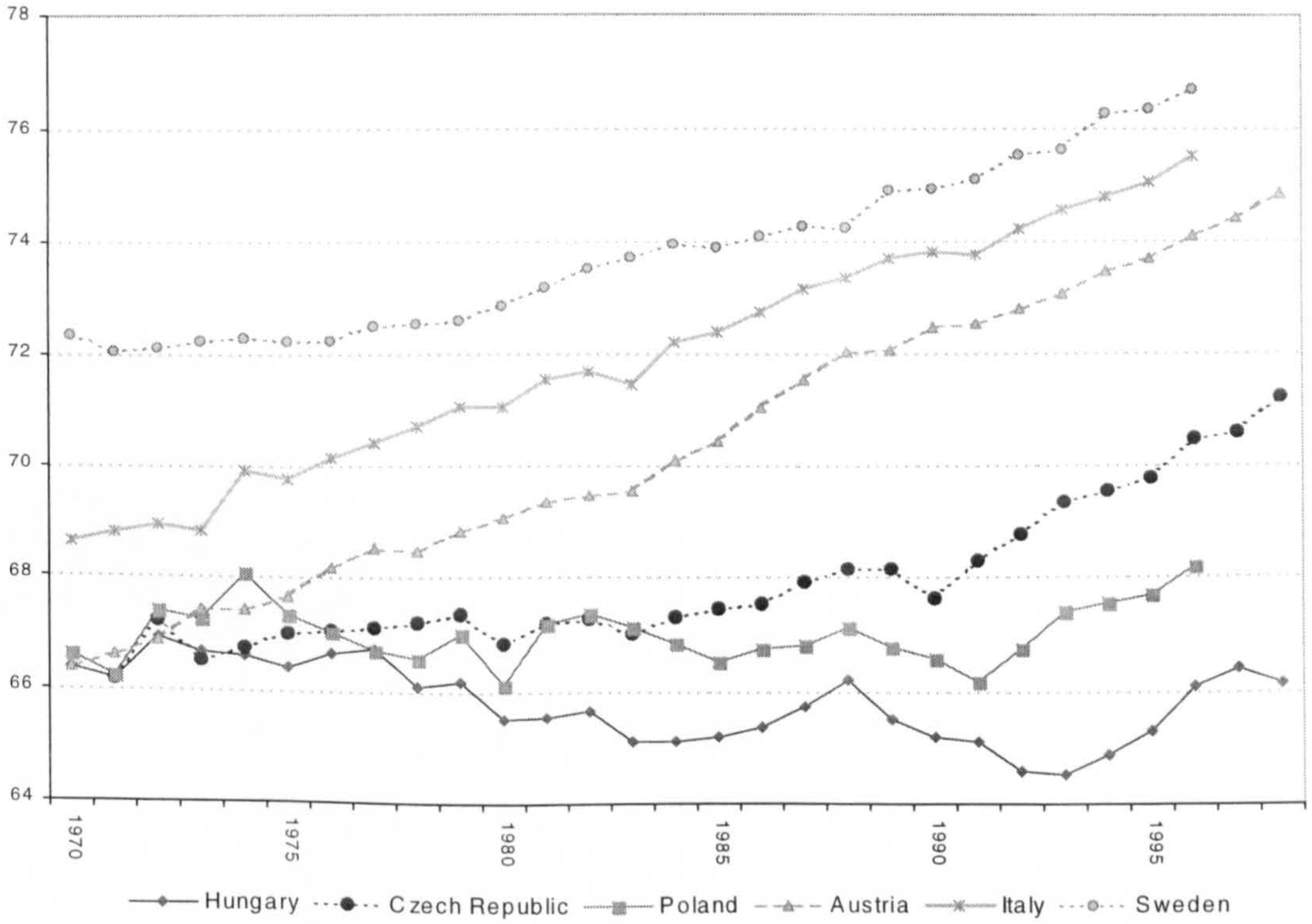


Figure 1.1.2: Life expectancy at birth in selected countries (women)

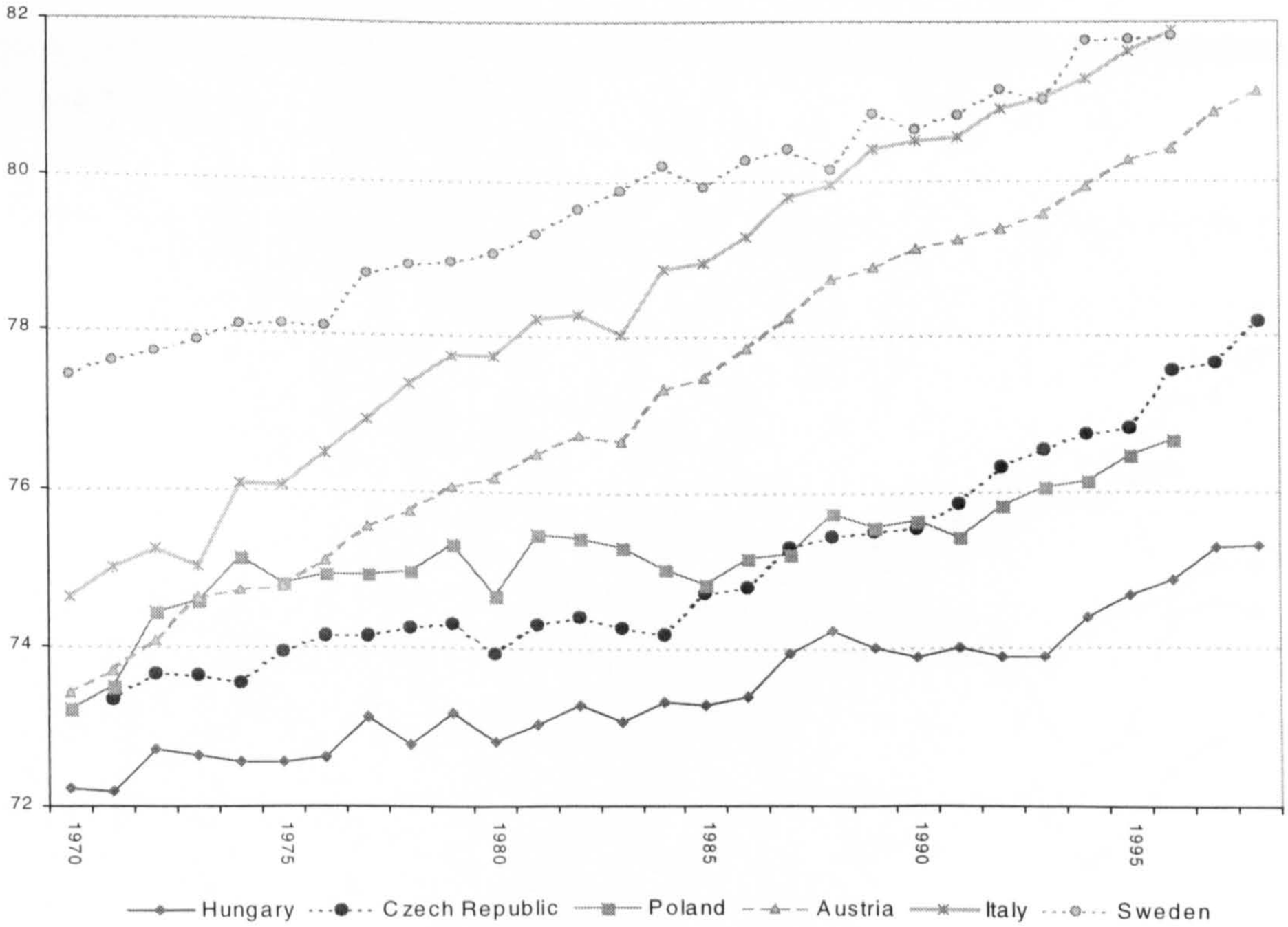


Figure 1.1.3: Life expectancy at birth in selected countries of central and eastern Europe (men)

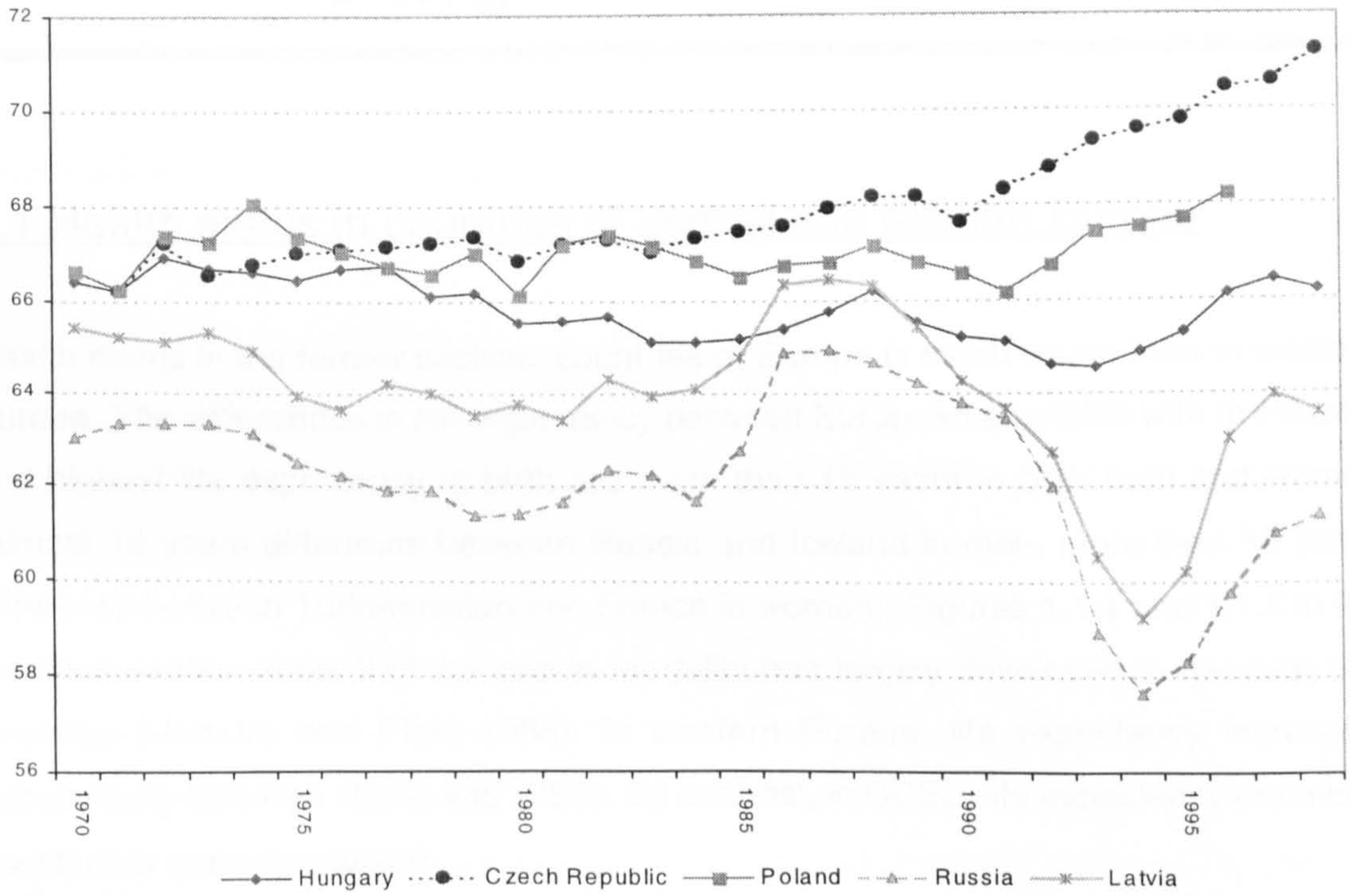
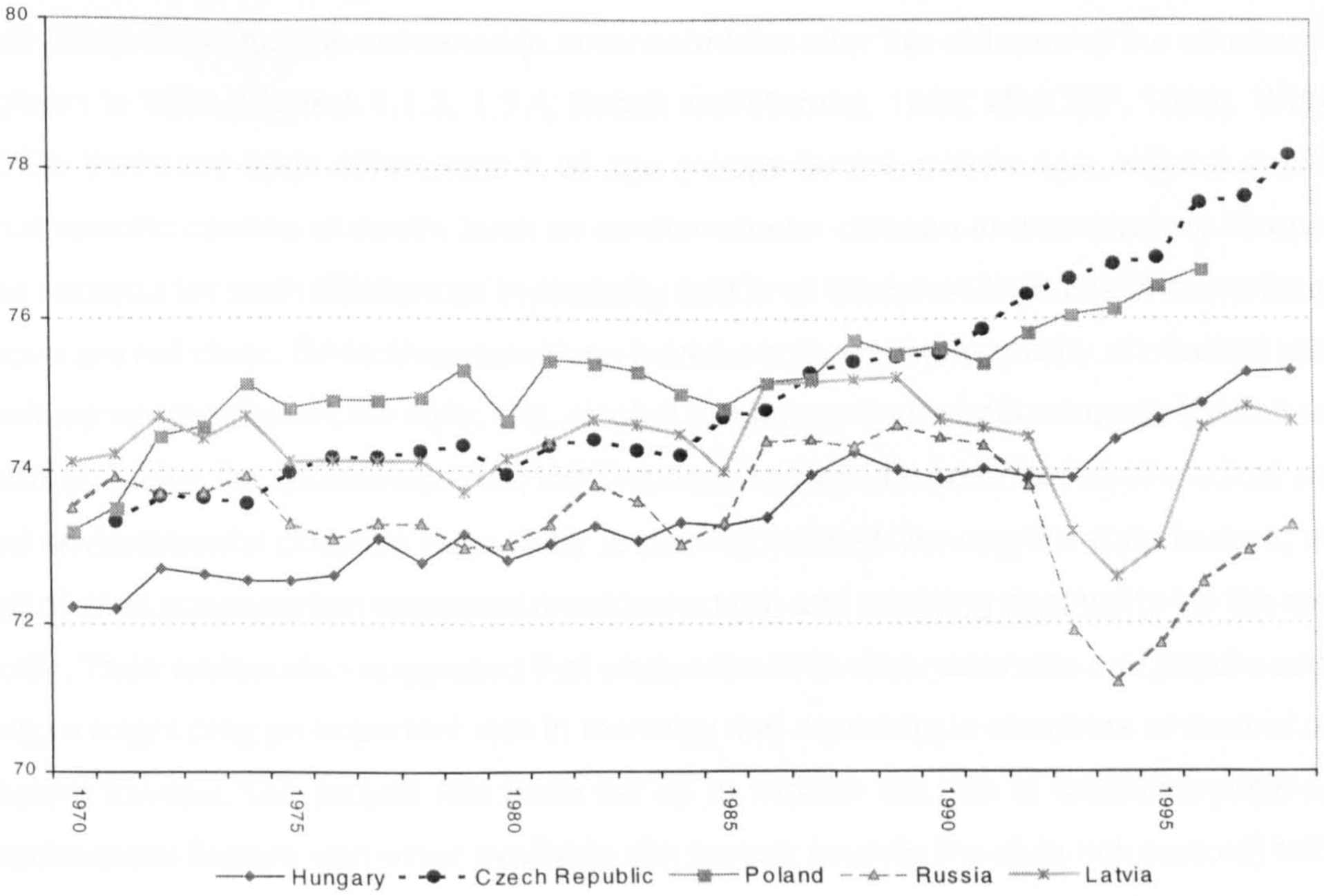


Figure 1.1.4: Life expectancy at birth in selected countries of central and eastern Europe (women)



Chapter 2

Background

2.1 Health status in countries of central and eastern Europe

Health status in the former socialist countries of Europe is much worse than in western Europe. The differences in life expectancy between European countries with the lowest and highest life expectancy at birth are more than 15 years in both men and women (almost 19 years difference between Russia and Iceland in men, more than 16 years difference between Turkmenistan and France in women). Figures 1.1.1 and 1.1.2 in the previous section show that the gap in mortality has largely developed in the past two decades (Uemura and Pisa, 1988). In western Europe, life expectancy increased substantially between 1970s and 1990s. By contrast, in CCEE, life expectancy remained constant or even decreased.

A similar difference in life expectancy can be seen within CCEE. Large differences can be found in life expectancy at a single point in time, but also in recent trends. In some countries of Central Europe (Czech Republic, Poland), the situation started to improve after 1990. The situation worsened in other countries after the collapse of the communist regimes in 1989 (Figures 1.1.3, 1.1.4; Bobak and Marmot, 1996; UNICEF, 1995). Within CCEE, there are large differences in all age groups (infant, middle age, elderly) and for most specific causes of death, such as cardiovascular disease and respiratory disease. The reasons for such differences in mortality and in all other health indicators mentioned above are not clear. Several explanations have been suggested: quality of medical care, environmental pollution, life style, diet, alcohol, socioeconomic circumstances (Bobak and Marmot, 1996). Bobak and Marmot (1996) speculated that the contribution of medical care and environmental pollution were likely to be only modest. Among life-style factors, diet and alcohol consumption appeared more important, and smoking seemed to be the main factor. Their review also suggested that socioeconomic circumstances and psychosocial factors might play an important role in mortality and morbidity in countries of central and eastern Europe. Our project has been set up to explore the role of socioeconomic and psychosocial factors with other available risk factors (mainly life-style risk factors) taken into account.

2.2 Self-rated health

Self-rated health was the main health outcome in this project. There are two main reasons for this. First, data on self-rated health are easy to collect (usually one or a few questions in a questionnaire or interview) and we had the opportunity to add the self-rated health question(s) to several national surveys. Second, it is well documented that self-rated health predicts mortality (all cause mortality, specific cause mortality) in prospective studies.

2.2.1 Self-rated health as a predictor of mortality

Self-rated health is a subjective indicator of health which depends on the individual's own perception. Several studies have examined the predictive validity of self-rated health in the last two decades. Mortality was used as the endpoint in most of these studies.

Mossey and Shapiro (1982) tested the hypothesis that self-rated health is a predictor of mortality independent of objective health status. They used a random sample of Manitoba residents (3128 individuals) examined during 1971-1977. At the beginning of the study period each person rated his/her health. The risk of early mortality (1971-1973) and late mortality (1974-1977) for individuals with poor self-rated health compared to those with excellent self-rated health was 2.92 and 2.77 (controlled for objective health status, age, sex, life satisfaction, income, urban/rural residence). The increased risk of death associated with poor self-rated health was higher than the risk associated with objective health status at baseline measurement.

Pijls and others (1993) followed up a cohort of 783 elderly Dutch men (the Zutphen Study) in 1985-1990 to assess the value of self-rated health in predicting mortality and the incidence of chronic diseases. Using survival analysis they showed that self-rated health was highly predictive of subsequent all-cause mortality ($p<0.001$): after adjusting for the presence of chronic disease at baseline, age, education, marital status and family history of chronic diseases, the relative risk for not healthy and only moderately healthy men compared with healthy men (according to self-rated health at a baseline) was 2.7. They also examined cause-specific mortality. The relative risk of cardiovascular mortality was 1.9 after the same adjustment as above (compared to crude relative risk 2.7), the adjusted relative risk of cancer mortality was 4.2 and mortality due to other causes 3.0. The authors suggested that self-rated health affects mortality from chronic diseases rather than their onset.

Results from the Kuopio Ischemic Heart Disease Risk Factor Study (Kaplan et al, 1996) showed strong, statistically significant, age-adjusted associations between the level of perceived health and mortality from all causes, cardiovascular causes and incidence of myocardial infarction among 2682 men aged 42-60 in eastern Finland during 1984-1992. Using the Cox Proportional Hazard Models they found relative hazards (bad versus good self-rated health) 3.67, 6.64 and 3.87 for the three groups of causes mentioned above. The associations between self-rated health and mortality and myocardial infarction were weakened after adjustment for risk factors (body-mass index, smoking, cholesterol, systolic blood pressure, physical activity, alcohol consumption and income) and prevalent disease (symptomatic and asymptomatic coronary heart disease, respiratory disease, hypertension, stroke, diabetes and cancer). The increased relative risk associated with bad versus good self-rated health was reduced by 54%, 69% and 62% for all-cause mortality, cardiovascular mortality and myocardial infarction incidence, respectively. The authors suggested that perceived health levels mainly reflect an underlying disease burden.

In another paper, self-rated health was shown as a predictor of coronary heart disease in Copenhagen, Denmark, in a cohort of 1052 men and women born in 1936 (Moller et al, 1996). The association between SRH and CHD during the 16 years of follow-up was statistically significant in the Cox regression model after adjustment for a number of social, environmental, health, and psychological factors. Relative risks of CHD in three SRH groups were 4.2 (good), 6.5 (poor), 18.6 (miserable) compared to extremely good SRH.

One of the most recent studies investigating predictive power of self-rated health was conducted in 1980-1990 in Finland (Miilunpalo, 1997). The study cohort comprised 1340 men and 1500 women, 35-63 years of age at the beginning of the study. The authors found a strong, statistically significant, inverse association between perceived health and mortality: relative risk (95%CI) for poor or rather poor versus good or fairly good self-rated health was 3.86 (2.28-8.46) for men and 4.24 (2.28-17.06) for women after adjustment for age, sex, social status. Perceived health was also inversely associated with the number of physician contacts per year. The authors suggested that subjective health assessment is a valid health status indicator in middle-aged populations and can be used in epidemiological studies.

An extensive review of longitudinal studies addressing an association between self-rated health and future mortality was published in 1997 (Idler and Benyamini, 1997). Twenty seven studies from twelve countries with follow-up 2-28 years were reviewed. The effect

of SRH in all of the studies was controlled for age and sex (or separate analysis was conducted for males and females). Most of the studies included some measures of chronic conditions. In 23 of the 27 studies, the findings were consistent and showed that self-rated health is an independent predictor of mortality in multivariate analyses (Figure 2.2.1). In four remaining studies with no significant multivariate effects, self-rated health was predictive of mortality in bivariate level but this effect was reduced by adjustment for other variables. The question about the self-rating of health differed from study to study. The authors stated that the consistency of results suggested that the concept of self-rated health is relatively insensitive to the exact wording of the questions asking about it.

Several other outcomes have also been studied. For example, Idler and Kasl (1995) found that self-rated health predicted decline in functional ability in elderly subjects. Wilcox and colleagues (1996) showed that self-rated health six weeks after a major medical event predicted disability after six months after the event.

The literature provides good evidence that self-rated health predicts future mortality (and, to some extent, objective health status in future) but the mechanisms are not clear. The link between self-rated health and mortality can be interpreted in two different ways. First, self-rated health may predict mortality because it is a measure of physical ill-health. Second, SRH is (at least partly) a psychological measure which predicts mortality by mechanisms other than physical illness. The literature suggests that both these pathways play a role because the association between self-rated health and mortality is to some degree reduced by adjustment for physical symptoms but some of its effect seems to be independent from measures of physical illness.

This has an implication for this project. Our outcome measure (self-rated health) is, to some extent, a measure of ill health, and thus it is a part of the east-west health divide. In addition, however, self-rated health may indicate psychosocial aspects of health or well being which may explain the health divide. If SRH is indeed partly a psychosocial factor, it would be difficult to separate it entirely from other psychosocial factors, and the interpretation of some of our findings must be cautious.

2.2.2 Self-rated health in CCEE

So far, there is little known about self-rated health in CCEE. One of the first studies in CCEE examining the relationship between self-rated health and overall and circulatory mortality was conducted in Poland (Krzyzanowski and Wysocki, 1986). 3047 men and women participated in a follow-up study between 1968-1981. The age-adjusted 13-year mortality was greater in those reporting poor self-rated health than in those reporting fair or better health: 23.6% vs 14.2% (men) and 10.6% vs 7.2% (women) for all-cause mortality, and 13.0% vs 7.5% (men) and 4.3% vs 2.9% (women) for circulatory mortality.

In the Kaunas-Rotterdam Intervention Study (KRIS) (Appels et al, 1996), 2452 Lithuanian males and 3365 Dutch males aged 45-60 were asked about self-rated health. Negative evaluation of own health was associated with higher mortality (all causes, CVD, CHD) in both populations, controlling for past and present heart disease, cardiovascular risk factors, socioeconomic factors and marital status. In Kaunas, those men evaluating their own health as worse compared to that of other men of the same age, showed higher risk of mortality from all causes (relative risk 1.75 (95% CI 1.18-2.59)), CVD (2.65 (1.33-5.28)), and CHD (2.23 (0.95-5.42)), respectively, compared to those evaluating their own health as better than other men of the same age.

Available data suggest that the east-west gap is not limited to mortality but also includes self-rated health and there is also large variability within the region of CCEE.

In data from the 1992 World Value Survey, Carlson (1998) detected an east-west gap in self-rated health analogous to that in mortality (Figure 2.2.2). He showed that self-rated health was correlated with national mortality rates. He also found that perceived control was related to self-rated health within and between 25 national samples of men and women. This finding is consistent with our hypothesis and will be described later with the concept of perceived control.

In KRIS (Appels et al, 1996), males in Kaunas considered themselves to be in poor health more often than males in Rotterdam (63% vs 16%) and in worse health condition compared to other men of their age also more often (31% vs 14%). The difference in mortality between Kaunas and Rotterdam was statistically explained by self-rated health.

The east-west gap in self-rated health was also documented in a survey comparing social patterning of SRH in Helsinki, Finland, and Moscow, Russia (Palosuo et al, 1998). 7% of males and 7.4% of females reported poor health in Helsinki compared to 18.1% of males

and 34.3% of females in Moscow. Similarly, health worries and dissatisfaction with their own health were higher in Moscow than in Helsinki, both in men and women.

Social inequalities in self-rated health were investigated in this Finnish-Russian study (Palosuo et al, 1998). Some of the findings are summarized in the next section.

Several other studies have investigated the effect of potential social and psychosocial risk factors on self-rated health in Central and Eastern Europe (Hraba et al, 1996; Hraba et al, 1998; Luschen et al, 1997), and they will be described in the next two sections.

Figure 2.2.2. Self-perceived poor health in 25 European countries 1990-91, men and women aged 35-64, (1=very good, 5=very bad)

2.3 Socioeconomic factors

There is strong evidence from western populations that groups in lower social and economic positions have higher rates of many health outcomes: all-cause mortality, specific cause mortality, morbidity, disability, and most risk factors for these outcomes. A large number of studies have investigated the socioeconomic differences in CHD and CVD. Almost all of these studies reported strong associations. The most commonly used measures and indexes of social class are education, income, occupation, employment status, special indexes of social class, measures of living conditions (such as ownership of car, house, dishwasher, or other material goods) and some area-based measures (based on characteristics of census districts, counties or other geographical units).

An extensive review of the effect of socioeconomic factors on cardiovascular disease by Kaplan and Keil (1993) concluded that socioeconomic status is an important risk factor for cardiovascular disease that is, at least partly, independent from biological risk factors. However, this view may depend on the understanding of the behavioural, social, psychological, and biologic pathways by which socioeconomic status affects cardiovascular disease. Identification of new biological factors and pathways linking socioeconomic status with ill health may change the view of how 'independent' the effects are.

The association between socioeconomic factors and health status in the countries of Central and Eastern Europe was studied less frequently than in western countries. Published literature showed a strong gradient in mortality and in the prevalence of risk factors by education (Kunst, 1997; Bobak et al, 1999; Shkolnikov et al, 1998). There are, however, little data on socioeconomic differences in self-rated health in CCEE.

The selection of the socioeconomic indicator is an important step. The use of different measures of socioeconomic status has recently been broadly discussed (Krieger et al, 1997; Bartley et al, 1999). It was suggested that there are several types of socioeconomic measures: measures reflecting general social standing and lifestyle (this type may be represented by education), employment relations and conditions (social class and various measures of employment status), and more direct 'material' dimension represented by income or deprivation. Different socioeconomic indices may predict health differently in different populations or even in men and women (Sacker et al, 2000). In general, however, there is fairly consistent evidence that the socioeconomic factors are associated with self-rated health.

From socioeconomic variables, most of the studies investigated the relationship between education and SRH. The vast majority of studies showed that low education is associated with poor SRH (for example Johnson and Wolinsky, 1993; Idler, 1993; Farmer and Ferraro, 1997) although some have found no association between education and SRH (for example Stoller, 1984).

The second common indicator of socioeconomic status is income. A strong association between income and health was found in many studies, and was also found in studies of self-rated health. In a study of US adults, Kawachi et al (1999) found a six-fold increase in risk of reporting poor health between the highest and the lowest income group. In the Netherlands, Stronks et al (1998) also found a strong association between income and self-rated health: OR (95% CI) 3.13 (1.95-5.01) for the lowest income category (approximately 10% of study population) compared to the highest category (approximately 15% of study population). This study also used an indicator of material deprivation based on questions of the affordability of the basic necessities of life, including food, access to medical care, and clean drinking water. The indicator of material deprivation was also significantly related to self-rated health. Interestingly, both income and material deprivation were independently associated with SRH.

Several studies have investigated the association between employment status and self-rated health. Moum (1992) found that employed people reported better SRH. In more detailed analysis, Smith et al (1994) in a study of middle-aged women showed that employment is related to the difference between average and better health, but not to the difference between poor and average health.

In a review of the effects of socioeconomic and demographic factors, Bjorner and colleagues (1996) summarized the consistent association between poor socioeconomic position, expressed by poor education or employment status, and poor self-rated health in approximately thirty studies from various populations in Europe, North America and Asia.

There has been much debate about whether and to what extent ethnicity can be included among socioeconomic indicators. Some studies, mostly in the United States, considered race as an indicator of socioeconomic position. In about half of these studies, non-white status was significantly associated with poor self-rated health (for example Tessler and Mechanic, 1978) while other studies did not find significant associations between race and SRH.

Socioeconomic factors in Central and Eastern Europe

In the last few years, several studies have investigated the effects of socioeconomic factors on self-rated health in Central and Eastern Europe.

In an analysis of 495 men and 609 women in a household panel study in the Czech Republic using data collected in 1994-1996, Hraba et al (1998) showed that self-rated health was significantly related to educational level and economic position (defined as a score variable constructed from six questions about affordability of food, clothing, medical care and several other needs; similar to the deprivation index defined in our study and described in the Methods section) in both men and women. The effect of education was partly reduced when education and economic position were simultaneously included in the same model.

Similar results were found among individuals in Taganrog, Russia in 1993-94 (Carlson, 2000). The results showed that those with the lowest education were twice as often more likely to report poor SRH than those with the highest education. Educational gradient was partly explained by material prosperity (a concept similar to material deprivation used in our study) and family relations. The results also showed that material prosperity was an important factor for self-rated health: OR was 7.06 (95% CI 2.86-17.43) for those reporting bad prosperity compared to those reporting very good prosperity when adjusted for education, age, sex and several other factors.

The statistically significant association between education and self-rated health was also documented in populations in East Germany (Luschen et al, 1997) and Moscow, Russia (Palosuo et al, 1998). In Moscow, family income and occupational position were also related to self-rated health.

In general, it is not clear whether measures of socioeconomic position, such as education, occupational position, and income have the same meaning in central and eastern Europe as in western Europe. In our study, we tried to use data on different indicators (education, material deprivation, to some extent employment status) to examine this issue.

Socioeconomic factors at aggregated level

The literature reviewed above focused on the question whether socioeconomic status is related to adverse health outcomes at an individual level. However, the relationship between income distribution in a society and health outcomes has attracted considerable attention.

In addition to simple ecological studies of 'mean' deprivation score and mortality rates (Townsend et al, 1988; Eames et al, 1993; Morris et al, 1996), which probably reflects relationship between deprivation and ill health at the individual level, there has been a considerable interest in the area-based measures of income inequality. Several recent ecological studies showed the association between income inequality and overall mortality (Le Grand, 1987; Wilkinson, 1992; Kaplan et al, 1996). Wilkinson (1992) used data from 11 industrialized countries and found a negative correlation between national life expectancy and national income inequality (r=-0.81). Kaplan et al (1996) used data from 50 states of the United States. He found a strong correlation (r=-0.62) between the percentage of total household income received by the less well off 50% in each state and all-cause mortality. The results in both papers were adjusted for absolute income levels in geographical areas. These studies did not use any individual data in the analysis.

These results generated a debate about whether the aggregated-level associations between income inequality and health do not merely reflect the association between income and health at the individual level. Several studies examined this proposition, mostly using multilevel statistical modelling, and tested whether income (or material) distribution in society was related to poor health status independently of individual or family socioeconomic characteristics.

Wolfson et al (1999) used 1990 US census data and 1989-1991 mortality data for 50 US states to assess whether the association between income distribution and mortality is a statistical artefact due to income at individual level. They concluded that the observed associations at the state level cannot be substantially explained by an individual level relationship between mortality and income.

In contrast, in a national representative sample of individuals aged 25-74 years in the United States, family income predicted future mortality. Income inequality in the community was significantly related to subsequent mortality when adjusted for age, sex, and mean income in the community of residence. This association disappeared after adjustment for family income (Fiscella and Franks, 1997).

Individual and state-level data (in the United States in 1993 and 1994) were used in the analysis of the cross sectional study to examine the effect of income inequality on self-rated health (Kennedy et al, 1998). The Gini coefficient was used to measure state-relative inequality in income. In these data, poor self-rated health was significantly associated with income inequality when personal and household socioeconomic status

was controlled for: odds ratio 1.25 (95% confidence interval 1.17-1.33) for the states with the greatest income inequalities compared to the states with the smallest inequalities.

The effect of neighbourhood socioeconomic status on self-rated health, adjusted for individual socioeconomic status, was examined in a Swedish study of adults (Malmstrom et al, 1999) by multilevel modelling. There was a strong association between poor self-rated health and a deprivation index constructed for small-areas: the odds ratio (95% confidence interval) was 1.84 (1.52-2.22) for the most deprived areas compared to the least deprived areas after adjustment for individual characteristics.

The existing results clearly indicate that individual income is an important factor in explaining inequalities in health, but the role of income inequalities on the aggregated level has not been resolved. Data collected in our study allow a simultaneous ('multi-level') analysis of the effect of income (and material) inequalities at the country level and at the level of individuals on individual health.

2.4 Psychosocial factors

Psychosocial factors have long been thought to influence health. A wide range of these factors has been proposed as possible determinants of health. Three broad areas which were used in our project are described in more detail: work related factors; perceived control over own life and health; and social support and social networks.

2.4.1 Work related factors

2.4.1.1 Job strain model

Karasek and co-workers (1981; 1988) proposed that the job strain model defined by his group, which is determined by psychological demand and decision latitude, contributed to the development of hypertension and coronary heart disease and promoted coronary risk factors. According to this model (figure 2.4.1), jobs with a combination of high demand and low decision latitude increase risk of CHD while jobs with high demand and high decision latitude, or low demand and low decision latitude have no or only a small effect compared to the jobs with low demand and high decision latitude.

In 1981, Karasek and others published results of a study of a random national sample of the Swedish male workforce. The study tested the association between specific job characteristics and subsequent cardiovascular disease. 1461 individuals were interviewed

in 1968 and reinterviewed in 1974. The study consisted of two analyses. First, cross-sectional and cohort methods were combined with development of a CHD indicator (constructed from self-reports of symptoms associated with clinically manifest cardiovascular disease). Secondly, a case-control analysis was conducted with CVD deaths as outcome. Analysis showed that prevalence of a CHD indicator increased with higher demand and with lower decision latitude (20% in the lowest decision latitude and the highest job demand group compared with 0% in the highest decision latitude and lowest job demand group). An incidence of a CHD indicator between 1968 and 1974 showed a similar pattern. Standardised odds ratios for the incidence of a CHD indicator were 1.44 (p-value 0.01) for job demand and 1.29 (p-value 0.025) for decision latitude. A case-control study was conducted on 88 individuals (22 cases, 66 controls). Although the number of subjects was very small, decision latitude and job demand predicted death from CVD causes. The odds ratio (95%confidence interval) for low latitude and high demand was 4.0 (1.1-14.4), p-value 0.02.

In 1988, an association between psychosocial job characteristics and prevalence of past myocardial infarction for employed males was tested in a study using data from the Health Examination Survey (HES 1960-61, N=2409) and the Health and Nutrition Examination Survey (HANES 1971-75, N=2424) (Karasek et al, 1988). The psychosocial exposure was estimated ecologically for 221 census occupations using the US Department of Labor Quality of Employment Surveys. In the HES data, the presence of myocardial infarction was judged by a panel of four doctors. In the HANES, data on CHD were based on the diagnosis made by the field examining physicians after reviewing the medical history, detailed questionnaire and physical examination. The authors showed that results supported their theoretical framework: the odds ratio for myocardial infarction for someone in the top decile of job strain compared to someone in the lowest decile was 3.80 in the HES (p=0.017) and 4.79 in HANES (p=0.022). The relative risk for job strain was on the same magnitude as that for smoking or serum cholesterol.

The job strain model was used in many other studies. In 1982, Alfredsson et al published results from a case-control study testing the association between job strain and myocardial infarction in men below the age of 65 from the greater Stockholm region. The psychosocial characteristics of the 118 occupations were recorded ecologically by means of a national interview survey in 1977. Shift work and monotony were associated with significant excess risk. Job demand was not associated with excess risk by itself but in combination with variables associated with low decision latitude and/or few possibilities for growth it was associated with significant excess risk (45% excess risk of myocardial

infarction).

In 1994, a case-control study tested the association between job strain and myocardial infarction on a large sample from five Swedish counties. 9,925 cases and 26,101 controls (randomly sampled from the general population) were included in the analysis. Job strain variables were assigned on the basis of individuals' occupation title (obtained from census). High strain jobs were found to increase the risk of myocardial infarction (RR ranging 1.1-1.4 for men and women aged <65 and 1.2-1.6 for men aged <55). Passive jobs (low demand, low decision latitude) were also found to be associated with increasing risk of MI but not with the same magnitude as high strain jobs. Similar results were obtained in analyses of male white collar and blue collar workers (Hammar et al, 1994).

Self-reported job strain and social support at work were significantly related to prevalence of cardiovascular disease in a sample of 13,779 Swedish male and female workers (Johnson and Hall, 1988). In this paper, the concept of social support at work was introduced. The authors have added an additional dimension to the Karasek's model (figure 2.4.2). In their paper, job demand was positively and decision latitude and social support at work negatively related to the prevalence of CVD, the age-adjusted odds ratio of 2.17 (95% CI 1.32,3.56) was observed among workers with high demands, low control and low social support compared to a low demand, high control and high social support group. Within each category of social support, job demand and control over work were related to CVD as predicted by Karasek's model but the magnitude of effect differed by social support category. The authors stated that there was a statistically significant interaction between social support and job strain. Based on these findings, the authors speculated that the addition of social support could expand the demand-control formulation from an emphasis on the individual connection between person and job into the area of collective relationships between people.

Apart from cardiovascular disease, some studies tried to assess whether work stress is associated with cardiovascular risk factors. Schnall et al (1990; 1992) reported an association between job strain and hypertension. Pickering et al (1996) reviewed the relationship of job strain to hypertension. In their paper, it has been shown that job strain was associated with higher ambulatory blood pressure, both cross-sectionally and prospectively, in men but not in women.

Recently, several studies have found that whereas decision latitude performed in the predicted direction, work demand did not (Alterman et al, 1994; Bosma et al, 1997; Bobak

et al, 1998) and the statistical interaction between job decision latitude and demand has not been found in some studies (Schnall et al, 1994).

In the Chicago Western Electric Study (Alterman et al, 1994), 25-year coronary mortality of middle-aged men was related to decision latitude after adjustment for the major coronary risk factors (the relative risk for the highest versus the lowest tertile of decision latitude 0.76 (95% confidence interval 0.59,1.00)) but the association between mortality and job demand pointed in the opposite direction: contrary to the job strain model, men in the highest tertile had relative risk 0.78 (95% CI 0.48,1.26) compared with men in the lowest tertile of demand. For job strain (defined as low decision latitude and high psychological demand), it was 1.40 (95% confidence interval 0.92,2.14).

Men and women with low job control in a prospective cohort Whitehall II study (Bosma et al, 1997), either self reported or independently assessed, had a higher risk of newly reported coronary heart disease during follow-up (mean length of follow-up 5.3 years). Job control assessed on two occasions three years apart, although intercorrelated, had cumulative effects on newly reported disease. Individuals with low job control on both occasions had an odds ratio for any subsequent coronary event 1.93 (95% confidence interval 1.34,2.77) compared with subjects with high job control on both occasions, and this odds ratio virtually did not change after adjustment for employment grade, classic coronary risk factors and negative affectivity. Job demands and social support at work were not related to the risk of CHD.

In a 14-year follow-up study of a Swedish national sample of 12,517 individuals, work control was significantly related to CVD mortality (Johnson et al, 1996). Statistically significant associations were also found for psychological demands. But the direction of the association was opposite to that predicted by the Karasek model: higher levels of psychological demands were inversely related to CVD risk. No significant association between work social support, physical job demands, job hazards and CVD mortality were found. When all five work characteristics were included in one model, only job control was significantly associated with CVD mortality. Significant interaction between job control and social support was found. Workers exposed to low control and low support for 25 years had relative risk 2.61 (95% CI 1.22, 5.61) compared to those exposed to high control and high support. No significant interaction was found for any combination of variables including job demands.

A meta-analysis by Pieper et al (1989) assessed the relationship between job strain and four coronary heart disease risk factors (cholesterol, smoking, systolic blood pressure,

diastolic blood pressure) among 12,555 men in 5 US datasets collected during 1959-1980. Job psychological demands and decision latitude were attached to persons in datasets by occupational classification. When the analysis was performed, all relations were in the predicted direction except for the relation of psychological demands to systolic blood pressure. Only the relation of job decision latitude to smoking and to systolic blood pressure was significant ($p<0.001$). The interaction of psychological demands and decision latitude was not related to any of the risk factors.

In a recent systematic review of prospective cohort studies, Hemingway and Marmot (1999) concluded that there is growing evidence of the importance of low job control while there are conflicting results about the effect of job demand. It is unlikely that job demand is a strong predictor of CHD.

Most recently, analysis based on a Whitehall II prospective cohort study examined the association between two alternative job stress models - the job strain model and the effort-reward imbalance model - and the risk of coronary heart disease among British civil servants (Bosma et al, 1998). Results will be discussed in the next section.

In the past few years, Karasek's model was tested also on other outcomes than coronary heart disease, hypertension and risk factors for CHD.

In the Whitehall II study, work characteristics (work demands, control, and support) were related to sickness absence in a cohort of 9072 male and female British civil servants (North et al, 1996). Low levels of work control, support, and demand were associated with higher rates of short and long spells of absence in both men and women (to a lesser extent). These differences were found for both self-reported and externally assessed work characteristics. The combination of low control and high demands was only associated with higher risk of short spells of absence in the lower grades of employment.

In a population study of men born in 1914 in Malmo, Sweden (Isacsson et al, 1995), the social support and social network indices and psychological job strain were related to neck and low back pain after retirement. Two of the social support and social network indices (social anchorage and availability of material and informational support) were related to daily neck and low back pain: OR (95% CI) 2.0 (1.2,3.4) and 1.7 (1.0,2.7), respectively. Psychosocial factors in former work were not related to these outcomes in this study.

In an analysis of 3503 Danish women with singleton pregnancies between 1989 and 1991

who worked at least 30 hours per week during first 16 weeks gestation, women with relaxed jobs (high control, low demands) had the lowest risk of having a child small-for-gestational age and preterm delivery. Compared to this group, ORs for small-for-gestational age delivery were 1.3, 1.1, and 1.1 among women with passive jobs, high-strain jobs, and active jobs, respectively. For preterm delivery, ORs were 1.4, 1.3, and 1.2, respectively. None of these odds ratios was significant (Henriksen et al, 1994).

The above mentioned results are not conclusive. There is a number of studies with results that were not statistically significant or of the borderline significance, and only a few studies used outcomes other than CVD. Our study may provide new information about the effects of job control and job demands on an individual's perceived health.

Figure 2.4.1. Job strain model

Karasek et al. American Journal Public Health 1981

Johnson and Hall, American Journal of Public Health 1988

2.4.1.2 Effort-reward imbalance model

Siegrist and colleagues (1989; 1990; 1991; 1993; 1995) have developed a different theoretical model linking the work environment of individuals with their health status. This model consists of (a) work effort (extrinsic and intrinsic) and (b) status control and work reward (Figure 2.4.3). In this model, the work role in adult life is considered a basic tool to link important emotional and motivational self-regulatory needs of a person, such as self-esteem and self-efficacy, with the social opportunity structure. The model assumes that the long-term imbalance between work effort and long-term reward defines a state of emotional distress and increases the risk of cardiovascular events.

In a prospective cohort study of 416 middle aged (25-55 years) blue-collar workers conducted in three industrial steel and metal plants in West Germany, low reward and/or high effort was statistically significantly associated with occurrence of ischemic heart disease after adjusting for major confounding somatic and behavioural risk factors (age, body-mass index, blood pressure, cholesterol) (Siegrist et al, 1990).

In 1993, Siegrist presented results of a prospective study in middle managers and showed that indicators of low reward and high effort were significantly related to hypertension

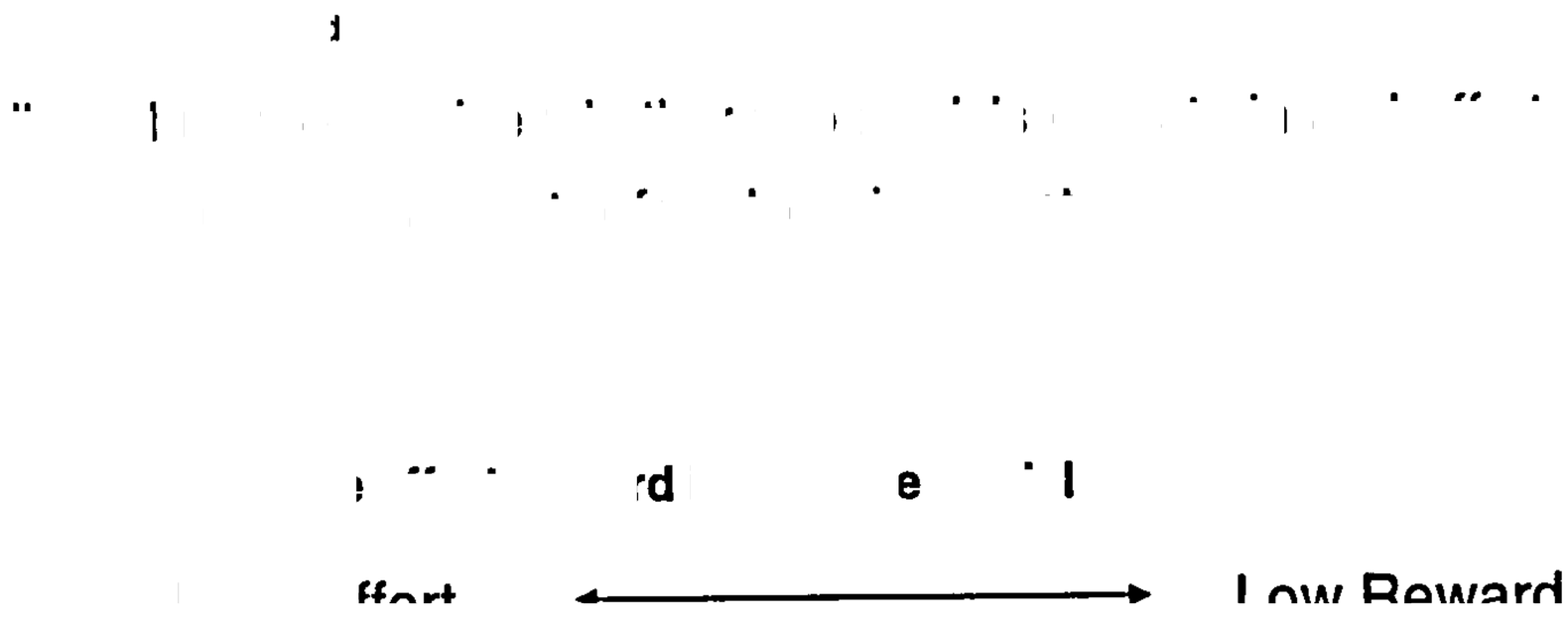
(odds ratio 6.81), high LDL-cholesterol (odds ratio 3.33) and cigarette smoking (odds ratio 4.34).

Recently, analysis based on a Whitehall II prospective cohort study examined the association between two previously discussed alternative models - the job strain model and the effort-reward imbalance model - and the risk of coronary heart disease among male and female British civil servants (Bosma et al, 1998). 6895 men and 3413 women aged 35 to 55 years were examined. Baseline measures of both job stress models were related to new reported cases of coronary heart disease over a mean 5.3 years of follow-up period. In statistical analysis, work characteristics were simultaneously adjusted and controlled for employment grade and coronary risk factors. The imbalance between personal efforts and rewards was significantly associated with higher risk of new coronary heart disease (odds ratio 2.15 with 95% CI 1.15-4.01). Job strain and high job demands were not related to coronary heart disease; however, low job control was significantly associated with new CHD (odds ratios and 95% CI were 2.38 (1.32, 4.29) for self-reported job control and 1.56 (1.08, 2.27) for externally assessed job control, respectively).

Some studies in the last few years tested the Siegrist model on other outcomes than ischemic heart disease (IHD) and risk factors for IHD.

A study in Germany (Peter and Siegrist, 1997) tested the effort-reward imbalance model among middle aged (40-55 years) middle managers in a car-producing company. The authors argued, both on theoretical and empirical grounds, that active coping with experience of chronic work stress (indicative by simultaneous manifestation of high effort and low reward at work) was more likely to be associated with physical health consequences such as hypertension, whereas passive coping (low occupational reward in the absence of signs of sustained effort) might predispose individuals to withdrawal behaviour such as sickness absence from work. They found that several indicators of occupational reward were significantly associated with short-term sickness absence, long-term sickness absence and a number of sickness-absence periods, whereas no indicator of high effort at work was associated with sickness-absence. They also found that simultaneous high effort and low reward were strongly associated with hypertension (adjusted odds ratio 5.77(95% CI 1.47,22.72)).

There is a growing and relatively consistent body of evidence of an adverse effect of the effort-reward imbalance on health. In our study we examine the relationship between the effort-reward imbalance and self-rated health. The availability of job strain in our data



Siegrist, Stockholm 1993

2.4.1.3 Work satisfaction

The concept of the work satisfaction model is similar to the job strain model but it does not measure specific features like job demand or latitude. It is a simple global index. It was used in an analysis of data of a longitudinal community health study in Jerusalem (Abramson et al, 1994). 773 subjects were asked "Are you in general satisfied with your work?" with answers on a 5-point scale. Association between work satisfaction and perceived health (general, physical and emotional) was tested. Positive associations were found: the odds ratio for those not so satisfied, or not satisfied at all compared to those very satisfied was 2.8 ($p<0.001$) for general health. However, job satisfaction was not significantly associated with symptoms of angina pectoris, a chest pain history, or hypertension.

A negative association between work satisfaction and mortality due to ischemic heart disease was found in the analysis of data of 2045 bus drivers in Denmark (Netterstrom and Suadicani, 1993). It was shown that men who reported a high degree of job satisfaction had an increased risk of IHD. Similarly, those who did not look for another job, those who reported their job was something special, and those who reported that they would choose the same job again, had an excess risk of IHD.

Job satisfaction is a simple global measure of psychosocial work environment. It is easy to collect but the previously discussed specific measures (such as demand, control, effort or reward) seem to be more promising in studying the health effects of the work

environment. First, their conceptual basis is more obvious, and second, they have been tested in a larger number of studies. In this project, we have preferred to collect data on the effort-reward and the job strain model.

2.4.1.4 Work-related psychosocial factors in CCEE

The concept of psychosocial determinants of health has not been widely studied in CCEE until the past few years.

A recent analysis of Czech data (Bobak et al, 1998) from a case-control study of myocardial infarction among full-time working men in a general population tested an association between self-reported job strain and myocardial infarction. Age-adjusted odds ratios for the highest versus the lowest quartile of decision latitude and job demand were 0.43 (95% CI 0.25-0.75) and 0.54 (0.31-0.93), respectively. Adjustment for other coronary risk factors did not change these estimates. Whereas decision latitude performed in the predicted direction of the Karasek model, work demand did not. This result was consistent with several recent studies in the West mentioned in section 2.4.1.1. The combination of job control and coronary risk factors explained the educational gradient in myocardial infarction.

Some psychosocial factors described in the previous three sections were used in an analysis of Czech married couples (Hraba et al, 1996). The authors defined the 'work rewards' concept as consisting of two dimensions: autonomy at work (flexibility of work schedules, being one's own boss, having independence on the job) and good work environment (opportunities for advancement, opportunities to use own ideas, variety on the job, repetitiveness of work). They did not find any significant relationship between this concept and self-rated health either in men or in women.

In an analysis of the former East German population (Luschen et al, 1997), the authors looked at an association between physically strenuous jobs, work stress and noise, problems in social relations at work, and self-rated health in a sample of 1289 adults more than 18 years old. A physically strenuous situation at work has highly significant negative impact on SRH ($p<0.001$). Stress at work was also significantly related to SRH ($p<0.05$) although social relations at work had no influence on SRH.

Our data included a range of work-related psychosocial variables (decision latitude, work demands, effort/reward imbalance, job variety, social support at work). Some of these variables were used in CCEE in the past, but there has been no previous study where

different dimensions of work environment were studied. In addition, we assessed the applicability of these concepts in settings other than western Europe or North America.

2.4.2 Perceived control over own life and health

Perceived control is defined as an individual's belief about the degree that he or she can bring about good events and avoid bad events (Peterson and Stunkard, 1989). The concept of control is relatively old and it integrates several aspects of psychosocial stress (Rotter, 1966; Syme, 1989; Skinner, 1996).

There is an extensive psychological literature on perceived control. Rotter (1966) described the concept of perceived control, summarized early attempts to measure personal control, and presented "internal-external control scale" together with several examples of the use of this scale. He used 29 items in his control scale, such as "Many times I feel that I have little influence over the things that happen to me" or "What happens to me is my own doing" (questions similar to those used in our project and described in the Methods).

The aspects of perceived control and its different definitions have been reviewed by Peterson and Stunkard (1989), and more recently by Skinner (1996). Peterson and Stunkard suggested several possible mechanisms that may account for the associations between personal control and health: first, people with high perceived control may choose healthier lifestyle; second, they may more often seek and follow medical advice when they are ill; third, they may be more able to avoid life crises and may be more skilled to cope with life crises that do occur; fourth, they may receive more social support; and fifth, they may have better immune systems. The authors also urged that self-reported measures of health must be used carefully since personal control affects an individual's perception of physical well-being and, as consequence, self-reported health and personal control may reflect a similar underlying phenomenon. Skinner (1996) concentrated on heterogeneity in the constructs used to describe control, and attempted to list the existing definitions of control and to organize them according to their definitions. Regardless of the large number of terms (often interrelated and overlapping), most of the studies show an association between personal control and variety of health outcomes.

Syme (1989) speculated that control is important for health. He has also suggested that perceived control is a key element in explaining socioeconomic differences in health. Some studies looked at an association of perceived control with health and well-being. Lachman and Weaver found that individuals with higher perceived control had better self-rated

health (1998). They showed that perceived control played a moderating role between income and health: individuals in the lowest income group with a high sense of control showed levels of health comparable to the groups with higher income. This result suggests that personal control may be useful in understanding socioeconomic differences in health.

Carlson (1998), using data from the 1992 World Value Survey, found that perceived control was related to self-rated health within and between 25 national samples of men and women. Life control together with membership of a non-political association and economic satisfaction variables explained 11% of the east-west divide in self-rated health in men and about 32% in women. He has also shown that life control was a stronger predictor of self-rated health in western Europe, both in men and women.

Control over own life was used in an analysis of data from Taganrog, Russia (Carlson, 2000). Poor self-rated health was strongly related to life control in men and women aged over 18 years: OR (95% CI) per 1 unit increase in 10-point scale was 0.90 (0.85-0.97). In this analysis, the effects of socioeconomic indicators (education, material deprivation) were reduced only slightly by controlling for personal control, and control did not appear to mediate the effect of socioeconomic variables.

The concept of control over life was used in the analysis of a national sample of Czech married couples. Hraba et al (1996) used a seven-item index (questions such as 'I can solve some of the problems I have', 'I have little control over the things that happen to me'; similar concepts to ones used in our project and described in the Methods section). They showed that this index was significantly associated with self-rated health in men but was not related to self-rated health in women. They also defined a self-esteem measure indicating a high evaluation of oneself and measure of distress constructed from questions asking about distress symptoms such as feeling lonely, feeling hopeless about the future, feeling helpless. They showed strong effects of both measures on self-rated health both in men and women.

As suggested earlier, the major problem with studies of perceived control and SRH is that both indices may reflect one underlying factor. It was therefore important to demonstrate that the perceived control was associated to a more objective health outcome in a prospective study. A recently published study suggested that this was the case.

Bosma et al (1999) reported that low perceived control was related to subsequent mortality in a prospective study of 2462 Dutch men and women in 1991-1997. OR (95% CI) for 1

SD decrease in the perceived control scale was 1.45 (1.19-1.75). Adjustment for perceived control also substantially reduced the association between low socioeconomic status and mortality. The average increase in mortality risk in the lowest socioeconomic group accounted for by low perceived control was 51%.

The effect of perceived control on SRH was consistently shown both in the West and in CCEE. There is more uncertainty about the potential mediating role of perceived control between socioeconomic variables and health. In this project, we examined the associations between perceived control and self-rated health, and the role that perceived control plays in explaining socioeconomic differences in SRH.

2.4.3 Social support and social networks

Although the literature has provided some preliminary evidence that there could be an association between social and community relationships and health, in most studies until the late seventies, investigators have not directly measured such social contacts. Among the first findings were results from Alameda County Study (Berkman and Syme, 1979), a follow-up study using a random sample of 6,928 adults living in Alameda County, California. In this study, social relationships were measured by four dimensions: presence of spouse (usually measured by marital status), contacts with friends and/or relatives, church membership, and membership in other formal and/or informal groups. The authors constructed a special indicator of social relationship - Social Network Index - and related this to all-cause mortality. After 9 years follow-up, subjects in the lowest quartile of the Social Network Index were found to have 2-3 (relative risk 2.3 for men and 2.8 for women) times higher mortality than subjects in the highest quartile after controlling for potential confounding variables. In separate analyses of each dimension of the index, marital status, contacts with friends and/or relatives (both $p<0.001$), and church membership ($p<0.05$) were significantly associated with mortality; an association between group membership and mortality was not significant. The magnitude of association between Social Network Index and mortality was dependent on sex and social class, but the direction was the same in all sub-analyses.

Subsequent re-analyses confirmed these results (Seeman et al, 1987). Proportional hazard analyses using seventeen-year mortality data indicated that social ties are important predictors of all-cause mortality (relative hazards 2.00, 1.40, 1.28 and 1.49 for Social Network Index defined by Berkman and Syme (1979) for those aged 38-49, 50-59, 60-69, 70+ after adjustment for other risk factors). Comparisons of the relative importance of four dimensions of the index showed that marital status was the most important social

tie for those aged less than 60 years at baseline. However, ties with friends and/or relatives were the most important ones for those aged 60 and older.

Results from the Alameda County Study were confirmed by other studies. The Tecumseh Community Health Study, a cohort study of 2754 adults aged 35-69 at baseline, showed similar, statistically significant, results for men but non significant results for women (House et al, 1982). The epidemiologic evidence for association between social support and health was reviewed by Broadhead et al (1983) and House et al (1988). These reviews supported the hypothesis that social support is related to health status and mortality.

A prospective cohort study of middle aged Swedish men, examined in 1973 and followed for 12 years, reported social support to be significantly related to CVD mortality (Welin et al, 1992). Another prospective Swedish study of 500 men, a random sample of residents of Malmo, born 1914, has found significantly higher relative mortality among men with low availability of emotional support and low adequacy of social participation and among men living alone (adjusted relative risk 2.5, 2.2, and 2.0, respectively) (Hanson et al, 1989).

In Finland, more than 13,000 men and women were studied in a 5-year follow-up study (Kaplan et al, 1988). For men, there was an association between social connections (defined as in the Social Network Index in the Alameda County Study), and mortality from all causes, CVD, and CHD: odds ratios (95%CI) were 1.54 (1.21,1.95), 1.54 (1.11,2.13), 1.34 (0.94,1.90), respectively, for those in the two lowest quintiles of the social connections scale compared to those in the highest quintiles. For women, they did not find any significant association. This could be due small number of deaths in women. There was no evidence for confounding or effect modification due to prevalent illness at baseline.

2.4.3.1 Marital status

Marital status has been the most widely studied dimension of social support. There is large and consistent evidence that marriage is associated with lower mortality; it seems more protective for men, less so for women (eg Rosengren et al, 1989; Kotler and Wingard, 1989).

The effect of marital status on self-rated health was studied in several studies and the results are relatively consistent. Several studies found a positive effect of marriage (eg. Fylkesnes and Forde 1992; Joung et al, 1994). Joung and colleagues presented results from a large prospective cohort study in the Netherlands. They showed that poor perceived general health was significantly associated with being either divorced or never married (OR

1.95 and 1.37) although separate results for men and women were not presented. A few studies found weaker or no association. For example, Moller et al (1996) showed an association on the borderline of significance in a univariate analysis (p=0.02) but this association disappeared in a multivariate analysis. In a more complex analysis of a population sample of 2000 middle-aged Australian women, Smith et al (1994) showed that marital status was associated with self-rated health when comparing average and better perceived health, but no significant association was found when compared poor and average perceived health.

Marital status is a dimension of social relationships which has been previously shown to predict health in CCEE (Watson, 1995; Hajdu et al, 1995). Watson (1995) examined the existing data concerning the possible role of levels of smoking, fats consumption, environmental factors and some social and psychosocial factors in the East-West health divide. She suggested that the devaluing of the public sphere and the increased importance of the private domain contributed to the greater health vulnerability of men in Eastern Europe. The importance of the private sphere is reflected in the fact that the rise of premature male mortality has been overwhelmingly concentrated in the unmarried population in the East European countries. For example, the death rates of married and divorced men in Poland developed quite differently between 1970 and 1988. During this period, mortality rates for divorced men rose dramatically for all age groups (for example, 60-64 old divorced men had three times higher mortality in 1988 than in 1970). Mortality of married men increased much less dramatically than among divorced men (60-64 old married men had 10% higher mortality in 1988 than in 1970).

For Hungary, it has been shown that much of the rise in death rates among adult men in 1982-1990 was due to the rise among the unmarried subjects. Death rates among the married remained almost the same during the whole period (Hajdu et al, 1995). They showed that the gap between standardized death rates for married and divorced Hungarian men aged 30-59 years increased from 4.9 in 1969 to 14.5 per 1000 in 1991. There was an increase in standardized death rates in both 30-49 and 50-59 age categories, and in all categories of marital status (married, never married, widowed, divorced). The steepest increase was observed among divorced men: a 1.82-fold increase among 30-49 year old men and a 1.97-fold increase among 50-59 year old men (compared to 1.36 and 1.47 among married men). The authors offered two explanations. Comparing the situation with England and Wales, it was shown that the relative mortality of divorced men (compared to married) was much worse in Hungary than in England and Wales. Economic factors were suggested as one of possible reasons for this situation:

divorced men were subject to particular economic constraints in Hungary during the 1980s and many divorced males were left in a state of poverty.

Watson (1995) said that, in general, keeping going in Eastern Europe meant keeping the family going. This depended crucially on the paid but mostly unpaid work of women. Despite the physical demands, the woman's role in the family was at the same time a resource and a way of coping. In a state-controlled public sphere men frequently missed a meaningful role while women felt they had role in the family.

The causes of the differences in mortality by marital status were studied by Wyke and Ford (1992) in Scottish middle-aged population. While risky health behaviour (measured by smoking and drinking) and levels of social support did not explain much of the effect of marital status on SRH, available material resources, stress and perceived quality of social support had a great impact. Material resources (measured by car ownership) explained about half of the difference in self-reported health between married and no longer married. Distress and perceived quality of social support also accounted for a part of the difference in SRH between married and unmarried individuals. These results showed that marital status is a variable with both psychosocial and material characteristics that needs further exploration. In our project, we will investigate the effect of marriage on SRH in the population in CCEE and to examine conditions associated with marital status in more details.

In conclusion, the literature shows that self-rated health varies with socioeconomic status, work-related psychosocial factors, perceived control, levels of social support and marital status. Most of the previously discussed concepts were established in western populations. The cross-sectional data used in this project allowed us to study these variables in CCEE, and to assess their applicability in these populations.

Chapter 3

Objectives

Our general hypothesis is that socioeconomic and psychosocial factors are strong determinants of health in CCEE.

The primary objective of this project is to test this hypothesis and to study the effects of socioeconomic and psychosocial factors on self-rated health in population samples in countries of Central and Eastern Europe. We hypothesized that, in addition to traditional risk factors, socioeconomic status and psychosocial stress play an important role in the health status of individuals.

In this thesis, I addressed the following specific questions:

- whether social factors are related to self-rated health
- whether the psychosocial work environment, measured by job strain and effort-reward models, is related to self-rated health
- whether there is any association between perceived control and self-rated health
- finally I examined whether psychosocial and socioeconomic factors may help to explain differences in SRH between populations in CCEE.

Chapter 4

Methods

The methodology of the study is presented in several sections. First, I will describe the populations used in the study (section 4.1). Second, available data are summarized and then described in detail (section 4.2). The statistical power of the study is presented in section 4.3. The aspects of the statistical analysis (strategy of analysis, restrictions, missing values, statistical software) are described in section 4.4.

4.1 Populations

The data were collected in twelve surveys from seven countries of central and eastern Europe: the Czech Republic, Poland, Hungary, Lithuania, Latvia, Estonia and Russia (Figure 4.1). There were two principal groups of population samples:

- National samples - a series of seven surveys in national population samples. These surveys were part of a larger set of studies conducted by the Centre for the Study of Public Policy (CSPP) at the University of Strathclyde (Glasgow, Scotland), the so-called New Democracies Barometer (NDB), New Baltic Barometer (NBB) and New Russia Barometer (NRB).
- Community samples - these include four surveys in populations participating in the WHO MONICA project (6 districts in the Czech Republic, Poland-Warsaw, Poland-Tarnobrzeg, Lithuania-Kaunas) (WHO, 1987), and a survey in the town of Kalocsa in Hungary. The latter was conducted as a baseline study for a community health promotion programme.

All the samples were selected randomly, and the details are described below.

4.1.1 National samples

All national samples were interviewed as part of a large policy-oriented research programme of the CSPP at the University of Strathclyde (Rose, 1996; Rose, 1997). This research focussed on social and political aspects of the transition in central and eastern Europe and the former Soviet Union, and on the impacts of people's living conditions.

The main source of information in this programme is a series of cross-sectional studies in population samples: the New Democracies Barometer (NDB), New Baltic Barometer (NBB) and New Russia Barometer (NRB) (Rose, 1996; Rose, 1997). All data were collected by local agencies under the supervision of the CSPP. All surveys used a two-stage sampling scheme. First, regions were sampled proportionally to their size. In the second stage, individuals were randomly selected from these locations. All surveys sampled adult populations (18 years of age and older).

We were able to join this research programme and to add several questions to some of the surveys (one in each country). These surveys are described below.

Poland

The data come from the New Democracies Barometer (NDB) survey carried out at the end of 1997 and the beginning of 1998. A random sample of the population aged 18-79 years was selected. Interviews were conducted with 1141 individuals (response rate 59%).

Czech Republic

This New Democracies Barometer (NDB) survey was also carried out at the end of 1997 and the beginning of 1998. A random sample of the population aged 18-79 years was selected. A face-to-face interview survey was conducted with 961 individuals (response rate 61%).

Hungary

This New Democracies Barometer (NDB) survey was carried out at the beginning of 1998. A random sample of the population 18 years of age and older was selected. A face-to-face interview survey was conducted with 973 individuals (response rate 58%).

Russia

The data come from the New Russia Barometer survey carried out after the presidential elections in July 1996 (Rose, 1996). A random sample of the population aged 18 years and more was selected. 1599 completed interviews represent a response rate of 66%.

Estonia

A national survey was conducted in November 1996 as a part of The New Baltic Barometer survey (Rose, 1997). A multi-stage sample of the population aged 18-74 years was selected. 971 interviews were completed (response rate 59%).

Latvia

Latvian data were collected in November 1996 (Rose, 1997) as a part of The New Baltic Barometer survey. A multi-stage sample of the population aged 18-74 years was selected. 952 interviews were conducted (response rate 57%).

Lithuania

In Lithuania, a national survey was carried out in November 1996 as a part of The New Baltic Barometer survey (Rose, 1997). A random sample of the population aged 18-74 years was selected. 1996 subjects were approached. The 1002 completed interviews represent response rate of 50%.

In the three Baltic populations, the first step of stratification of the sample was the distribution of native and non-native citizens in the population. A two-stage method described at the beginning of this section was then used to draw samples of native citizens and non-native citizens with limited oversampling of non-native inhabitants.

In all seven samples, the representativeness of respondents was compared with national population characteristics. The samples showed good agreement for age, education and urban-rural distribution (Rose, 1996).

4.1.2. Community samples

Czech Republic

In the Czech Republic, the study population was based on the WHO MONICA Project, an international study examining trends in CVD and risk factors (Skodova et al, 1991; Tunstall-Pedoe et al, 1994; WHO, 1987). In the Czech Republic, six districts participated in the project (Figure 4.1.2). These districts were originally selected because the local cardiologists were able to participate in the project and the local conditions were favourable. The data used in this thesis were collected in a cross-sectional postal survey in 1995. A random sample of population was formed by individuals aged 27-66 years with permanent residence in these districts. A total of 2121 subjects returned a completed questionnaire (response rate 75%).

Warsaw, Poland

In Warsaw, the study population was also based on the WHO MONICA Project. It was an urban sample of the population from two districts of the capital city (figure 4.1.4). Data were collected in a cross-sectional postal survey in 1995. Men and women aged 36-66

years with residence in the study area were eligible. A total of 564 individuals returned completed questionnaires (response rate 72%).

Tarnobrzeg, Poland

In the Tarnobrzeg county, Poland, the study population was also based on the WHO-MONICA project. It was a rural sample of population. Tarnobrzeg county ("voivodship") is a south-east province of Poland with small towns and rural communities (figure 4.1.4). It is a traditional agricultural area, with sulphur mining and a steel industry developed in recent decades. The data came from a cross-sectional postal survey in 1995 among men and women aged 37-66 years with residence in the study area. Completed questionnaires were returned by 993 individuals (response rate 76%).

Kaunas, Lithuania

In Kaunas, Lithuania, the study population was based on the MONICA Project. It was an urban population in a large city (figure 4.1.5). The data came from a cross-sectional postal survey in 1995 of men and women aged 28-69 years with residence in the study area. 960 individuals completed and returned the questionnaire (response rate 73%).

Kalocsa, Hungary

The study was conducted in Kalocsa town and Homogmegyi village, a rural agricultural area some 100 km south of Budapest (figure 4.1.3). A random sample of the population was surveyed at the end of 1995 and the beginning of 1996 as a baseline survey of a health promotion project funded by the World Bank. The sample was selected randomly from the population aged 15-64. Data were collected in two stages. First, screening and medical examinations were done by trained staff in a medical centre. In the second phase, a health behaviour survey in households was carried out. 2050 individuals participated in this health behaviour survey (95% of those invited); 1096 people (53.5% of those participating in the health behaviour survey) participated in both stages of data collection.

Table 4.1.1. Description of the study populations

Population	Source	Sample	Postal/ interview	Description of the data
National samples				
Czech Republic	NDB	national	interview	Self-rated health, perceived control [2], social and demographic data
Poland	NDB	national	interview	Self-rated health, perceived control [2], social and demographic data
Hungary	NDB	national	interview	Self-rated health, perceived control [2], social and demographic data
Russia	NRB	national	interview	Self-rated health, perceived control [2], physical functioning [3], social and demographic data
Estonia	NBB	national	interview	Self-rated health, perceived control [2], social and demographic data
Latvia	NBB	national	interview	Self-rated health, perceived control [2], social and demographic data
Lithuania	NBB	national	interview	Self-rated health, perceived control [2], social and demographic data
Community samples				
Hungary	WB survey	urban/rural	interview	CHEWE questionnaire [1] + data about health behaviours, extra psychosocial variables
Poland (Warsaw)	MONICA	urban	postal	CHEWE questionnaire [1]
Poland (Tarnobrzeg)	MONICA	rural	postal	CHEWE questionnaire [1]
Czech Republic	MONICA	urban/rural	postal	CHEWE questionnaire [1]
Lithuania	MONICA	urban	postal	CHEWE questionnaire [1]

[1] - See Appendix 1

[2] - See Appendix 1, questions 39 a-i, n

[3] - See Appendix 2

NDB - New Democracies Barometer

NBB - New Baltic Barometer

NRB - New Russia Barometer

4.2 Description of data

The data collected in the populations described above included demographic and socioeconomic circumstances, psychosocial factors (job-related and general), social networks, smoking, alcohol consumption, diet, medical history of individuals and their families and self-rated health. However, data collected in different populations differ. Datasets collected in the MONICA centres are virtually identical - they were collected by the CHEWE questionnaire (CHEWE, 1996; Appendix 1). Data in Kalocsa, Hungary included the CHEWE questionnaire, but also contained smoking, alcohol consumption, measurements of weight and height. All national data consisted of a wide range of demographic and socioeconomic factors that are not always identical.

Self-rated health, age, gender, education, marital status, deprivation, and personal control data were included in all datasets. Job demand, decision latitude, job variety, social support at work, effort and reward at work were included in all community samples. Table 4.2.1 summarizes data available for each population. Variables used at any stage of data analysis are described in detail below.

Self-rated health was used as the main outcome in the thesis. It was assessed by the question "How do you rate your health over the last 12 months?" in the community samples, and by the question "How do you rate your physical health over the last 12 months" in the national samples, with answers "very good", "good", "average", "poor" and "very poor". For the analyses, the responses were dichotomised into "poor health" (combination of poor and very poor). In four community samples (Poland-Warsaw, Poland-Tarnobrzeg, Lithuania, Hungary) people were also asked the question "Compared to most people of your age, how would you rate your health?" with the possible answers "much better", "somewhat better", "about the same", "somewhat worse", "much worse". These responses were dichotomised into "worse than others" (combination of somewhat worse and much worse). Self-reported cardiovascular disease was assessed by the question "Have you ever had heart trouble suspected or confirmed by a doctor?" and by a set of questions asking about heart attack, angina, high blood pressure, valve disease and congenital heart disease. These questions were also used as outcomes in some analyses. In Russia only, physical functioning was measured by a subset of ten questions taken from the original SF36 questionnaire (Appendix 2; Brazier et al, 1992; Garratt et al, 1993; Jenkinson et al, 1993; Ware, 1993).

A range of social and psychosocial factors were measured. These will be defined below.

4.2.1 Socioeconomic status

Education

Individuals were asked about their highest attained education, which was categorised into primary, vocational, secondary, and university.

Material deprivation

Socioeconomic conditions were assessed by three questions about difficulties in paying for food, clothing and bills. The possible answers were "never", "sometimes", "often", "always". The answers were coded 0,1,2,3. The material deprivation score was calculated by combining these answers.

In addition, a self-reported financial situation was assessed in the Hungarian community sample by the question "Have the changes since 1989 been good or bad for your financial situation?" with possible answers 'very good', 'good', 'neither good nor bad', 'bad', 'very bad'.

Household items

In several samples, individuals were asked about ownership of household equipment (colour TV, cable TV, satellite, radio, microwave, video recorder, washing machine, dishwasher, fridge, freezer, PC, car, motorcycle, weekend/holiday cottage/house in countryside, garden). The items varied in different populations. An index of household items ownership was constructed by summing up items owned by household. In the national sample in Hungary, where the questions were the most extensive, three arbitrary groups of items were defined: 'basic needs' (washing machine, fridge, freezer, microwave, phone), 'standard/socially oriented needs' (colour TV, radio, tape player/recorder, motorcycle, car, car radio), and 'luxurious needs' (cable TV, satellite, video recorder, video camera, CD, PC, dishwasher, dacha, garden). Although this classification was entirely arbitrary, it nevertheless proved to be useful in predicting SRH.

In addition to factors measured at the individual level, two ecological measures of socioeconomic inequality (characterising whole populations) were used. For each population, an ecological index of material inequality was calculated as the difference between the 10th and 90th percentile of the deprivation score. In addition, the Gini coefficient of income inequality as an independent measure of inequality for each country was taken from UNICEF (United Nations Children's Fund, 1998).

4.2.2 Psychosocial factors not related to work

Marital status

Marital status is a variable on the border between "social" and "psychosocial". In this study, marital status was used as a proxy for social support and/or social relationships/social connectedness. Marital status was categorised into two groups: "married/cohabiting" and "unmarried" (including single, divorced, and widowed). A more detailed classification could not be used as the finer division was not available in all samples.

Perceived control

There is no universally accepted definition or instrument to measure perceived control (see Background). In our study, perceived control was based on a set of questions adapted from the Whitehall II Study and the MacArthur Foundation Research Network on Successful Midlife Development; they are close to the inverse of perceived constraints used by Lachman and Weaver (1998). The questions are listed in Appendix 1 (questions 39 a-o). The subjects were asked to what extent they agreed/disagreed with the statements asked in the questionnaire; answers were recorded at a 6-point scale. Answers to all 9 questions were coded to have values 0 to 5 in logic order (disagree strongly-moderate-slightly, agree slightly-moderate-strongly). Nine questions (39a,c,d,e,f,g,h,i,n) were available in all samples. A score of overall perceived control was constructed based on these nine questions; Cronbach's alpha of internal consistency (Bland and Altman, 1997) was 0.65. Scores of 'health control' (39c,d,e) and 'general control' (39a,f,g,h,i,n) were also constructed and used in some specific analyses. All three scores were recalculated to have values between 0 (low control) and 5 (high control). Individual scores of perceived control were defined as follows:

- overall perceived control = (q39a+q39c+q39d+q39e+5-q39f+q39g+5-q39h+5-q39i+5-q39n)/9
- perceived control over life = (q39a+5-q39f+q39g+5-q39h+5-q39i+5-q39n)/6
- perceived control over health = (q39c+q39d+q39e)/3

Other variables available in selected samples

In different samples, different "other" variables were collected. These include:

- *reaction to economic changes* (available in national samples) - based on statements: rating of the former socialist economy (negative, neutral, positive), and rating of the present economic system (negative, neutral, positive). Both variables were combined and four categories were defined: pro-market (non-positive evaluation of socialist economic

system and positive evaluation of current economic system), always positive (positive evaluation of both systems), always negative (non-positive evaluation of both systems), nostalgic (non-positive evaluation of current system and positive evaluation of socialist system)

- *types of social relations* (available in national samples in Russia, Estonia, Latvia, Lithuania) - based on whom individuals rely on when they have problems: self only, informal institutions only (friends and/or relatives), formal institutions only (such as employer, state, public organizations, church), both informal and formal institutions.

- *trust in institutions* (available in national samples) - individuals were asked whether they trust public institutions, such as president, prime minister, government, parliament, parties, police, courts, army, civil servants, TV, radio, and newspapers. Answers to these questions were on a 7-point scale ranging from strong distrust to strong trust. An index of trust was constructed from these responses.

- *personal freedom* (available in national samples in Hungary, Poland, the Czech Republic) - individuals were asked about freedom to speak, to join any formal organizations, to travel, freedom in religious matters, freedom for interest in politics, fair treatment by officials, possibility to influence government. An index of personal freedom was constructed on the basis of these questions.

- *general social situation* (Hungarian community sample) - individuals were asked whether the changes since 1989 had been good or bad for their general social position. The answers were on a 5-point scale ranging from very good to very bad.

4.2.3 Work-related psychosocial factors

As described in Background, several psychosocial factors at work were examined in the community samples. They included job demands and job decision latitude (part of the job strain model), the effort-reward model, and several other work characteristics.

Job demand and job decision latitude

Both job demand and decision latitude (control at work) are part of the job strain model. Only selected questions were used. Job demand was measured by one question and job decision latitude by four questions (appendix 3). Each question was answered on a four-point scale: 'often', 'sometimes', 'seldom', 'never/almost never'. Answers were coded to values 0 to 3 and average scores were calculated as shown in Appendix 3. A decision

latitude score was generated if at least 3 of 4 questions were answered. Job demand and decision latitude scores were then dichotomised ('low' as a score less than or equal 1.5, 'high' as a score greater than 1.5) and combined to four "job strain" categories: low demand + low decision latitude (passive jobs), low demand + high decision latitude (low strain jobs), high demand + low decision latitude (high strain jobs) and high demand + high decision latitude (active jobs).

Job variety

Job variety was measured by four questions (Appendix 3). Each question was answered on a four-point scale: 'often', 'sometimes', 'seldom', 'never/almost never'. Answers were coded to have values 0 to 3 and average scores were calculated as shown in Appendix 3. A job variety score was generated if at least 3 of 4 questions were answered.

Social support at work

Social support at work was measured by four questions taken from the Whitehall II Study (Bosma et al, 1997; Appendix 3). Each question was answered on a four-point scale: 'often', 'sometimes', 'seldom', 'never/almost never'. Answers were coded to have values 0 to 3 and average scores were calculated as shown in Appendix 3. A score was generated if at least 3 of 4 questions were answered.

Effort and reward at work

We used questions on effort-reward imbalance developed by Siegrist (1996). The original questionnaire contained large number of questions but Siegrist and Peter developed a short version which was used here (Peter and Siegrist, 1997). Work effort was measured by six questions and reward at work by eleven questions (Appendix 3). The answers were recoded to have values 1 or 2 and average scores were calculated. The details of the coding procedure are shown in Appendix 3. A work effort score was computed if at least 5 of 6 questions were answered and reward at work was generated if at least 9 of 11 questions had valid answers. Work effort and reward were then combined to the effort-reward imbalance ratio, calculated as effort score/reward score. The imbalance ratio was used either as a dichotomised variable (E/R ratio less than 1, and equal or greater than 1) as recommended by Peter and others (1998), or as a continuous variable on a logarithmic scale (log(E/R)). The logarithmic scale was used to place inverse imbalance of the same magnitude (for example 0.5 and 2) in the same distance from 1 (no imbalance) and to allow use of this variable in statistical analysis.

Perceived control at work

Perceived control at work was the only work-related psychosocial factor available in

national samples. It was measured by the question "At work, do you feel you have control over what happens in most situations?" with answers coded on the 6-point scale (Appendix 1, question 39b).

4.2.4 Life-style risk factors

Life-style risk factors for poor health outcomes, such as alcohol consumption, smoking or obesity were used in samples when available. Alcohol consumption was estimated by questions asking about type and amount of alcohol consumed during an average week. Smoking was used either as a dichotomised variable (current smoker - yes or no) or as a categorical variable (smoking now, smoking in the past, never smoking). The body-mass index [weight in kilograms/height in metres squared] was used as a measure of obesity.

Table 4.2.1. Matrix of the data available in the study

Variable	National samples							Community samples				
	Lithuania	Latvia	Estonia	Poland	Czech	Hungary	Russia	Czech	Poland-W	Poland-T	Lithuania	Hungary
self-rated health	+	+	+	+	+	+	+	+	+	+	+	+
CVD history	-	-	-	-	-	-	-	+	+	+	+	+
phys.functioning	-	-	-	-	-	-	+	-	-	-	-	-
gender	+	+	+	+	+	+	+	+	+	+	+	+
age	+	+	+	+	+	+	+	+	+	+	+	+
education	+	+	+	+	+	+	+	+	+	+	+	+
mat. deprivation	+	+	+	+	+	+	+	+	+	+	+	+
marital status	+	+	+	+	+	+	+	+	+	+	+	+
occupation	+	+	+	+	+	+	+	+	+	+	+	+
smoking	-	-	-	-	-	-	+	-	-	-	-	+
alcohol cons.	-	-	-	-	-	-	+	-	-	-	-	+
demand, latitude	-	-	-	-	-	-	-	+	+	+	+	+
effort, reward	-	-	-	-	-	-	-	+	+	+	+	+
perceived control	+	+	+	+	+	+	+	+	+	+	+	+

4.3 Statistical power of the study

This study was based on existing data. This study used the opportunity that data either existed (CHEWE) or that a few questions could be added at low cost to planned surveys. We could not influence the size of the population samples. We can, however, under some assumptions, calculate the power of the study.

For the power calculations below, the following assumptions are used:

- 95% or 99% confidence level
- exposed:unexposed ratio 1:4
- 15% prevalence of disease in unexposed group.

Four different sets of individuals were used in the analysis: national samples, community samples, working individuals from national samples, and working individuals from community samples. For these different samples, the statistical power was calculated. All calculations are post hoc calculations. Tables 4.3.1-4 shows the statistical power of the study for several odds ratios and 95% and 99% confidence level in full national data, in community data, in work active population from national samples, and in work active population from community samples.

Table 4.3.1. Power calculation for national data - population of more than 7,500 individuals

Odds ratios	Power	
	95% confidence level	99% confidence level
1.3	>90%	~80%
1.4	~99%	>95%
1.5	>99.9%	>99.5%

Table 4.3.2. Power calculation for community data - population of more than 6,500 individuals

Odds ratios	Power	
	95% confidence level	99% confidence level
1.3	>85%	>70%
1.4	~98%	>90%
1.5	>99.5%	>99%

Table 4.3.3. Power calculation for work active population from national data - population of about 4,000 individuals

Odds ratios	Power	
	95% confidence level	99% confidence level
1.4	~90%	~75%
1.5	~97%	>90%

Table 4.3.4. Power calculation for work active population from community data - population of about 3,000 individuals

Odds ratios	Power	
	95% confidence level	99% confidence level
1.4	>80%	~60%
1.5	>90%	~80%

Although there is some loss of power in multivariate analysis (adjusting for country, age, sex and other potential confounding factors), all samples were sufficient to study relatively weak associations. For odds ratios larger than, say, 1.7, statistical power was over 95% in all samples.

4.4 Statistical analysis

4.4.1 Strategy of analysis

The purpose of the statistical analysis was to characterize the samples in terms of prevalence of poor health and levels of socioeconomic and psychosocial factors, to identify associations between risk factors and outcomes, and to explain differences in poor health between populations. To do so, the data were analysed in several steps. First, the data were cross-tabulated to obtain description of the subjects in the study. Second, the effects of socioeconomic status on self-rated health were examined. Third, the effects of perceived control and other psychosocial factors (not at work) on self-rated health were analysed. Fourth, the effects of inequality measures at population level were evaluated. Fifth, the effects of work-related psychosocial factors on self-rated health were assessed and the most influential factors were selected. Finally, other endpoints (available in some datasets) were examined.

In all steps crude or sex-age adjusted effects of individual variables on outcomes were estimated as the first step of analysis. Age-sex-adjusted prevalence rates of poor health were standardised by the direct method with the pooled data as the standard. The associations between poor health and explanatory variables were estimated by logistic regression. Perceived control, material deprivation and both inequality indices were analysed as continuous variables. To express their effects in meaningful units, odds ratios were calculated for one standard deviation increase in perceived control and material deprivation, and for an increase in inequality indices we calculated the odds ratios equivalent to the difference between the most and the least unequal population. Weighted least squares regression analysis was used in ecological analysis using populations as units of analysis.

In all steps, bivariate analysis was done first and multivariate analysis (when several independent variables were included in the same model) second. Models were built from simple to more complex. In the analysis of the work-related psychosocial factors, the most influential variables were identified and a model was built using these variables.

4.4.2 Restrictions of analysis

The following restrictions applied during different sections of data analysis:

✦National and community data were analysed separately. This was done because of:

- different data collection strategies,
- partly different purposes of data collection, and

- different response rates.

✦Some parts of the analysis are relevant only for some populations due to the unavailability of some variables in some populations

✦Results on work-related factors are based on working populations only (individuals who were employed at the time of data collection)

✦Most results on work-related factors are based on community populations only - this is because almost no job-related psychosocial variables were collected in national samples (with the exception of a question asking about 'control over what happens in most situations at work' [39b from Appendix 1] which was available for all samples).

4.4.3 Missing values

Missing data in categorical variables, such as education, were coded as special category and individuals with such data were not excluded from the statistical analysis. Individuals with missing information about the outcome or about continuous variables (such as perceived control) were excluded from the analysis.

4.4.4 Software

Data were cleaned, coded, and analysed using statistical packages Stata for Windows, versions 5 and 6 (Stata Corporation, College Station, USA), and SPSS for Windows, versions 6 and 8 (SPSS Inc., Chicago, USA). Epi Info software, version 6 (CDC, Atlanta, USA) was used for calculations of the statistical power of the study.

Chapter 5

Results

Results are presented in six sections. First, descriptive characteristics of study subjects and populations are summarized. Second, the effects of socioeconomic factors at the individual level on self-rated health are shown. Third, the effects of psychosocial factors not related to work on self-rated health are presented. Fourth, the associations between poor self-rated health and measures of socioeconomic inequality at the population level are displayed. Fifth, the associations between psychosocial factors at work and poor self-rated health are shown. Finally, the analysis using other endpoints is presented.

The project had two main components: the national samples and the community samples. For several reasons (different data collection strategy, different spectrum of available variables, different representativeness of the samples), these two sets of data were analysed separately. Except for the sections 1 (general description of selected countries and study subjects) and 4 (the analysis of national samples only), each section is therefore subdivided into two parts: analysis of data from national samples and analysis of data from community samples. In sections 2 and 3, both sets of data are analysed in similar way. Most of the section 5 (psychosocial factors at work) relates to the analysis of community samples.

Tables and figures are numbered by chapter, section, and number of the table. In each section, tables and figures follow the text.

5.1. Descriptive characteristics of study subjects and populations

(a) countries

The study was conducted in seven countries of Central and Eastern Europe described in the Methods section. Selected economic, demographic and health characteristics of these countries are shown in Table 5.1.1. There was large variation in presented characteristics between countries. The cumulative change in real GDP between 1989 and 1997 (in

constant prices from 1989) varied between +10.4% (Poland) and -55.5% (Lithuania). Life expectancy at birth in 1998 varied between 71.2 (Czech Republic) and 61.4 years (Russia) in men, and between 78.2 (Czech Republic) and 73.3 (Russia) in women. Large differences can be also seen in the changes in life expectancy between 1989 and 1998. In men, there was a 3.1 years increase in the Czech Republic, a smaller increase in Poland and Hungary, and a decrease in all three Baltic countries and Russia. The maximal decline occurred in Russia (2.8 years). A similar pattern was observed in women: life expectancy increased in the Czech Republic (2.7 years), less so in Poland, Hungary, Estonia and Lithuania, and decreased in Latvia and Russia (-1.3 years) (Figures 1.1.3 and 1.1.4 in the Introduction section). The trends in standardized death rates from all causes for the 0-64 age group between 1989 and 1998 also varied substantially: from a 22% (men) and 23% (women) decrease in the Czech Republic to a 26% (men) and 17% (women) increase in Russia. (For all health data summarized in this section, data for Poland are available only until 1996.) There were also dramatic demographic changes in central and eastern Europe. For example, fertility rate (defined as the average number of children per woman, if all women lived to the end of their childbearing years and bore children according to a given set of age-specific fertility rates) between 1989 and 1997 declined in all seven countries: it varied between -0.4 (Poland) and -1.0 (Estonia). As a consequence, the numbers of people in most of CCEE started to decline in last few years. There was also dramatic increase in the percentage of illegitimate births, decrease in the number of new marriages, and increase in divorce rates (UNICEF, 1998).

(b) study subjects

As described in the Methods section, the project analysed two types of data: seven national samples and five community samples. In total, 14,241 individuals (6,429 men and 7,812 women) from twelve samples participated in the study. Of these, 7,599 subjects (3,350 men and 4,249 women) participated in national cross-sectional studies. The response rate varied between 51% and 66%. The response rates were higher in community cross-sectional surveys: they varied between 72% (Poland-Warsaw) and 76% (Poland-Tarnobrzeg) in postal surveys, and a response rate of 95% was achieved in the household survey in the Hungarian population (Table 5.1.2). Altogether, 6,642 subjects (3079 men and 3563 women) participated in community cross-sectional surveys.

(c) national samples

Table 5.1.3 shows distribution of the population in national samples by self-rated health,

gender, education and marital status. Mean age, deprivation score, general control score, health control score are also displayed. Prevalence of poor SRH varied between 13.4% (Poland) and 24.6% (Hungary). In all samples, there were more women than men. The difference between countries in the proportion of men and women was not very large. In six populations where age in years (or date of birth) was available, mean age varied between 43.0 and 47.9 years. In Poland, only age group data were available (less than 20, 20-29, 30-39, 40-49, 50-59, 60 and more). Based on the frequency of individuals in each age group, mean age of 40.9 years was estimated.

There were large differences in education between countries. There was higher prevalence of subjects who achieved only primary education in Poland and Hungary. One of the possible reasons is that Poland and Hungary were countries with large rural agricultural areas with little opportunities for qualified work. In contrast, there was larger proportion of subjects with university education in Russia and the Baltic countries. We can only speculate whether this is due to random variation or due to a different concept of education in the former Soviet Union.

The proportion of unmarried subjects was similar in all seven countries: it was between 30% and 35%. Deprivation differed substantially between countries. The lowest deprivation was in three Central European countries (mean deprivation score less than two on the 0-10 scale). In the Baltic countries, there was higher deprivation than in Central Europe but much lower than in Russia. The mean deprivation score was 5.32 in Russia (approximately three times higher than in Central Europe). Differences in perceived control were not as large as differences in deprivation, although both scores of perceived control (over own life and own health) were much lower in Russia than in other countries.

Figure 5.1.1 shows age adjusted prevalence of self-rated health among men and women in each national sample. In all countries age adjusted prevalence of poor self-rated health was higher among women than in men. There were large differences in age adjusted prevalence of poor SRH between countries. In men, prevalence of poor SRH varied between 12% (Czech Republic) and almost 20% (Hungary). In women, differences were even larger: the prevalence of poor SRH was between 15% (Czech Republic) and 27% (Russia).

(d) community samples

Table 5.1.4 and figure 5.1.2 show the distribution of the population in community samples

by self-rated health, gender, education and marital status. Mean age, deprivation score, general control score, health control score are also presented. There were much larger differences in the prevalence of poor SRH than in national samples: it varied between 7.6% (Czech Republic) and 19.7 (Lithuania). Our samples were representative samples of given areas but not representative samples of the country. This may be the reason for the difference in prevalence of poor SRH between national and community samples of the same countries. In some cases (Czech Republic, Hungary), the higher prevalence of poor self-rated health in national data can be due to larger number of older people in samples. Although mean age did not substantially differ, there was a difference in age structure of samples (for example, in the Czech Republic, age range in the national sample was 18-79 and in the community sample 27-66). When we compared populations in the same age range, the difference was much smaller: 11.7% (national sample) compared to 7.6% (community sample) in the Czech Republic, and 20.5% (national sample) compared to 17.4% (community sample) in Hungary.

Mean age of subjects in the samples was between 43.1 years (Hungary) and 53.1 years (Poland-Tarnobrzeg). Four MONICA populations were on average older than Hungarian subjects. As in national samples, the proportion of men was lower than the proportion of women in all populations and ranged from 43.3% (Poland-Tarnobrzeg) to 48.3% (Lithuania).

There were large differences in education between populations. The large proportion of university and secondary educated people in Poland-Warsaw might be caused by better opportunities for qualified work in the capital and a tendency of highly qualified people to move to large cities. This may be also one of two possible reasons for the high proportion of university educated subjects in Kaunas, a sample of urban population from one of two large cities in Lithuania. The second possible reason is a generally high proportion of university educated people in Lithuania as was reported in the national sample (21.9%). In contrast, there was a small proportion of university educated people in the Poland-Tarnobrzeg sample with more than half of the study population reporting primary education only. This was a sample of rural population, mostly in an agricultural area with very few opportunities for qualified work and with family traditions for farming.

The proportion of unmarried subjects varied between 17.8% (Poland-Tarnobrzeg) and 32.9% (Hungary). The proportion of unmarried individuals in four MONICA populations

was lower than in Hungarian community sample and all national samples. There were large differences in the deprivation scores between study populations in community samples (a similar pattern to national samples): the lowest deprivation in the Czech Republic, followed by other Central European centres with the highest deprivation in Lithuania. Differences in perceived control over own life and own health were smaller than differences in deprivation. Lithuania had the lowest levels of both control scores.

Table 5.1.1. Characteristics of countries under the study

	Cumulative change in real GDP (1989-97)	Life expectancy (1998)		Change in life expectancy (1989-98)		Change in SDR all causes, 0-64 (1989-98)		Change in fertility rate (1989-97)[1]
		males	*females*	*males*	*females*	*males*	*females*	
Czech Republic	-0.4%	71.2	78.2	3.1	2.7	-22%	-23%	-0.7
Poland	10.4%	68.2*	76.7*	1.4**	1.1**	-9%**	-13%**	-0.6
Hungary	-10.7%	66.2	75.3	0.7	1.3	-1%	-10%	-0.4
Lithuania	-55.5%	66.7	77.0	-0.3	0.6	6%	-3%	-0.6
Latvia	-41.8%	63.5	74.6	-1.9	-0.6	21%	10%	-0.9
Estonia	-19.3%	64.6	75.7	-1.2	0.7	20%	-1%	-1.0
Russia	-36.7%	61.4	73.3	-2.8	-1.3	26%	17%	-0.8

* 1996
** 1989-96

[1] (WHO HFA definition): the average number of children per woman, if all women lived to the end of their childbearing years and bore children according to a given set of age-specific fertility rates

Sources:
Health data: HFA Database (WHO, 2000)
GDP data: UNICEF Report (1998)

Table 5.1.2. Description of study populations in the project

Population	Sample size			Response rate
	Total	Men	Women	
National samples				
Russia	1599	731	868	66%
Estonia	971	454	517	59%
Latvia	952	471	481	57%
Lithuania	1002	399	603	50%
Czech Republic	961	407	554	61%
Poland	1141	490	651	59%
Hungary	973	398	575	58%
Community samples				
Hungary	2004	902	1102	95%
Poland - Warsaw	564	272	292	72%
Poland - Tarnobrzeg	993	430	563	76%
Czech Republic	2121	1011	1110	75%
Lithuania	960	464	496	73%

Table 5.1.3. Descriptive characteristics of national samples

		Czech	Hungary	Poland	Lithuania	Latvia	Estonia	Russia
Self-rated health	very good/ good/average	84.6%	75.4%	86.6%	80.6%	78.3%	83.4%	76.4%
	poor/ very poor	15.4%	24.6%	13.4%	19.4%	21.7%	16.6%	23.6%
Age	**Mean**	47.9	47.6	40.9****	44.8	45.7	43.0	45.0
Sex	**Males**	42.3%	40.9%	42.9%	39.8%	49.5%	46.8%	45.8%
	Females	57.7%	59.1%	57.1%	60.2%	50.5%	53.2%	54.2%
Education	**Primary**	17.5%	34.0%	36.1%	10.1%	13.1%	8.2%	9.7%
	Vocational	41.9%	28.4%	28.1%	22.6%	21.5%	17.2%	28.1%
	Secondary	31.4%	26.2%	29.0%	45.4%	46.8%	58.4%	48.3%
	University	9.2%	11.4%	6.8%	21.9%	18.7%	16.2%	13.9%
Marital status	**Married**	66.8%	68.7%	69.5%	66.5%	63.6%	65.3%	67.5%
	Unmarried	33.2%	31.3%	30.5%	33.5%	36.4%	34.7%	32.5%
Deprivation score *	**Mean**	1.52	1.84	1.97	3.41	3.98	2.95	5.32
Control over life score**	**Mean**	2.80	2.75	2.78	2.59	2.60	2.84	2.25
Control over health score***	**Mean**	3.44	3.41	3.35	2.66	3.04	3.15	2.31

* deprivation score between 0-10
** perceived control over own life score between 0-5
*** perceived control over own health score between 0-5
**** age groups available only

Table 5.1.4. Descriptive characteristics of community samples

		Czech - 6 regions	Poland - Warsaw	Poland - Tarnobrzeg	Hungary - Kalocsa	Lithuania - Kaunas
Self-rated health	**Very good/ good/average**	92.4% (N=1947)	88.3% (N=498)	84.6% (N=840)	83.3% (N=1559)	80.3% (N=770)
	Poor/very poor	7.6% (N=161)	11.7% (N=66)	15.4% (N=153)	16.7% (N=313)	19.7% (N=189)
Age (years)	**Mean**	47.2	51.8	53.1	43.1	50.4
Sex	**Males**	47.7% (N=1011)	48.2% (N=272)	43.3% (N=430)	44.9% (N=844)	48.3% (N=464)
	Females	52.3% (N=1110)	51.8% (N=292)	56.7% (N=563)	55.1% (N=1034)	51.7% (N=496)
Education	**Primary**	16.5% (N=348)	12.8% (N=72)	51.5% (N=508)	36.3% (N=682)	11.4% (N=106)
	Vocational	31.0% (N=655)	12.1% (N=68)	24.9% (N=246)	25.6% (N=480)	28.7% (N=268)
	Secondary	43.1% (N=909)	49.3% (N=278)	18.8% (N=186)	26.7% (N=501)	29.7% (N=277)
	University	9.4% (N=199)	25.9% (N=146)	4.8% (N=47)	11.5% (N=215)	30.2% (N=282)
Marital status	**Married**	81.7% (N=1729)	78.7% (N=443)	82.2% (N=816)	67.1% (N=1260)	79.4% (N=738)
	Unmarried	18.3% (N=387)	21.3% (N=120)	17.8% (N=177)	32.9% (N=618)	20.6% (N=191)
Deprivation score *	**Mean**	2.34	3.20	4.19	2.78	5.50
Control over life score**	**Mean**	2.75	2.76	2.36	3.00	2.33
Control over health score***	**Mean**	3.78	3.66	3.58	3.61	3.10

* deprivation score between 0-10
** perceived control over own life score between 0-5
*** perceived control over own health score between 0-5

Figure 5.1.1 Age-standardised prevalence of poor self-rated health by gender in seven national samples

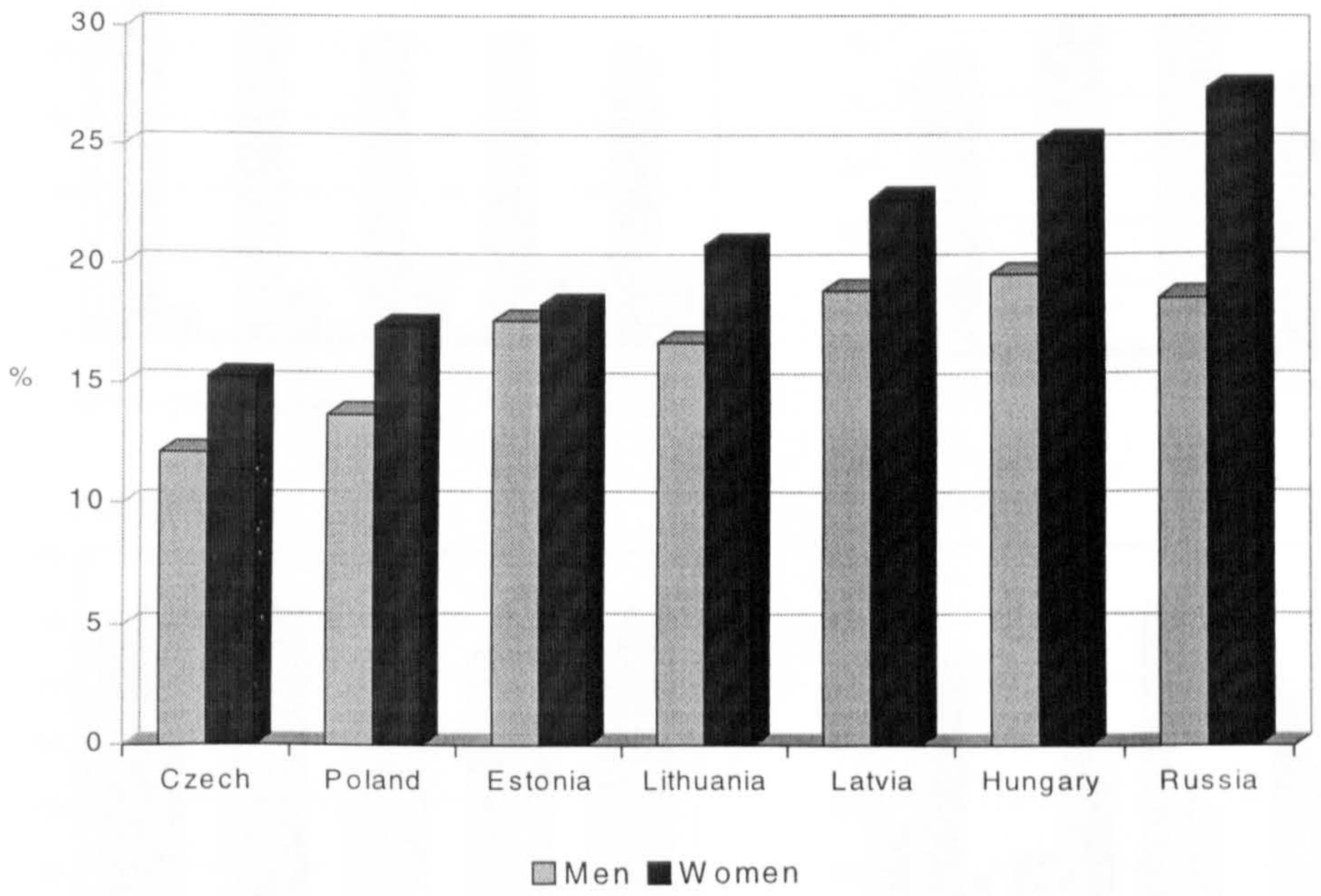
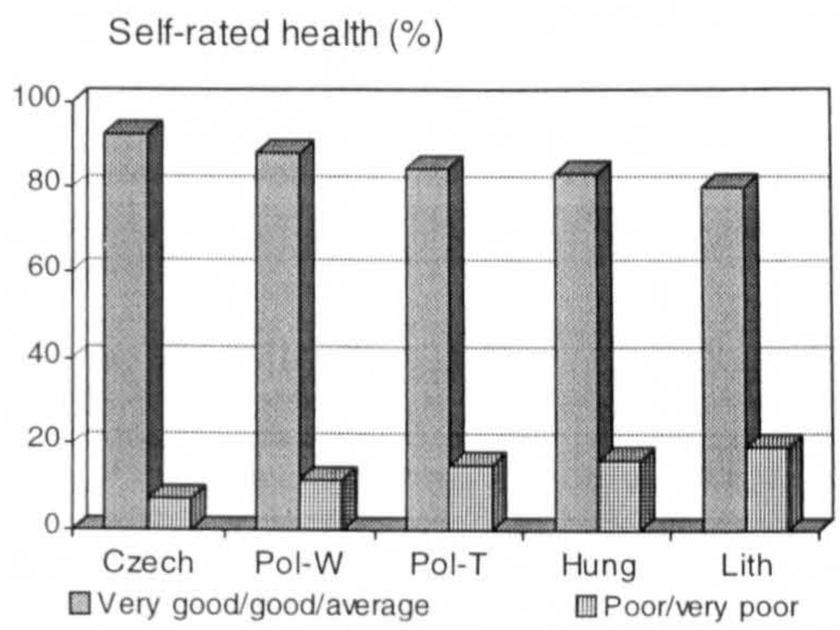
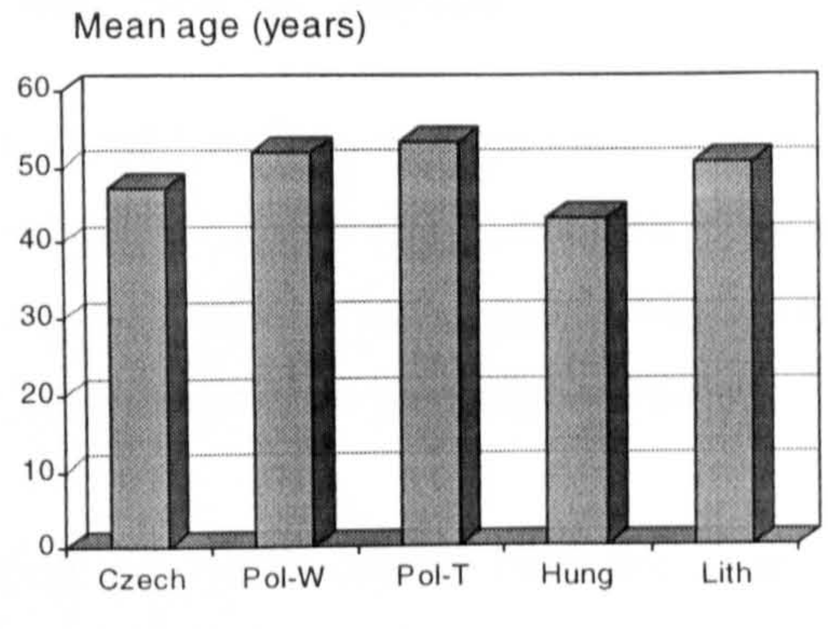
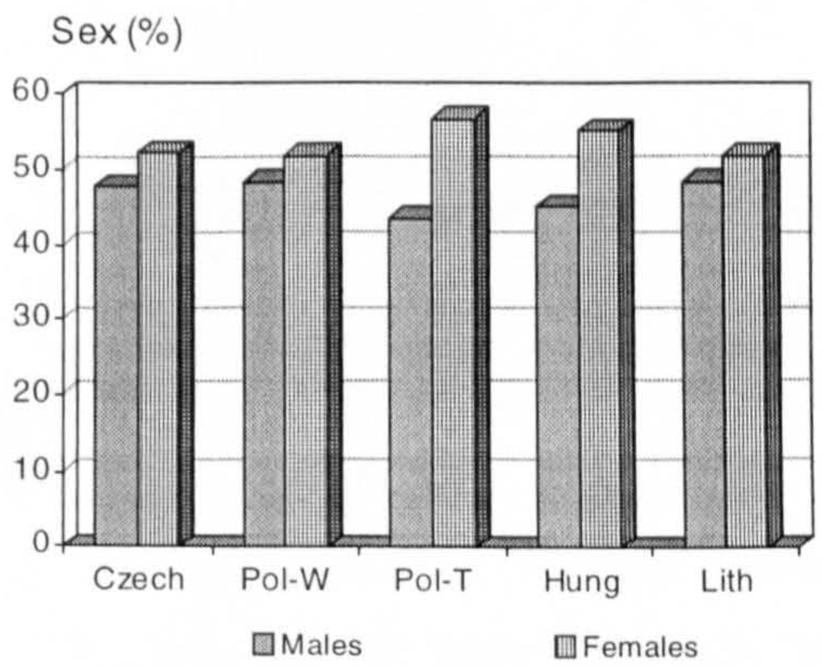
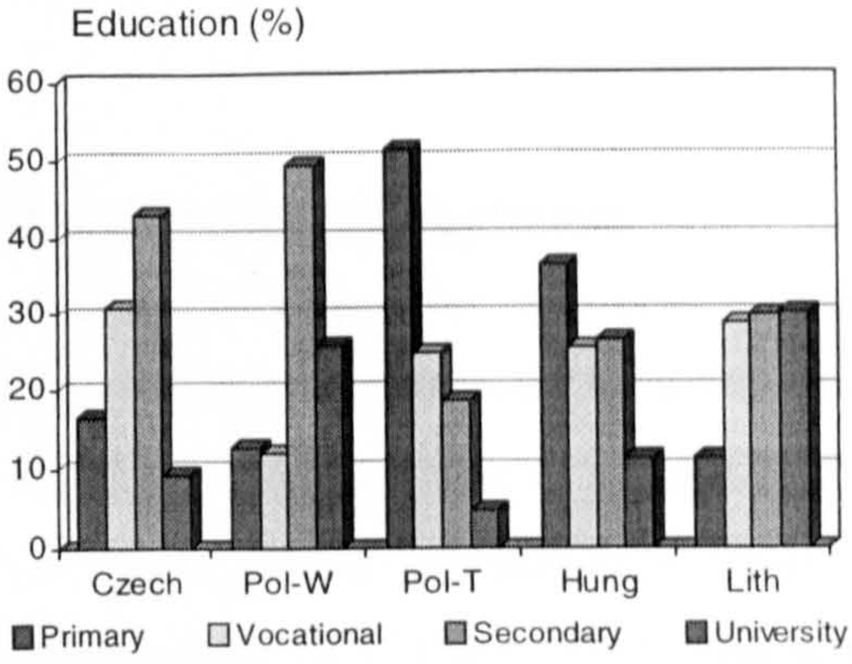


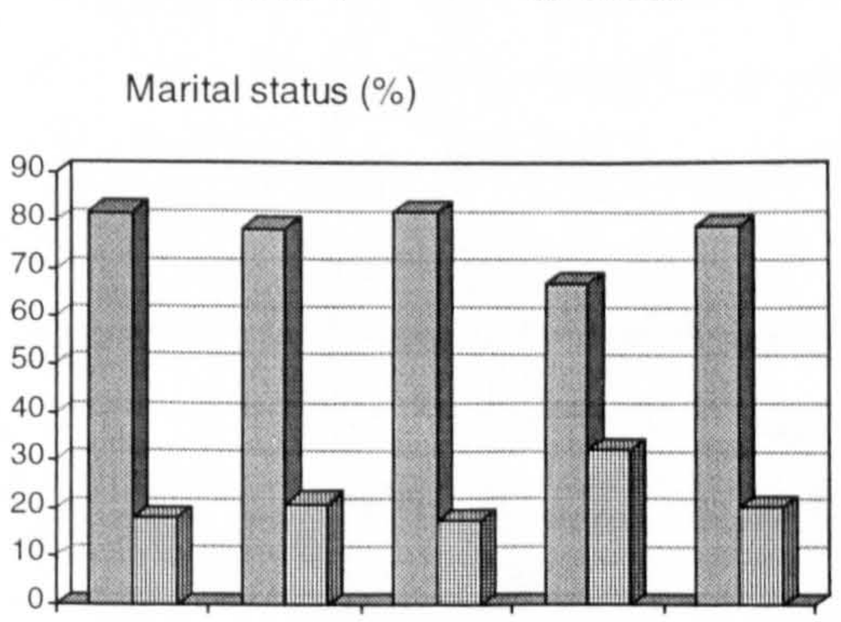
Figure 5.1.2 Descriptive characteristics of community samples

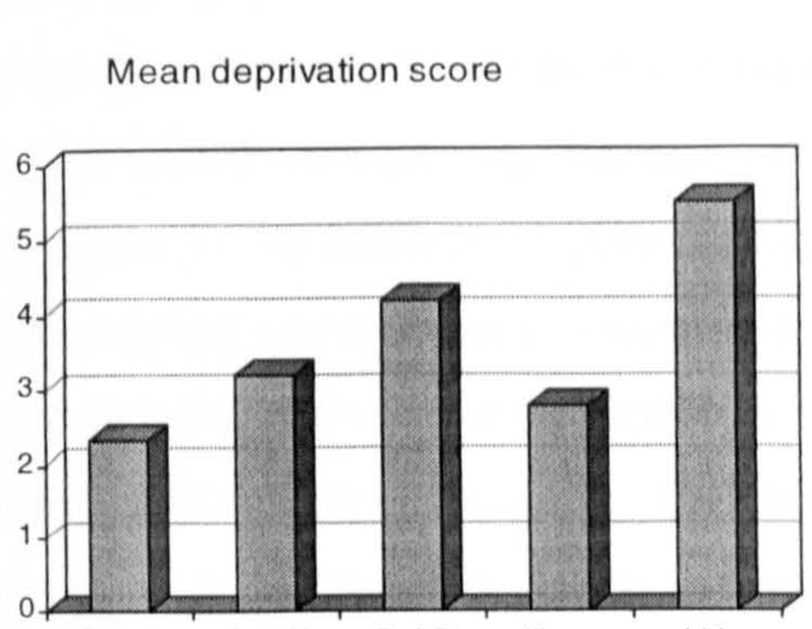


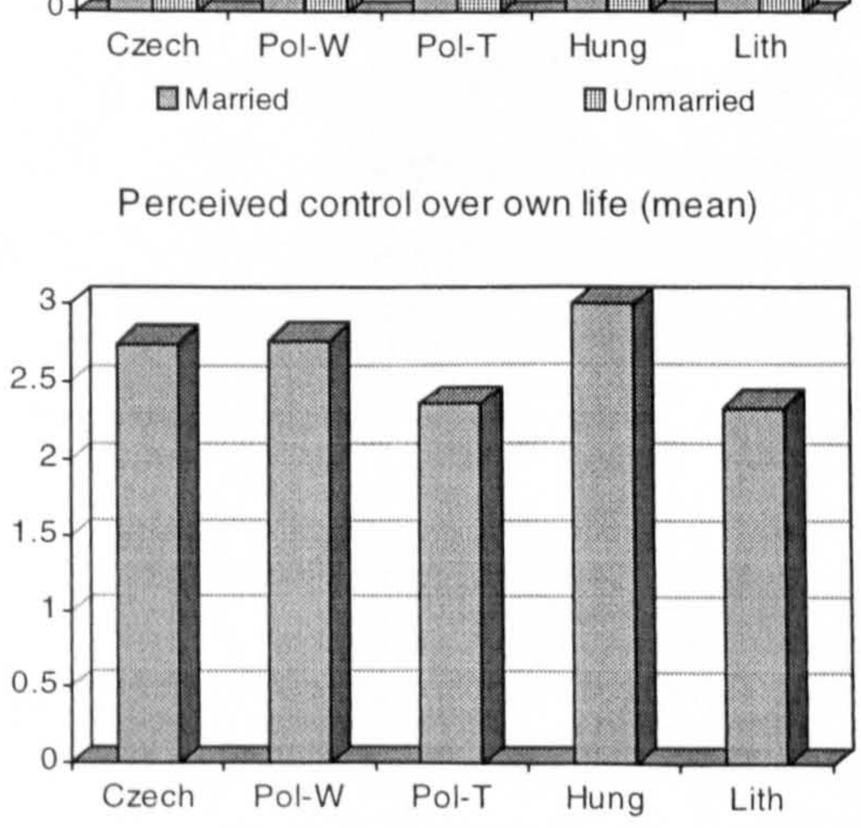


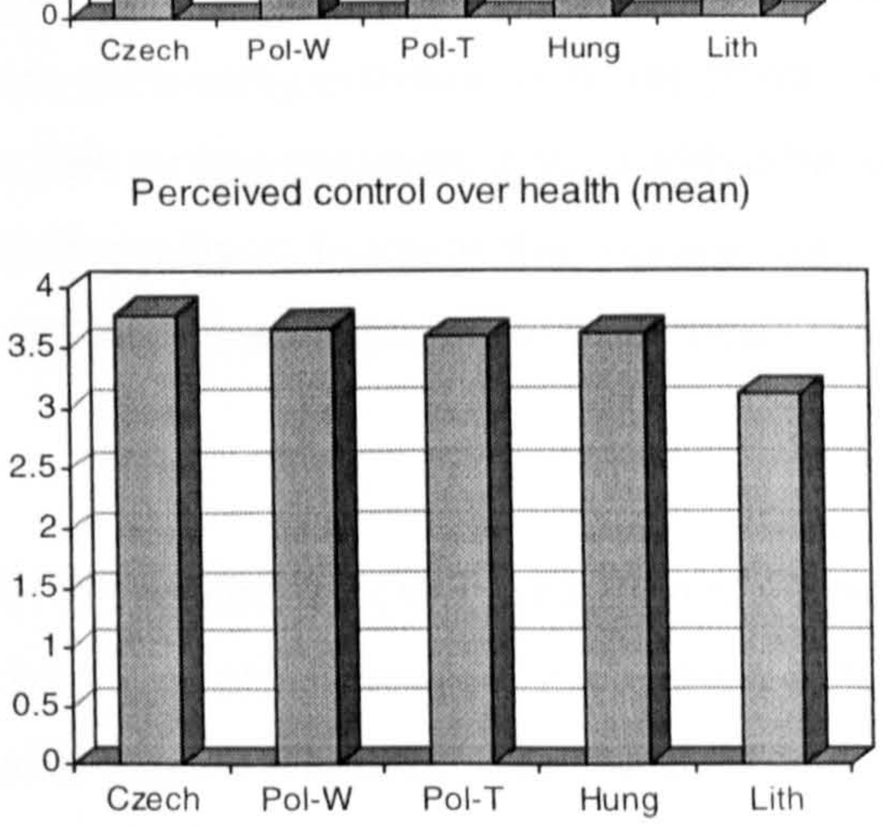












5.2. Socioeconomic characteristics and marital status

This chapter examines the effect of socioeconomic factors on self-rated health. We concentrated on the effects of factors which were measured in all populations: education, deprivation and marital status. Several other variables were also analysed. Marital status is included in this chapter although it has both social and psychosocial elements.

Results of this chapter are presented in two sections. First, results from the analysis of seven national samples are shown. Second, results from the analysis of five community samples are presented.

5.2.1 The role of socioeconomic variables in seven national samples

Tables 5.2.1.1, 5.2.1.2, and 5.2.1.3 show the prevalence of poor or very poor self-rated health by education, deprivation and marital status for men and women for each sample and for the pooled data; the numbers of individuals reporting poor or very poor SRH are given in brackets. Both in men and women, there was a strong gradient in prevalence of poor self-rated health by education. The highest prevalence of poor health was among only primary educated individuals and it was gradually lowering towards the university educated individuals. The highest prevalence of poor health was among Russian women with primary education only (73%). A strong gradient in prevalence of poor self-rated health by education was therefore found in the pooled data in both men and women (table 5.2.1.3, top panel). Prevalence of poor health was almost three times higher among primary educated than among university educated subjects in both sexes. Similarly, a strong gradient in poor SRH was found by deprivation in all samples and in the pooled data. Increasing deprivation was associated with increasing prevalence of reported poor health. In the pooled data, the magnitude of the differences between groups with different level of deprivation was similar to the educational gradient; those in the highest quartile of deprivation reported poor SRH approximately three times more often than those in the lowest quartile.

In marital status, the situation was not so clear. In women, with the exception of Poland, there was higher prevalence of poor SRH among unmarried women; it reached 40% in Russia. Among men, situation was the opposite. Czech Republic was the only country with higher prevalence of poor SRH among unmarried men. In the pooled data, prevalence of poor SRH was higher among married men and unmarried women. When

adjusted for age (table 5.2.1.4), the situation changed substantially: Lithuania and Poland remained the only countries with lower prevalence of poor SRH among unmarried men. The difference between married and unmarried men was substantially reduced even in these two countries. In the pooled data, there was no difference between men and women. In both genders, age adjusted prevalence of poor health was significantly higher among unmarried subjects (22.1% compared to 16.1% in men, and 23.1% compared to 19.6% in women). There was no statistical interaction between gender and marital status when adjusted for age.

Correlation coefficients between education, deprivation and marital status were relatively low, between -0.24 and 0.23 in all national samples and in the pooled data (Table 5.2.1.5). This means that these three variables were relatively independent and unrelated to each other.

Although the samples were relatively similar in terms of age and sex, it is appropriate to remove the effects of these variables. Sex-age adjusted odds ratios and 95% confidence intervals of poor self-rated health by education, deprivation and marital status are presented in table 5.2.1.6. There was a strong association between education and poor self-rated health: higher age-sex adjusted prevalence of poor SRH was among less educated individuals (the test for linear trend was highly significant in the Czech Republic, Hungary, Latvia, Russia and Poland, on the borderline of significance in Estonia, and non-significant in Lithuania). Deprivation was also strongly related to poor SRH: odds ratios varied between 1.36 (Poland) and 1.82 (Estonia) per 1 standard deviation increase in deprivation score and were strongly significant in all countries. Marital status was only weakly related to poor self-rated health. In six countries (the exception was Lithuania) the risk of poor SRH was higher among unmarried individuals, but these results were significant only in the Czech Republic and in Russia. The heterogeneity between results in separate countries was of borderline statistical significance. The pooled estimate for the effect of marital status is reported but the heterogeneity means that pooled estimates may not be appropriate.

The results from the analysis adjusted for age, sex, and education, deprivation and marital status mutually adjusted are shown in table 5.2.1.7 and in figures 5.2.1.2-4. The results from this analysis showed similar patterns to the results from age-sex adjusted analysis. Education and deprivation were strongly related to poor self-rated health. An association between marital status and poor SRH was weak. Higher risk of poor SRH among the

unmarried was found in five countries; statistically significant heterogeneity between countries was detected for the effect of marital status. As a consequence, the pooled estimate of the effect of marital status may be invalid.

In Hungary and Poland, data about ownership of household items were available and used in additional analysis. In Hungary, individuals were asked about 21 items; in Poland, people were asked about 7 items (list of items for both countries in Table 5.2.1.8). Table 5.2.1.8 shows OR (95% CI) of poor self-rated health by number of household items grouped to 5 and 3 categories, respectively, in three levels of adjustment. In Hungary, household items ownership was strongly related to poor self-rated health (table 5.2.1.8, first panel). The difference between the worst and the best categories (0-4 and 14-21 household items) was approximately threefold after adjustment for sex, age, marital status, education and deprivation. The association between poor SRH and household items ownership in Poland was weaker than in Hungary and was partly removed after full adjustment (table 5.2.1.8, second panel).

Table 5.2.1.9 shows the results from the fully adjusted analysis in Hungary. The effect of education and deprivation was reduced after adjusting for household items (compare table 5.2.1.7, second column) but it remained statistically significant. The effect of marital status was removed completely. In Poland (not shown in the tables), the effect of deprivation was also reduced after adjusting for household items: OR (95% CI) per 1 SD increase in deprivation score was 1.20 (1.00-1.43) compared to 1.27 (1.03-1.57) before the adjustment (table 5.2.1.7, third column).

In an attempt to recognize the importance of different household items, these were divided into three categories: 'basic needs', 'socially oriented needs', 'luxury' (division of items shown in table 5.2.1.10) and used as three separate variables in an analysis. Table 5.2.1.10 shows the effect of three newly constructed score variables in three levels of adjustment: (1) age and sex, (2) age, sex, education and marital status, (3) age, sex, education, marital status and deprivation. The top three panels present results from the analysis when each of these three variables was included in the analysis separately. The bottom panel shows results from the analysis when three variables were mutually adjusted.

A significant effect of basic needs items was found after adjustment for sex and age. After adjusting for other socioeconomic variables and marital status this effect was removed.

When adjusted for the other two categories of household items, no significant effect of basic needs items was found. After adjusting for other socioeconomic variables and marital status, subjects with more basic needs items had higher prevalence of poor SRH but this association was not significant (table 5.2.1.10, bottom panel, last two columns).

A strong statistically significant effect of socially oriented needs items was found in all levels of adjustment when included in the analysis as a separate household-items score or when mutually adjusted by the other two scores. After full adjustment (table 5.2.1.10, bottom panel, last column), p value for linear trend was 0.03.

A statistically significant effect of luxury items was found in all levels of adjustment. When adjusted for the other two categories of household items, the effect of luxury items was slightly reduced but it remained significant (p value for linear trend was 0.05 in fully adjusted analysis). After adjusting for other socioeconomic variables and marital status, the difference between the worst and the best categories (0-1 and 5-9 luxury items) was approximately threefold (table 5.2.1.10, bottom panel, last column).

The effect of the three categories of household items was examined also in Poland. As described above, there was a limited number of items available in Polish data. Therefore the 'basic needs', 'socially oriented needs', 'luxury' are constructed from only two, two and three items, respectively (description shown in table 5.2.1.11).

Table 5.2.1.11 shows the effect of the three categories using the same levels of adjustment as in the table for Hungary. The effects do not have same strength as in Hungary but they share the same pattern: the effect of basic needs was removed when adjusted for other socioeconomic variables and marital status. When adjusted for the other two categories of household items, the effect of items of basic needs was removed and even reversed. The effect of 'socially oriented needs' items was not significant in any level of adjustment but the direction of the association was same as in Hungary. A statistically significant effect of luxury items was found in all levels of adjustment, and the direction and the magnitude of the effect was similar to Hungary.

Table 5.2.1.1. Crude prevalence of poor or very poor self-rated health by education, deprivation and marital status by populations (numbers of individuals reporting poor or very poor SRH in brackets) - men

		Czech	Hungary	Poland	Lithuania	Latvia	Estonia	Russia
Education	**Primary**	35.9 (14)	33.7 (35)	12.4 (20)	42.9 (15)	38.3 (23)	34.4 (11)	42.9 (27)
	Vocational	12.8 (26)	18.9 (31)	11.5 (21)	13.8 (16)	14.8 (20)	15.2 (14)	24.4 (48)
	Secondary	8.6 (10)	11.0 (9)	8.8 (10)	11.8 (18)	17.4 (31)	13.4 (34)	10.6 (38)
	University	4.1 (2)	14.6 (7)	6.7 (2)	13.9 (11)	11.9 (8)	16.0 (12)	8.7 (9)
Deprivation	**1st quartile***	8.8 (21)	14.4 (29)	8.4 (20)	7.4 (7)	12.0 (11)	12.9 (22)	2.9 (2)
	2nd	12.9 (11)	22.1 (21)	10.0 (13)	11.8 (11)	14.4 (14)	14.3 (15)	9.9 (13)
	3rd	24.5 (13)	30.7 (19)	11.1 (9)	22.8 (33)	12.8 (18)	15.3 (19)	11.2 (28)
	4th	21.4 (6)	33.3 (13)	28.6 (10)	18.4 (9)	35.5 (39)	27.8 (15)	29.4 (79)
Marital status	**Married**	9.4 (26)	22.5 (67)	15.2 (48)	18.3 (53)	19.5 (66)	15.7 (52)	17.6 (98)
	Unmarried	20.2 (26)	15.0 (15)	2.9 (5)	7.6 (7)	15.7 (16)	15.6 (19)	14.6 (24)

* 1st quartile= 0; 2nd quartile= 1-2.5; 3rd quartile= 3-6; 4th quartile= 6.25-10

Table 5.2.1.2. Crude prevalence of poor or very poor self-rated health by education, deprivation and marital status by populations (numbers of individuals reporting poor or very poor SRH in brackets) - women

		Czech	Hungary	Poland	Lithuania	Latvia	Estonia	Russia
Education	**Primary**	30.2 (39)	41.9 (95)	22.1 (55)	37.7 (23)	53.9 (28)	43.8 (21)	73.0 (65)
	Vocational	17.0 (34)	22.3 (25)	12.5 (17)	28.7 (29)	38.6 (22)	24.3 (18)	39.3 (97)
	Secondary	10.2 (19)	16.8 (29)	11.5 (25)	19.1 (54)	18.5 (45)	14.1 (44)	16.8 (67)
	University	10.3 (4)	12.7 (8)	6.4 (3)	14.6 (19)	14.4 (14)	8.6 (7)	18.1 (21)
Deprivation	**1st quartile***	11.4 (33)	19.7 (57)	11.8 (35)	14.4 (13)	5.6 (4)	10.7 (13)	13.5 (7)
	2nd	18.8 (25)	29.7 (35)	13.7 (17)	17.1 (26)	15.7 (13)	7.6 (11)	13.3 (16)
	3rd	32.2 (29)	33.1 (40)	18.8 (29)	19.5 (42)	29.5 (49)	17.8 (24)	23.8 (60)
	4th	21.6 (8)	53.2 (25)	27.5 (19)	37.3 (44)	33.3 (43)	36.8 (42)	39.0 (167)
Marital status	**Married**	12.4 (45)	24.9 (92)	18.5 (88)	19.0 (67)	20.5 (47)	17.2 (52)	21.4 (108)
	Unmarried	26.8 (51)	31.7 (65)	6.9 (12)	26.0 (58)	28.2 (62)	17.8 (38)	40.8 (142)

* 1st quartile= 0; 2nd quartile= 1-2.5; 3rd quartile= 3-6; 4th quartile= 6.25-10

Table 5.2.1.3. Crude prevalence of poor or very poor self-rated health by education, deprivation and marital status in the pooled data

		Men	Women
Education	**Primary**	29.3	38.3
	Vocational	16.1	26.1
	Secondary	11.9	15.7
	University	11.2	13.4
Deprivation	**1st quartile***	10.1	13.5
	2nd	13.3	16.3
	3rd	16.2	24.2
	4th	29.2	37
Marital status	**Married**	16.9	19.2
	Unmarried	12.7	27.5

* 1st quartile=0, 2nd quartile=1-2.5, 3rd quartile=3-6, 4th quartile=6.25-10

Table 5.2.1.4. Age-adjusted prevalence of poor or very poor self-rated health by marital status for men and women in each population

	Czech	Hungary	Poland	Lithuania	Latvia	Estonia	Russia
Men							
married	8.5%	19.2%	13.8%	17.4%	18.9%	16.4%	17.9%
unmarried	21.9%	23.5%	11.1%	13.7%	22.4%	26.3%	23.3%
Women							
married	12.2%	23.7%	17.0%	21.2%	19.7%	19.9%	24.0%
unmarried	15.0%	25.5%	26.1%	19.5%	25.3%	17.1%	30.8%

Table 5.2.1.5. Correlation matrix of selected socioeconomic factors in 7 national samples and in the pooled data

Czech Republic			
	Educ	Depriv	Mar.st.
Educ		-0.15	0.15
Depriv	-0.15		-0.05
Mar.st.	0.15	-0.05	

Poland			
	Educ	Depriv	Mar.st.
Educ		-0.24	0.07
Depriv	-0.24		-0.01
Mar.st.	0.07	-0.01	

Hungary			
	Educ	Depriv	Mar.st.
Educ		-0.18	0.23
Depriv	-0.18		0.05
Mar.st.	0.23	0.05	

Russia			
	Educ	Depriv	Mar.st.
Educ		-0.19	0.07
Depriv	-0.19		-0.09
Mar.st.	0.07	-0.09	

Estonia			
	Educ	Depriv	Mar.st.
Educ		-0.12	0.12
Depriv	-0.12		-0.06
Mar.st.	0.12	-0.06	

Latvia			
	Educ	Depriv	Mar.st.
Educ		-0.22	0.01
Depriv	-0.22		-0.11
Mar.st.	0.01	-0.11	

Lithuania			
	Educ	Depriv	Mar.st.
Educ		-0.09	0.08
Depriv	-0.09		-0.08
Mar.st.	0.08	-0.08	

Pooled data			
	Educ	Depriv	Mar.st.
Educ		-0.05	0.09
Depriv	-0.05		-0.05
Mar.st.	0.09	-0.05	

education (1=primary, 2=vocational, 3=secondary, 4=university)
deprivation (0-10)
marital status (1=married, 0=unmarried)

Table 5.2.1.6. Odds ratios (95% confidence intervals) of poor self-rated health by socioeconomic factors by country (sex-age adjusted)

		Czech	Hungary	Poland	Lithuania	Latvia	Estonia	Russia	Pooled*
Education	**Primary**	1	1	1	1	1	1	1	1
	Vocational	0.61 (0.38-0.97)	0.53 (0.35-0.79)	0.82 (0.49-1.37)	1.10 (0.62-1.97)	0.58 (0.34-1.00)	0.75 (0.40-1.41)	0.55 (0.36-0.84)	0.69 (0.58-0.82)
	Secondary	0.39 (0.23-0.66)	0.36 (0.23-0.56)	0.58 (0.35-0.95)	0.96 (0.56-1.66)	0.45 (0.28-0.75)	0.71 (0.40-1.26)	0.34 (0.22-0.54)	0.48 (0.40-0.58)
	University	0.27 (0.11-0.69)	0.26 (0.14-0.48)	0.31 (0.12-0.82)	0.75 (0.40-1.39)	0.27 (0.14-0.50)	0.50 (0.25-1.02)	0.31 (0.18-0.55)	0.36 (0.28-0.45)
	p for linear trend	*<0.001*	*<0.001*	*0.003*	*0.27*	*<0.001*	*0.07*	*<0.001*	*<0.001*
Marital status	**Married**	1	1	1	1	1	1	1	1
	Unmarried	2.06 (1.37-3.11)	1.18 (0.82-1.71)	1.37 (0.70-2.69)	0.84 (0.56-1.24)	1.22 (0.84-1.77)	1.04 (0.70-1.57)	1.58 (1.17-2.12)	1.28 (1.11-1.47)
Deprivation	**1SD increase**	1.61 (1.29-2.02)	1.65 (1.39-1.96)	1.36 (1.11-1.67)	1.40 (1.15-1.71)	1.52 (1.26-1.82)	1.82 (1.51-2.20)	1.69 (1.46-1.96)	1.58 (1.48-1.69)

* adjusted for population

Table 5.2.1.7. Odds ratios (95% confidence intervals) of poor self-rated health by socioeconomic factors by country (fully adjusted*)

		Czech	Hungary	Poland	Lithuania	Latvia	Estonia	Russia	Pooled**
Education	**Primary**	1	1	1	1	1	1	1	1
	Vocational	0.66 (0.41-1.05)	0.55 (0.37-0.83)	0.83 (0.49-1.40)	1.01 (0.56-1.82)	0.60 (0.35-1.05)	0.88 (0.46-1.69)	0.57 (0.37-0.88)	0.71 (0.59-0.85)
	Secondary	0.44 (0.25-0.76)	0.42 (0.27-0.65)	0.63 (0.38-1.04)	0.87 (0.50-1.52)	0.50 (0.30-0.82)	0.80 (0.44-1.44)	0.35 (0.22-0.56)	0.52 (0.43-0.62)
	University	0.36 (0.14-0.93)	0.33 (0.18-0.62)	0.35 (0.13-0.95)	0.72 (0.39-1.35)	0.33 (0.18-0.63)	0.65 (0.31-1.35)	0.35 (0.20-0.63)	0.43 (0.33-0.55)
	p for linear trend	*0.001*	*<0.001*	*0.01*	*0.24*	*0.001*	*0.23*	*<0.001*	*<0.001*
Marital status	**Married**	1	1	1	1	1	1	1	1
	Unmarried	1.77 (1.15-2.71)	1.15 (0.79-1.67)	1.38 (0.69-2.77)	0.76 (0.51-1.14)	1.12 (0.77-1.65)	0.95 (0.63-1.45)	1.47 (1.08-2.00)	1.17 (1.01-1.36)
Deprivation	**1SD increase**	1.51 (1.20-1.89)	1.51 (1.27-1.81)	1.27 (1.03-1.57)	1.41 (1.15-1.73)	1.42 (1.17-1.71)	1.80 (1.50-2.18)	1.63 (1.40-1.90)	1.52 (1.42-1.63)

* sex, age, education, marital status, deprivation
** adjusted for population

Table 5.2.1.8. Odds ratios (95% confidence intervals) of poor self-rated health by number of household items owned by individuals

	Hungary		
	Sex-age adjusted	**Sex-age-education-marital status adjusted**	**As before+ deprivation adjusted**
0-4	1	1	1
5-7	0.57 (0.38-0.86)	0.62 (0.41-0.95)	0.71 (0.46-1.10)
8-10	0.40 (0.25-0.63)	0.51 (0.31-0.83)	0.63 (0.38-1.05)
11-13	0.27 (0.16-0.46)	0.36 (0.21-0.63)	0.47 (0.26-0.85)
14+	0.17 (0.07-0.37)	0.25 (0.11-0.60)	0.33 (0.14-0.80)
p for trend	<0.001	<0.001	0.003

maximum 21 items (washing machine, fridge, freezer, microwave, phone, colour TV, radio, recorder, record player, motorcycle, car, car radio, cable TV, satellite, video recorder, video camera, CD, PC, dishwasher, dacha, garden)
correlation between deprivation and number of household items r=-0.35

	Poland		
	Sex-age adjusted	**Sex-age-education-marital status adjusted**	**As before+ deprivation adjusted**
0-2	1	1	1
3-4	0.69 (0.44-1.08)	0.78 (0.49-1.23)	0.86 (0.53-1.37)
5-7	0.57 (0.35-0.91)	0.72 (0.43-1.21)	0.78 (0.46-1.34)
p for trend	0.02	0.20	0.44

maximum 7 items (washing machine, colour TV, cable TV, satellite, phone, car, video recorder)
correlation between deprivation and number of household items r=-0.26

Table 5.2.1.9. Odds ratios (95% confidence intervals) of poor self-rated health by number of household items owned by individuals - fully adjusted model (all variables in the table) - Hungary

Sex	Males	1
	Females	1.33 (0.94-1.87)
Age	<20	1
	-30	0.67 (0.16-2.70)
	-40	1.83 (0.47-7.07)
	-50	3.72 (1.00-13.93)
	-60	3.91 (1.05-14.54)
	60+	3.86 (1.08-13.81)
Education	Primary	1
	Vocational	0.63 (0.41-0.96)
	Secondary	0.50 (0.31-0.80)
	University	0.43 (0.23-0.82)
	p for linear trend	*0.001*
Deprivation	1 SD increase	1.31 (1.13-1.53)
Household items	0-4	1
	5-7	0.71 (0.46-1.10)
	8-10	0.63 (0.38-1.05)
	11-13	0.47 (0.26-0.85)
	14+	0.33 (0.14-0.80)
	p value for linear trend	*0.003*
Marital status	Married	1
	Unmarried	1.02 (0.69-1.50)

Household items: maximum 21 items (washing machine, fridge, freezer, microwave, phone, colour TV, radio, recorder, record player, motorcycle, car, car radio, cable TV, satellite, video recorder, video camera, CD, PC, dishwasher, dacha, garden)

Table 5.2.1.10. Odds ratios (95% confidence intervals) of poor self-rated health by different categories of household items owned by individuals in Hungary

	Adjusted 1	Adjusted 2	Adjusted 3
Basic needs (1)			
0-3	1	1	1
4-5	0.63 (0.45-0.87)	0.86 (0.60-1.21)	0.99 (0.69-1.42)
Socially oriented needs (2)			
0-2	1	1	1
3-5	0.41 (0.29-0.57)	0.50 (0.35-0.71)	0.56 (0.39-0.81)
6-7	0.33 (0.17-0.62)	0.45 (0.23-0.88)	0.55 (0.28-1.10)
p for linear trend	*<0.001*	*<0.001*	*0.005*
Luxury (3)			
0-1	1	1	1
2-4	0.51 (0.37-0.71)	0.60 (0.42-0.84)	0.67 (0.47-0.96)
5-11	0.17 (0.05-0.56)	0.26 (0.07-0.88)	0.30 (0.09-1.04)
p for linear trend	*<0.001*	*0.001*	*0.007*
Mutually adjusted			
Basic needs (1)			
0-3	1	1	1
4-5	1.05 (0.72-1.54)	1.27 (0.85-1.89)	1.36 (0.91-2.04)
Socially oriented needs (2)			
0-2	1	1	1
3-5	0.48 (0.32-0.70)	0.53 (0.36-0.78)	0.57 (0.38-0.86)
6-7	0.48 (0.23-1.01)	0.55 (0.26-1.17)	0.64 (0.30-1.36)
p for linear trend	*0.001*	*0.006*	*0.03*
Luxury (3)			
0-1	1	1	1
2-4	0.68 (0.47-0.99)	0.70 (0.48-1.02)	0.74 (0.50-1.09)
5-9	0.26 (0.07-0.94)	0.31 (0.08-1.12)	0.32 (0.09-1.16)
p for linear trend	*0.01*	*0.03*	*0.05*

Adjusted 1: age, sex
Adjusted 2: age, sex, education, marital status
Adjusted 3: age, sex, education, marital status, deprivation

(1) washing machine, fridge, freezer, microwave, phone
(2) colour TV, radio, recorder, record player, motorcycle, car, car radio
(3) cable TV, satellite, video recorder, video camera, CD, PC, dishwasher, dacha, garden

Table 5.2.1.11. Odds ratios (95% confidence intervals) of poor self-rated health by different categories of household items owned by individuals in Poland

	Adjusted 1	Adjusted 2	Adjusted 3
Basic needs (1)			
0	1	1	1
1	0.94 (0.59-1.50)	1.04 (0.65-1.69)	1.14 (0.70-1.86)
2	0.70 (0.44-1.11)	0.90 (0.55-1.49)	1.04 (0.62-1.74)
p for linear trend	*0.12*	*0.68*	*0.91*
Socially oriented needs (2)			
0	1	1	1
1	0.66 (0.33-1.36)	0.72 (0.35-1.51)	0.76 (0.36-1.59)
2	0.51 (0.24-1.10)	0.62 (0.28-1.39)	0.67 (0.30-1.51)
p for linear trend	*0.07*	*0.27*	*0.36*
Luxury (3)			
0	1	1	1
1	0.47 (0.30-0.74)	0.51 (0.32-0.81)	0.54 (0.34-0.86)
2-3	0.51 (0.32-0.83)	0.61 (0.37-1.02)	0.65 (0.38-1.09)
p for linear trend	*0.003*	*0.04*	*0.07*
Mutually adjusted			
Basic needs (1)			
0	1	1	1
1	1.25 (0.75-2.07)	1.31 (0.79-2.19)	1.43 (0.85-2.40)
2	1.13 (0.64-1.99)	1.34 (0.75-2.42)	1.51 (0.82-2.75)
p for linear trend	*0.71*	*0.34*	*0.19*
Socially oriented needs (2)			
0	1	1	1
1	0.83 (0.39-1.75)	0.82 (0.38-1.75)	0.82 (0.38-1.76)
2	0.73 (0.31-1.69)	0.76 (0.32-1.79)	0.77 (0.33-1.80)
p for linear trend	*0.44*	*0.59*	*0.59*
Luxury (3)			
0	1	1	1
1	0.48 (0.29-0.78)	0.48 (0.29-0.79)	0.50 (0.30-0.82)
2-3	0.52 (0.29-0.92)	0.56 (0.31-1.00)	0.56 (0.31-1.02)
p for linear trend	*0.02*	*0.05*	*0.05*

Adjusted 1: age, sex
Adjusted 2: age, sex, education, marital status
Adjusted 3: age, sex, education, marital status, deprivation

(1) washing machine, phone
(2) colour TV, car
(3) cable TV, satellite, video recorder

Figure 5.2.1.1. Crude prevalence of poor or very poor self-rated health by education by sex by populations

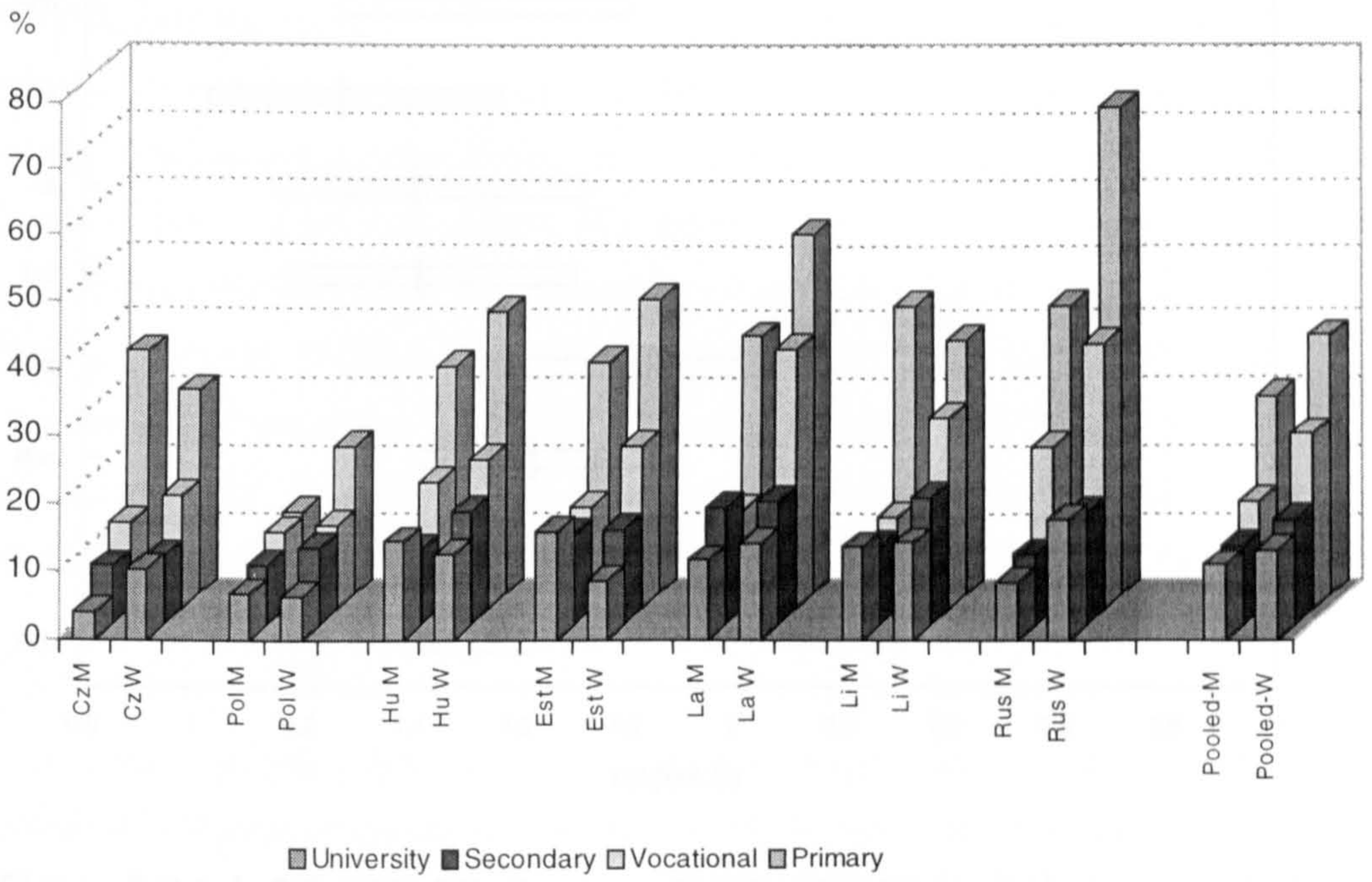


Figure 5.2.1.2. OR (95% CI) of poor self-rated health by education by country

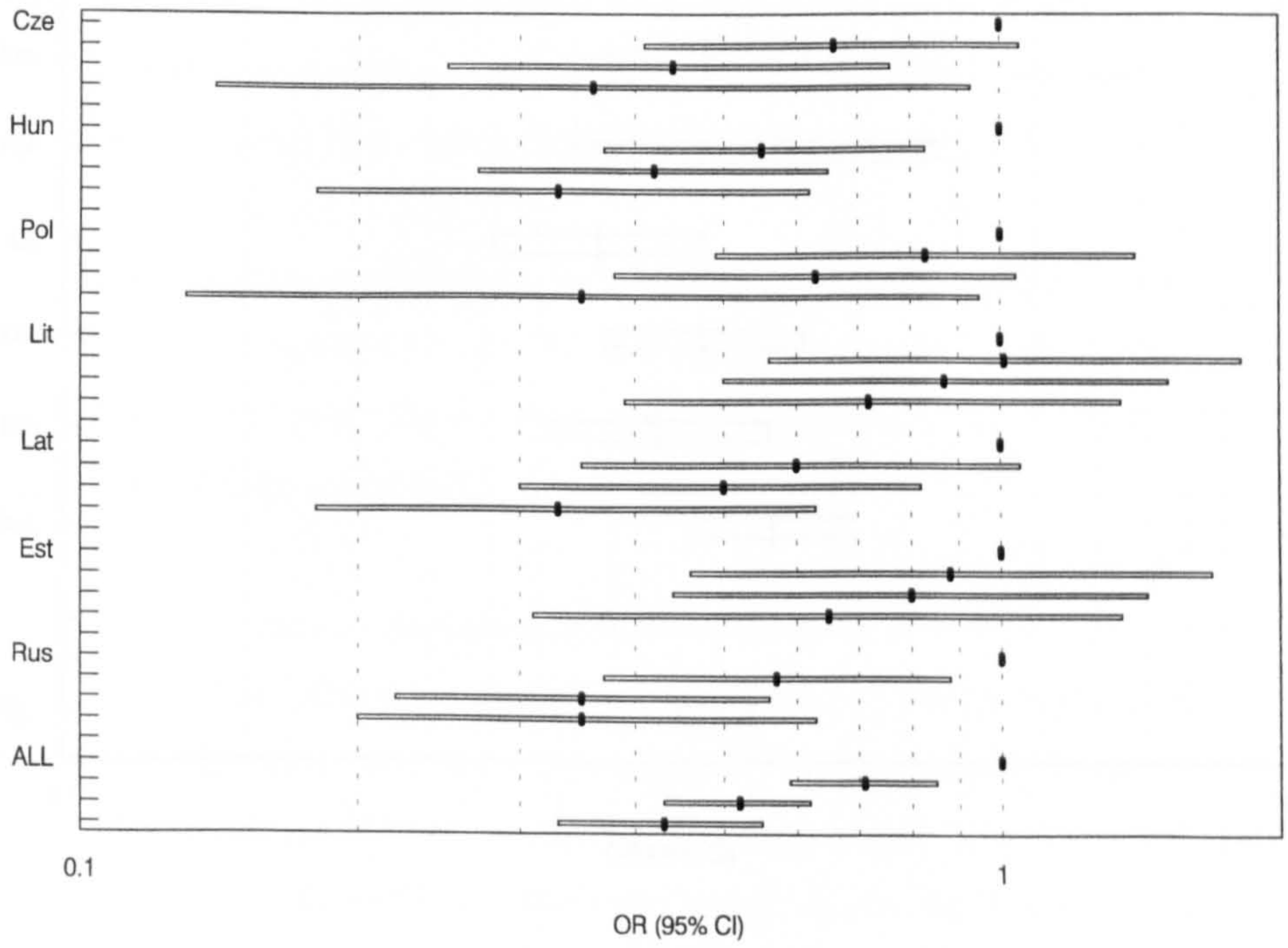


Figure 5.2.1.3. OR (95% CI) of poor self-rated health by deprivation (per 1SD increase) by country

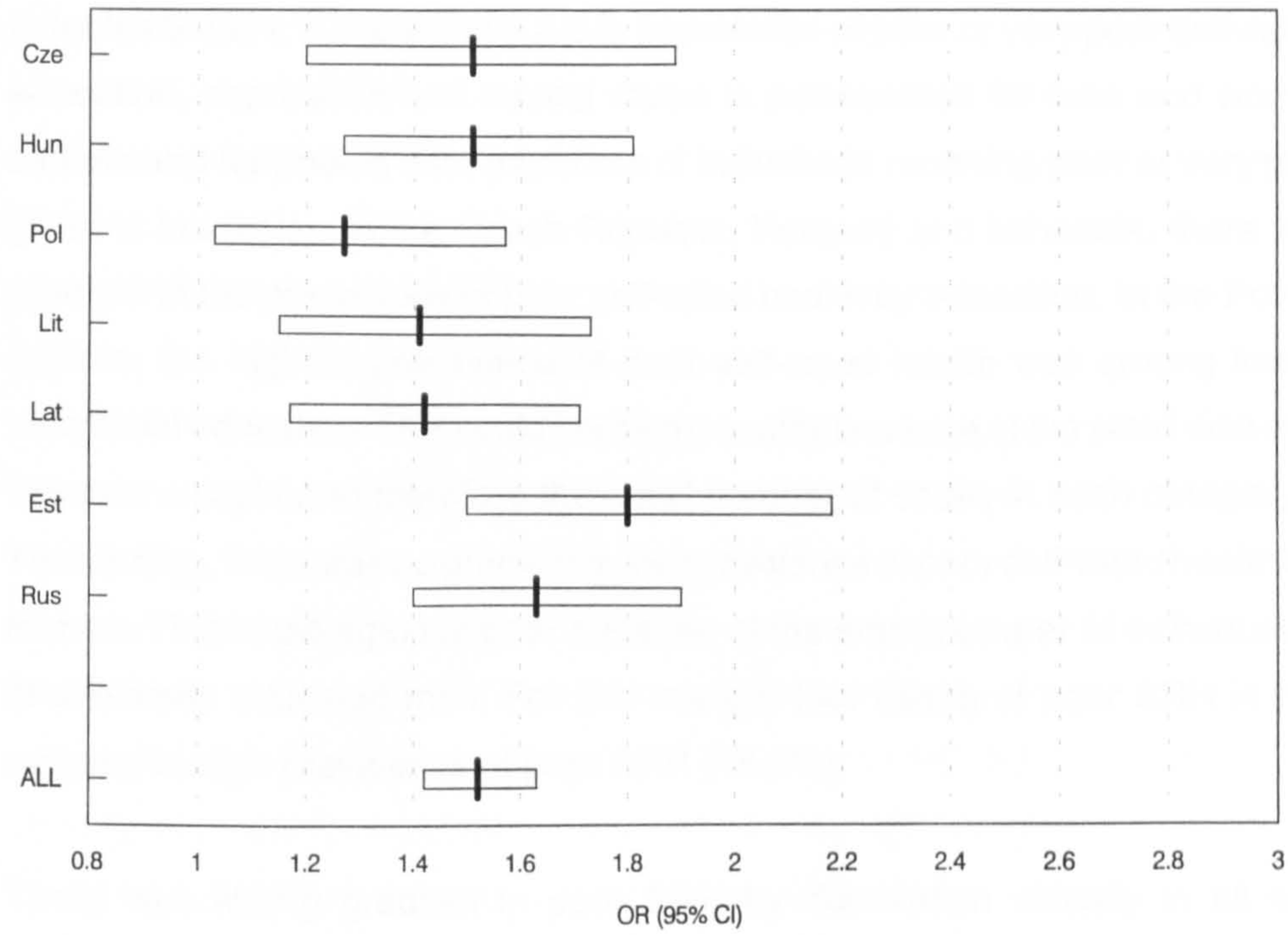
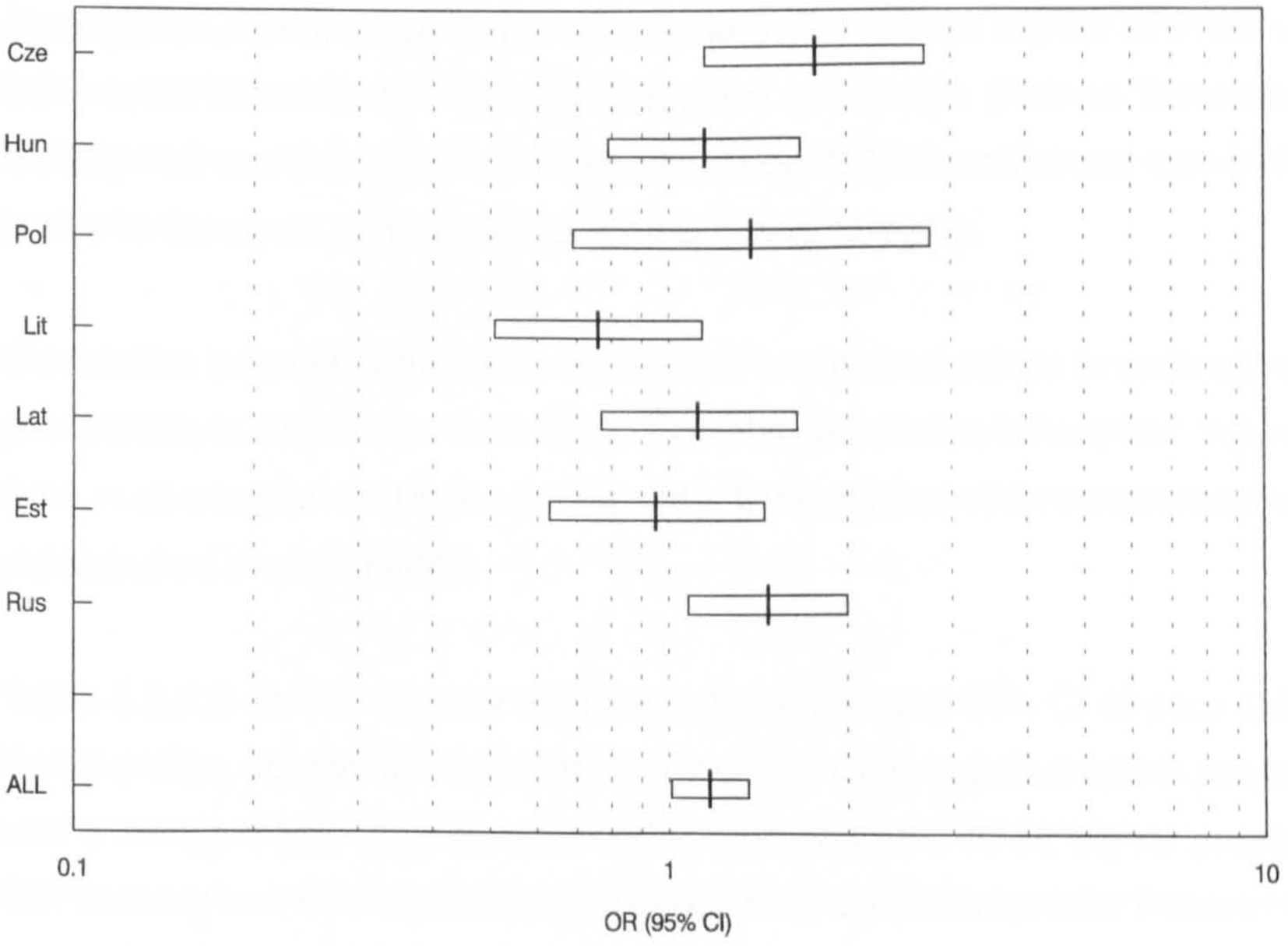


Figure 5.2.1.4. OR (95% CI) of poor self-rated health for being unmarried compared to being married by country



5.2.2 The role of socioeconomic variables in five community samples

In tables 5.2.2.1, 5.2.2.2 and 5.2.2.3, prevalence of poor or very poor self-rated health by education, deprivation and marital status is summarized for men and women for each sample and for pooled data (numbers of individuals reporting poor or very poor SRH are given in brackets). In the Czech Republic, Hungary and Lithuania, there was a strong gradient in the prevalence of poor self-rated health by education. In the Poland-Warsaw sample, the highest prevalence of poor self-rated health was among individuals with vocational education. This could happen possibly because of the small size of the Poland-Warsaw sample and therefore the small number of cases in each category. In Poland-Tarnobrzeg, there was no gradient in the prevalence of poor self-rated health by education in men. This could again appear because of the small number of individuals, especially of university educated men. For this reason, four cases of poor SRH in this category resulted in high prevalence of poor SRH (18.2%).

There was strong gradient in poor SRH by deprivation virtually in all samples with extremely high prevalence of poor SRH in the worst quartile of deprivation score.

Prevalence of poor self-rated health was higher among unmarried women in all samples. Among men, the situation varied substantially. Prevalence of poor SRH among unmarried men varied between 4.7% (Czech Republic) and 30.8% (Poland-Tarnobrzeg). Again, it is likely that such variation in prevalence of poor SRH in unmarried men between centres is due to the small number of individuals in this category.

Correlation between education, deprivation and marital status in each sample and in the pooled data is shown in table 5.2.2.4. Correlations were relatively low, between -0.27 and 0.14, in all samples and in the pooled data. It means that all three variables were relatively independent and unrelated.

Table 5.2.2.5 shows age-sex adjusted odds ratios and 95% CI of poor self-rated health by education, deprivation and marital status in each population and in pooled data. There was a strong relationship between education and poor SRH: higher prevalence of poor SRH among less educated people (a statistically significant test for linear trend in Hungary and Lithuania, not significant but consistent results for remaining centres and a highly significant result when using all five populations). Deprivation was strongly related to poor SRH in all five populations. Odds ratios per 1 SD increase in deprivation score varied

between 1.50 and 2.21. When data from all five populations were used together OR and 95% CI was 1.81 (1.66-1.97) per 1 SD increase in deprivation score. Association between marital status and poor SRH was weaker. When each population was used separately, lower risk of poor SRH among married individuals was found in both Polish populations, in Hungary and in Lithuania. In the Czech Republic, being married was associated with higher risk of poor SRH but 95% CI was very wide. In pooled analysis, being unmarried was significantly associated with higher risk of poor SRH: OR (95% CI) was 1.33 (1.10-1.61).

Results from the analysis adjusted for age, sex, and mutually for education, deprivation and marital status are presented in table 5.2.2.6. The effect of education on poor SRH remained strong in Hungary and Lithuania and non-significant in the Czech Republic. In both Polish centres, the effect of education was removed. In pooled data, the effect of education remained strong ($p<0.001$ for test for linear trend). The difference between primary and university educated people was approximately threefold. The association between material deprivation and poor SRH marginally decreased but remained strong (OR and 95% CI was 1.70 (1.56-1.86) per 1 SD increase in deprivation score in pooled data). No consistent effect of marital status was found (OR and 95% CI was 1.14 (0.93-1.39) for unmarried compared to married individuals in pooled data).

The working population in the Czech Republic, Poland-Warsaw, Poland-Tarnobrzeg and Lithuania was used to look at the effect of occupation on self-rated health. Individuals were classified in three groups: non-manual, manual and 'not-specified'. After adjustment for age and sex, OR (95% CI) was 1.77 (1.26-2.47) for manual class compared to non-manual class, and 1.83 (1.20-2.81) for 'not specified' compared to non-manual class. Results from fully adjusted analysis (age, sex, education, deprivation and occupation in the same model) are shown in table 5.2.2.7. The effect of occupation was slightly reduced but remained significant for both manual and 'not-specified' classes: OR (95% CI) was 1.57 (1.06-2.31) for manual and 1.63 (1.01-2.61) for 'not specified' class compared to non-manual class.

In Hungary, several additional variables were available: household items ownership (based on ownership of washing machine, microwave, freezer, colour TV, video recorder, PC, hifi/CD, bicycle, car, cottage), alcohol consumption (based on type and amount of consumed alcohol), current smoking, self-classification of own financial circumstances (with answers on 5-point scale from very bad to very good). For part of the Hungarian

sample, height and weight were measured and a body-mass index was constructed.

Table 5.2.2.8 summarizes results from the analysis using these additional variables. After adjustment for age and sex, there was a strong association between poor SRH, and education, material deprivation, household item ownership and self-assessment of financial situation. When mutually adjusted, the effect of deprivation was reduced but remained strong: OR (95% CI) was 1.54 (1.31-1.81) per 1 SD increase in deprivation score. Self-assessment of financial situation also remained strongly related to poor SRH, although the magnitude of the effect was reduced. The effect of household items ownership was removed. Table 5.2.2.9 presents results from analysis when material deprivation, household items ownership score and self-assessment of financial situation were entered into regression model separately, but the effect of these variables was controlled for all the other variables: age, sex, education, smoking, alcohol consumption and marital status. Results in the table 5.2.2.9 are virtually the same as those in the first column of table 5.2.2.8, showing that the effect of socioeconomic characteristics was not affected by this level of adjustment. It means that the effect of the socioeconomic characteristics was reduced by their mutual adjustment in the model presented in the second column in table 5.2.2.8. Table 5.2.2.10 shows that there was high correlation between all three socioeconomic variables in this data set. The elimination of the effect of household items is in contrast with the results from the analysis of Hungarian national sample in the previous section. The reason can be in a smaller number of household items in the questionnaire, and, according to the results in the section 5.2.1, a smaller number of luxury items in this score.

Current smoking was associated with poor SRH in age-sex adjusted analysis on the borderline of significance but this effect was almost removed in fully adjusted analysis. The association between alcohol consumption and poor SRH showed a J-shape. Although reduced, this association remained in the fully adjusted model (table 5.2.2.8).

The same analysis as above was conducted in a subsample of 965 Hungarians with valid measurements of body-mass index. In age-sex adjusted analysis there was a strong effect of the body-mass index on poor SRH: OR (95% CI) was 1.07 (1.04-1.11) per 1 kg/m^2 increase in the body-mass index. This effect remained virtually the same in the fully adjusted model (table 5.2.2.11). Including the body-mass index into the model did not reduce the effect of any socioeconomic variable (the strengthening of the effect of the household items ownership score was the result of using a subsample of population from

the previous analysis). For alcohol consumption, odds ratio and 95% confidence interval for the last category (>150 ml of pure alcohol/week) was not estimated because there were only two individuals in that category with valid BMI, and both reported poor SRH.

Table 5.2.2.1. Prevalence (%) of poor self-rated health by education, deprivation and marital status by populations (numbers of individuals reporting poor or very poor SRH in brackets) - men

		Czech	Poland-W	Poland-T	Hungary	Lithuania
Education	Primary	15.7 (13)	12.1 (4)	20.3 (41)	20.7 (58)	44.2 (23)
	Vocational	6.4 (16)	23.1 (3)	13.4 (18)	11.2 (33)	13.9 (18)
	Secondary	9.1 (50)	9.8 (13)	17.1 (12)	11.3 (21)	15.8 (22)
	University	4.1 (5)	5.4 (5)	18.2 (4)	3.2 (3)	10.1 (13)
Deprivation	1Q*	5.3 (19)	3.2 (3)	17.2 (11)	8.0 (18)	11.5 (3)
	2Q	7.5 (23)	7.9 (6)	10.3 (12)	10.5 (34)	11.5 (11)
	3Q	10.7 (20)	6.5 (4)	15.6 (20)	14.4 (33)	10.6 (15)
	4Q	24.1 (20)	29.3 (12)	27.1 (33)	31.6 (36)	26.9 (52)
Marital status	Married	9.1 (78)	6.8 (16)	15.9 (60)	14.5 (84)	17.6 (68)
	Unmarried	4.7 (7)	25.0 (9)	30.8 (16)	11.3 (31)	18.6 (11)

* 1Q= 0 2Q= 1-2.5 3Q= 3-6 4Q= 6.25-10

Table 5.2.2.2. Prevalence (%) of poor self-rated health by education, deprivation and marital status by populations (numbers of individuals reporting poor or very poor SRH in brackets) - women

		Czech	Poland-W	Poland-T	Hungary	Lithuania
Education	Primary	13.4 (35)	12.8 (5)	16.0 (49)	33.8 (137)	40.7 (22)
	Vocational	5.0 (20)	20.0 (11)	14.3 (16)	15.7 (30)	29.0 (40)
	Secondary	5.0 (18)	13.8 (20)	7.8 (9)	9.4 (30)	14.5 (20)
	University	4.1 (3)	9.4 (5)	8.0 (2)	3.3 (4)	14.4 (22)
Deprivation	1Q*	5.0 (15)	10.1 (7)	4.0 (3)	9.9 (26)	11.8 (2)
	2Q	3.1 (11)	13.2 (10)	12.6 (17)	15.0 (54)	14.8 (9)
	3Q	8.5 (23)	9.9 (8)	11.0 (18)	22.2 (74)	18.2 (29)
	4Q	18.7 (20)	24.2 (16)	20.5 (39)	40.6 (54)	26.1 (65)
Marital status	Married	6.7 (58)	10.1 (21)	13.0 (57)	19.0 (130)	20.5 (72)
	Unmarried	7.6 (18)	22.6 (19)	16.0 (20)	20.2 (71)	25.0 (33)

* 1Q= 0 2Q= 1-2.5 3Q= 3-6 4Q= 6.25-10

Table 5.2.2.3. Prevalence of poor or very poor self-rated health by education, deprivation and marital status in pooled data (%)

		Men	Women
Education	**Primary**	20.6	23.4
	Vocational	10.6	10
	Secondary	10.4	11.1
	University	6.6	7.4
Deprivation	**1st quartile***	8.7	7.8
	2nd	8.1	10.8
	3rd	10.6	12.2
	4th	25.3	25.2
Marital status	**Married**	12	13.1
	Unmarried	12.2	16.3

* 1st quartile=0 2nd quartile=1-2.5 3rd quartile=3-6 4th quartile=6.25-10

Table 5.2.2.4. Correlation matrix of selected socioeconomic factors in five community samples and in the pooled data

Czech Republic			
	Educ	Depriv	Mar.st.
Educ		-0.09	0.06
Depriv	-0.09		-0.10
Mar.st.	0.06	-0.10	

Poland - Warsaw			
	Educ	Depriv	Mar.st.
Educ		-0.27	0.10
Depriv	-0.27		-0.18
Mar.st.	0.10	-0.18	

Poland - Tarnobrzeg			
	Educ	Depriv	Mar.st.
Educ		-0.18	0.00
Depriv	-0.18		-0.02
Mar.st.	0.00	-0.02	

Hungary			
	Educ	Depriv	Mar.st.
Educ		-0.17	0.14
Depriv	-0.17		-0.01
Mar.st.	0.14	-0.01	

Lithuania			
	Educ	Depriv	Mar.st.
Educ		-0.17	0.09
Depriv	-0.17		-0.12
Mar.st.	0.09	-0.12	

Pooled data			
	Educ	Depriv	Mar.st.
Educ		-0.13	0.10
Depriv	-0.13		-0.05
Mar.st.	0.10	-0.05	

education (1=primary, 2=vocational, 3=secondary, 4=university)
deprivation (0-10)
marital status (1=married, 0=unmarried)

Table 5.2.2.5. Odds ratios (95% confidence intervals) of poor self-rated health by socioeconomic factors by population (sex-age adjusted)

		Czech Republic	Poland-Warsaw	Poland-Tarnobrz.	Hungary	Lithuania	Pooled data
Education	**Primary**	1	1	1	1	1	1
	Vocational	0.48 (0.26-0.87)	1.63 (0.62-4.29)	0.88 (0.55-1.39)	0.50 (0.35-0.71)	0.42 (0.23-0.78)	0.58 (0.47-0.73)
	Secondary	0.62 (0.35-1.09)	0.95 (0.40-2.25)	0.68 (0.40-1.14)	0.33 (0.23-0.48)	0.25 (0.13-0.48)	0.47 (0.37-0.58)
	University	0.33 (0.13-0.81)	0.67 (0.25-1.84)	0.75 (0.30-1.85)	0.10 (0.05-0.22)	0.18 (0.09-0.35)	0.25 (0.18-0.35)
	p for trend	*0.08*	*0.23*	*0.15*	*<0.001*	*<0.001*	*<0.001*
Marital status	**Married**	1	1	1	1	1	1
	Unmarried	0.71 (0.40-1.27)	2.78 (1.52-5.00)	1.49 (0.97-2.33)	1.39 (1.02-1.87)	1.11 (0.69-1.75)	1.33 (1.10-1.61)
Deprivation	**per 1SD**	2.21 (1.81-2.71)	1.82 (1.40-2.37)	1.65 (1.37-1.98)	1.92 (1.66-2.21)	1.50 (1.21-1.86)	1.81 (1.66-1.97)

pooled analysis adjusted for population

Table 5.2.2.6. Odds ratios (95% confidence intervals) of poor self-rated health by socioeconomic factors by population (fully adjusted)

		Czech Republic	Poland-Warsaw	Poland-Tarnobrz.	Hungary	Lithuania	Pooled data
Education	**Primary**	1	1	1	1	1	1
	Vocational	0.60 (0.32-1.11)	2.09 (0.74-5.88)	0.97 (0.61-1.55)	0.54 (0.37-0.78)	0.44 (0.24-0.83)	0.66 (0.52-0.82)
	Secondary	0.72 (0.40-1.30)	1.25 (0.50-3.11)	0.81 (0.48-1.38)	0.41 (0.28-0.60)	0.27 (0.14-0.52)	0.56 (0.44-0.70)
	University	0.50 (0.20-1.27)	1.30 (0.44-3.89)	1.05 (0.41-2.66)	0.14 (0.06-0.30)	0.21 (0.11-0.40)	0.35 (0.25-0.49)
	p for trend	*0.31*	*0.98*	*0.62*	*<0.001*	*<0.001*	*<0.001*
Marital status	**Married**	1	1	1	1	1	1
	Unmarried	0.53 (0.29-0.98)	2.13 (1.15-4.00)	1.49 (0.95-2.33)	1.12 (0.81-1.56)	0.93 (0.57-1.52)	1.14 (0.93-1.39)
Deprivation	**per 1SD**	2.20 (1.79-2.71)	1.77 (1.33-2.36)	1.63 (1.35-1.97)	1.74 (1.50-2.02)	1.39 (1.11-1.74)	1.70 (1.56-1.86)

pooled analysis adjusted for population

Table 5.2.2.7. An association between socioeconomic factors and poor SRH in working individuals (N=2876). OR (95% CI) adjusted for all variables in the table and population

Age	20-29	1
	30-34	1.34 (0.28-6.43)
	35-39	1.92 (0.44-8.42)
	40-44	2.61 (0.61-11.13)
	45-49	2.31 (0.54-9.88)
	50-54	3.02 (0.70-12.93)
	55+	2.98 (0.69-12.77)
	p value for linear trend	*0.01*
Sex	Male	1
	Female	1.06 (0.78-1.44)
Education	Primary	1
	Vocational	0.91 (0.56-1.48)
	Secondary	0.67 (0.42-1.08)
	University	0.83 (0.45-1.53)
	p value for linear trend	*0.19*
Deprivation	1 SD increase	1.49 (1.28-1.73)
Occupation	Non-manual	1
	Manual	1.57 (1.06-2.31)
	Not specified	1.63 (1.01-2.61)

Table 5.2.2.8. Odds ratios (95% confidence intervals) of poor self-rated health by potential risk factors in Hungary (sex-age adjusted, fully adjusted) (N=1665)

		age-sex adjusted	*fully adjusted***
Gender	males females	1 1.54 (1.16-2.05)	1 1.13 (0.80-1.61)
Age	1 year increase	1.07 (1.06-1.08)	1.06 (1.05-1.08)
Education	Primary Vocational Secondary University *p for linear trend*	1 0.59 (0.41-0.84) 0.38 (0.26-0.56) 0.09 (0.03-0.21) *<0.001*	1 0.63 (0.42-0.92) 0.51 (0.34-0.77) 0.14 (0.05-0.36) *<0.001*
Household items	0-1 2-3 4-5 6-7 8-10 *p for linear trend*	1 0.75 (0.43-1.31) 0.57 (0.33-0.96) 0.37 (0.21-0.64) 0.17 (0.08-0.36) *<0.001*	1 1.09 (0.59-2.01) 1.15 (0.62-2.13) 1.07 (0.55-2.10) 0.83 (0.35-1.96) *0.83*
Deprivation	1 SD increase	1.87 (1.63-2.14)	1.54 (1.31-1.81)
Marital status	Married Single Divorced Widowed	1 1.17 (0.67-2.04) 1.27 (0.81-1.99) 1.24 (0.73-2.09)	1 1.09 (0.59-2.02) 0.99 (0.59-1.65) 0.86 (0.49-1.51)
Alcohol consumption (pure alcohol)	0 ≤50 ml/week ≤100 ml/week ≤150 ml/week >150 ml/week	1 0.46 (0.32-0.66) 0.70 (0.29-1.65) 1.41 (0.28-7.06) 5.12 (0.32-83.05)	1 0.44 (0.30-0.64) 0.53 (0.22-1.29) 0.70 (0.13-3.84) 2.40 (0.12-47.43)
Current smoking	yes no	1 0.74 (0.54-1.01)	1 0.96 (0.67-1.37)
Financial circumstances	1 unit increase*	0.53 (0.45-0.62)	0.69 (0.57-0.83)

** scale 1-5; 1=very bad, 5=very good*
*** adjusted for all variables in the table*

Table 5.2.2.9. OR (95% CI) of poor SRH by socioeconomic variables (deprivation, household items, financial circumstances) separately in adjusted model (all other variables from table 5.2.2.8 in model)

Hungary		OR (95% CI)
Material deprivation	1 SD increase	1.90 (1.65-2.20)
Household items	0-1	1
	2-3	0.80 (0.44-1.43)
	4-5	0.61 (0.34-1.08)
	6-7	0.39 (0.21-0.71)
	8-10	0.19 (0.09-0.41)
	p for linear trend	*<0.001*
Financial circumstances	1 unit increase	0.53 (0.45-0.63)

Table 5.2.2.10. Correlation matrix of variables used in the analysis (Hungary, 1665 individuals)

	Poor H	Gender	Age	Educatio	Items	Deprivat	Married	Alcohol	Smoking	Finance
Poor health*										
Gender**	0.08									
Age	0.29	0.03								
Education	-0.24	0.02	-0.15							
Household items***	-0.24	-0.06	-0.26	**0.38**						
Deprivation	0.22	0.05	0.01	**-0.18**	**-0.38**					
Married****	0.02	-0.01	0.29	0.12	0.14	-0.02				
Alcohol consumption*****	-0.01	-0.32	0.08	-0.05	-0.09	0.08	0.05			
Current smoking******	0.03	0.12	0.14	0.04	0.10	-0.18	0.02	-0.18		
Financial circumstances	-0.25	-0.02	-0.25	**0.20**	**0.36**	**-0.43**	-0.06	-0.06	0.10	

* 1=yes, 0=no
** 1=males, 2=females
*** number of items owned by household (microwave, video recorder, washing machine, freezer, PC, hifi/CD played, colour TV, bicycle, car, summer cottage)
**** 1=yes, 0=no
***** alcohol consumption (in ml/week of pure alcohol)
****** 1=yes, 2=no

Table 5.2.2.11. OR and 95% CI of poor self-rated health for socioeconomic variables and classical risk factors in subsample of Hungarians with known BMI

		*fully adjusted***
Gender	males	1
	females	1.22 (0.76-1.95)
Age	1 year increase	1.05 (1.03-1.07)
Education	Primary	1
	Vocational	0.51 (0.31-0.85)
	Secondary	0.42 (0.24-0.75)
	University	0.17 (0.06-0.49)
	p for linear trend	*<0.001*
Household items	0-1	1
	2-3	0.94 (0.39-2.24)
	4-5	0.86 (0.36-2.03)
	6-7	0.70 (0.28-1.78)
	8-10	0.70 (0.22-2.23)
	p for linear trend	*0.29*
Deprivation	1 SD increase	1.70 (1.38-2.09)
Marital status	Married	1
	Single	1.08 (0.45-2.59)
	Divorced	1.19 (0.63-2.28)
	Widowed	0.93 (0.46-1.90)
Alcohol consumption	0	1
	≤50 ml/week	0.50 (0.30-0.83)
	≤100 ml/week	0.79 (0.24-2.61)
	≤150 ml/week	0.85 (0.13-5.50)
Current smoking	yes	1
	no	0.97 (0.59-1.59)
Financial circumstances	1 unit increase*	0.66 (0.53-0.84)
Body-mass index	1kg/m^2 increase	1.07 (1.03-1.11)

* scale 1-5; 1=very bad, 5=very good
** adjusted for all variables in the table

5.3. Perceived control and other psychosocial factors not related to work

The effect of perceived control on self-rated health was examined and results are presented in this chapter. The chapter is divided into two sections. First, the role of perceived control in seven national samples is investigated. Second, the role of perceived control is explored in five community samples. Perceived control over own life and health was available in all data. Several other psychosocial factors not related to work were available only in some samples and results of analyses using those variables are presented at the end of each section.

5.3.1 The role of perceived control and other psychosocial factors not related to work in seven national samples

Three control scores were constructed for each individual: perceived control, control over own life and control over own health (construction of all three scores was described in the Methods section). Cronbach's alpha index of internal consistency (Bland and Altman, 1997) for perceived control score constructed from nine questions was 0.65. As Cronbach's alpha about 0.7 is regarded as sufficient, perceived control was used in the following analysis. Age adjusted means of all three scores for men and women in all seven countries are shown in table 5.3.1.1. There was large variation between countries with the highest level of perceived control in the Czech sample (with exception of control over own life in men when mean value was marginally higher in Estonia) and the lowest level of perceived control in the Russian population.

There was a strong gradient in prevalence of poor SRH by levels of control. Age standardized prevalence of poor self-rated health by three categories of perceived control score in men and women in each country and in pooled data is shown in table 5.3.1.2 and figure 5.3.1.1.

There was relatively high correlation between all three control scores and material deprivation. Correlation between perceived control and education and marital status was low (table 5.3.1.3 shows correlation between socioeconomic factors and marital status, and perceived control in pooled data).

Odds ratios with 95% confidence intervals of poor self-rated health by three control scores in two levels of analysis are shown in figure 5.3.1.2. For each country two estimates are displayed: the top one is OR and 95% CI from analysis adjusted for age and sex, the bottom one is from analysis additionally adjusted for education, deprivation and marital status. Control over own life and over own health were included simultaneously into both models; perceived control based on all nine questions was included in the analysis separately. All three graphs show that the effect of control was partly reduced by adjusting for other variables but remained strong and statistically significant in all seven countries. Estimates in pooled data are very precise and highly statistically significant ($p<0.001$ for all three scores). Odds ratios and 95% confidence intervals of poor self-rated health by perceived control, education, deprivation and marital status in fully adjusted analysis are presented in table 5.3.1.4. Two models of control were fitted. First, a model using control over own health and control over own life, and second, a model using a perceived control score constructed from all nine questions. Estimated OR and 95% CI for education, marital status and deprivation were virtually the same in both models and only results from the analysis using the perceived control score constructed from nine questions are shown here. The effects of all these three variables were reduced by adjusting for perceived control (compare table 5.2.1.6). In pooled data, the effect of marital status was not significant. There was not statistically significant heterogeneity between countries in this level of adjustment. The effect of material deprivation was reduced substantially but remained highly significant: OR and 95% CI was 1.35 (1.26-1.46) per 1 SD increase in deprivation score in pooled data. The effect of education was also reduced but remained highly significant in pooled data (p value for linear trend <0.001).

Table 5.3.1.5 shows the effects of the household items ownership (defined in section 5.2.1) on SRH in Hungary and Poland when additionally adjusted for perceived control. After the adjustment, the association remained virtually unchanged (compared with tables 5.2.1.10 and 5.2.1.11). This indicates that the effects of luxury and socially oriented items on SRH are independent from perceived control.

The following three tables display results from analysis using additional psychosocial variables, which were available only in some populations: reaction to economic changes, types of social relations, trust in institutions, and personal freedom. Analysis was conducted separately in the Russian sample, three Baltic samples, and three Central European samples (Hungary, Poland, the Czech Republic).

In Russia, data on personal freedom were not available (table 5.3.1.6). The results are shown in three levels of adjustment: (i) for age and sex; (ii) for age, sex and socioeconomic variables; (iii) for all variables in the table. Both socioeconomic indicators, education and deprivation, were strongly associated with poor SRH. The effect of both variables was little changed by adjustment for other variables. Perceived control was strongly related to poor SRH in all levels of adjustment. OR and 95% CI for 1 SD increase of perceived control score in fully adjusted analysis was 0.72 (0.61-0.84). When adjusted only for age and sex, there was strong association between reaction to economic changes and poor health: those who rated the current economic system negatively reported significantly worse health than those who rated the current economic system positively. This association was substantially reduced after adjustment for other factors.

There was a significant association between types of social relations and poor SRH. Those who relied only on formal institutions reported significantly worse health than the other three groups and this association was not removed in any level of adjustment: there was approximately a two-fold difference between those who could rely on themselves or informal institutions and those could rely on formal institutions only. Married people reported better health than unmarried but this association was reduced after adjusting for socioeconomic factors and psychosocial factors. Current smoking was non-significantly associated with poorer health and the association between alcohol consumption and poor SRH was U-shaped. Those reporting low frequency of consumption of alcohol reported better health than non-drinkers. Unfortunately, there were only a few people reporting high frequency of drinking alcohol, and the scale used for alcohol consumption frequency was not detailed enough to obtain a precise estimate of the shape of this curve.

In the Baltic states, data about personal freedom was not available nor was data about smoking and alcohol consumption. Additionally, data about employment in the previous year were available. Trust in institutions data were missing for approximately 800 individuals. Therefore four sets of results are presented in table 5.3.1.7: OR and 95% CI adjusted for age and sex; age, sex, education and deprivation; all variables in the table except trust in institutions; and finally all variables in the table. Both socioeconomic indicators, education and deprivation were strongly associated with poor SRH. The effect of deprivation was marginally reduced by adjustment for other variables but remained strong: OR per 1 SD increase in deprivation score was 1.32 in analysis not using trust in institutions score and 1.36 when trust in institutions was used. The effect of education was substantially reduced when adjusted for other variables. Those outside the labour force

reported worse SRH, and this association remained significant in all levels of analysis although the magnitude of the effect was reduced. When adjusted for age and sex current unemployment was related to poor health but this association was removed by further adjustment. Perceived control was strongly related to poor SRH in all levels of adjustment. OR and 95% CI for 1 SD increase of perceived control score in fully adjusted analysis was 0.57 (0.48-0.67). When adjusted only for age and sex, those individuals who rated positively the socialist economic system and negatively the current economic system reported their health as worse than others. This association was removed when adjusted for other variables.

The association between types of social relations and poor SRH was not very strong, although those who relied on self or informal institutions only reported better health than the others. There was strong association between trust in institutions and self-rated health: there was more than a two-fold difference between those in the highest and the lowest quartile of the trust scale.

In the Czech Republic, Hungary and Poland (table 5.3.1.8), types of social relations variable was not available. In addition to variables previously mentioned, data about the religion of individuals was available. Education and deprivation were strongly associated with poor SRH. The effect of deprivation was partly reduced by adjustment for other variables but remained borderline significant when fully adjusted. The effect of education was reduced when adjusted for other variables but remained strong (the test for linear trend was statistically significant in all levels of adjustment). Those outside the labour force reported much worse SRH and this association remained highly significant in all levels of analysis. When adjusted for age and sex, current unemployment and unemployment in the previous 12 months was related to poor health. This effect was reduced by further adjustment but remained significant for currently unemployed individuals. No association between religion and self-rated health was found.

Perceived control was strongly related to poor SRH in all levels of adjustment. OR and 95% CI for 1 SD increase of perceived control score in fully adjusted analysis was 0.58 (0.51-0.65). When adjusted only for age and sex, those individuals who rated positively the socialist economic system and negatively the current economic system reported their health significantly worse than 'pro-market' individuals (those who rated positively the current economic system and negatively the socialist economic system). This association was reduced when adjusted for other variables and was non-significant. There was a

strong association between trust in institutions and self-rated health: when adjusted for socioeconomic factors, the p value was 0.001 when the trust in institutions score was entered into the model as a continuous variable. When adjusted for other psychosocial variable, the effect of the trust in institutions index was reduced and was not significant. The personal freedom index showed a similar pattern. When adjusted for age and sex, there was almost a two-fold difference between those in the highest and those in the lowest quartile of the personal freedom index. This effect was reduced when adjusted for socioeconomic factors (p=0.003 when a personal freedom index was used as a continuous variable) and removed when adjusted for other psychosocial factors.

In an attempt to find variables responsible for the reduction of the effect of a personal freedom index and a trust in institutions index, two additional analyses were conducted. First, the effect of the personal freedom index was adjusted for age, sex, socioeconomic variables and perceived control. In this model, the effect of the personal freedom index completely disappeared. Second, the effect of the trust in institutions index was adjusted for the same set of variables. Again, the effect of trust in institutions was almost removed: odds ratios for quartiles of the trust in institutions index were 1.00 (baseline, the lowest quartile), 1.00, 0.88, and 0.84 (the highest quartile), with p value 0.13 when the trust index was entered as a continuous variable. There was some evidence that perceived control removed the effect of these two variables.

There was higher prevalence of poor SRH in Hungarian population. There was not any significant difference between the Czech Republic and Poland. The difference between Hungary and other two countries was not fully explained even in fully adjusted model (OR and 95% CI was 1.47 (1.10-1.96) for Hungary compared to the Czech Republic). It may suggest that some important predictors of self-rated health were not available in this data.

Table 5.3.1.1. Means of control scores by sex and country (age adjusted)

a. Men

	Control over life*	Control over health**	Perceived control***
Czech	2.85	3.51	3.07
Poland	2.8	3.46	3.02
Hungary	2.75	3.36	2.95
Lithuania	2.61	2.76	2.66
Latvia	2.61	3.07	2.76
Estonia	2.87	3.19	2.98
Russia	2.3	2.38	2.33

b. Women

	Control over life*	Control over health**	Perceived control***
Czech	2.76	3.39	2.97
Poland	2.72	3.36	2.94
Hungary	2.72	3.22	2.89
Lithuania	2.54	2.54	2.54
Latvia	2.59	2.98	2.72
Estonia	2.75	3.03	2.84
Russia	2.17	2.21	2.19

All control scores: 0-5 scale

* based on six questions (39a,39f,39g,39h,39i,39n)
** based on three question (39c,39d,39e)
*** based on nine questions: * and **

Table 5.3.1.2. Age-standardized prevalence of poor self-rated health by country, gender and control score (%)

Control score	CZECH		POLAND		HUNGARY		ESTONIA		LATVIA		LITHUANIA		RUSSIA		POOLED	
	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W
0-2	27.9	40.1	17.1	36.8	33.2	47.3	47	37.6	45.9	40.4	33.2	33.7	26.5	32.9	30.2	35.6
2.1-3	15	17.3	19.8	18.9	23.2	28.7	20	22.1	17	23.5	11.8	19.6	15.8	23.7	17.1	21.4
3.1-5	6.1	6.4	6.8	11.7	11.3	12.2	12.9	7	14.8	13.2	11.1	7.3	11.3	19.8	9.7	9.9
Total	12	15.2	13.9	17.1	19.8	25.1	17.6	18.4	19	22.8	16.7	20.9	18.7	27.4	16.8	21.2

Control score based on 9 questions (39a,c,d,e,f,g,h,i,n)

Table 5.3.1.3. Correlation matrix of socioeconomic factors and perceived control

Control score (9 questions)

	Males	Females	All
Education	0.12	0.14	0.13
Deprivation	-0.41	-0.42	-0.42
Marital status*	-0.04	0.06	0.03

* married/unmarried

Control over health (3 questions)

	Males	Females	All
Education	0.06	0.08	0.07
Deprivation	-0.29	-0.33	-0.32
Marital status*	-0.02	0.04	0.02

* married/unmarried

Control over life (6 questions)

	Males	Females	All
Education	0.13	0.14	0.14
Deprivation	-0.37	-0.37	-0.37
Marital status*	-0.04	0.06	0.03

* married/unmarried

Table 5.3.1.4. Odds ratios (95% confidence intervals) of poor self-rated health by perceived control, socioeconomic factors and marital status by country

		Czech	Hungary	Poland	Lithuania	Latvia	Estonia	Russia	Pooled*
Model 1:									
Education	Primary	1	1	1	1	1	1	1	1
	Vocational	0.75	0.58	0.93	1.16	0.64	0.88	0.56	0.75
		(0.46-1.24)	(0.38-0.89)	(0.54-1.59)	(0.63-2.15)	(0.36-1.12)	(0.45-1.71)	(0.36-0.88)	(0.62-0.91)
	Secondary	0.56	0.50	0.74	1.25	0.54	0.82	0.35	0.58
		(0.32-1.00)	(0.31-0.79)	(0.44-1.26)	(0.69-2.24)	(0.33-0.91)	(0.45-1.51)	(0.22-0.56)	(0.48-0.70)
	University	0.54	0.53	0.44	1.28	0.40	0.72	0.36	0.53
		(0.20-1.44)	(0.28-1.00)	(0.16-1.20)	(0.65-2.50)	(0.21-0.78)	(0.34-1.53)	(0.20-0.64)	(0.41-0.69)
p for linear trend		*0.04*	*0.003*	*0.09*	*0.47*	*0.005*	*0.4*	*<0.001*	*<0.001*
Marital status	Married	1	1	1	1	1	1	1	1
	Unmarried	1.75	1.01	1.27	0.81	1.10	0.97	1.37	1.11
		(1.11-2.78)	(0.68-1.49)	(0.61-2.63)	(0.53-1.22)	(0.75-1.64)	(0.63-1.49)	(1.00-1.85)	(0.96-1.30)
Deprivation	per 1 SD	1.23	1.27	1.19	1.32	1.33	1.42	1.51	1.35
		(0.96-1.57)	(1.05-1.53)	(0.95-1.49)	(1.07-1.62)	(1.10-1.62)	(1.15-1.75)	(1.29-1.77)	(1.26-1.46)
Control over health	per 1 SD	0.68	0.64	0.75	0.66	0.74	0.74	0.81	0.74
		(0.53-0.87)	(0.53-0.77)	(0.60-0.94)	(0.54-0.81)	(0.59-0.92)	(0.59-0.93)	(0.70-0.93)	(0.69-0.79)
Control over life	per 1 SD	0.52	0.69	0.78	0.64	0.76	0.63	0.81	0.71
		(0.41-0.66)	(0.58-0.82)	(0.62-0.99)	(0.52-0.79)	(0.62-0.93)	(0.50-0.79)	(0.69-0.95)	(0.66-0.76)
Model 2:									
Perceived control	per 1 SD	0.42	0.52	0.65	0.49	0.63	0.53	0.70	0.59
		(0.32-0.54)	(0.43-0.63)	(0.51-0.82)	(0.40-0.62)	(0.50-0.79)	(0.41-0.68)	(0.61-0.81)	(0.54-0.63)

Model 1: age, sex, education, marital status, deprivation, control over own health, control over own life

Model 2: age, sex, education, marital status, deprivation, perceived control

* Pooled data: both models adjusted for country

Table 5.3.1.5. Odds ratios (95% confidence intervals) of poor self-rated health by different categories of household items owned by individuals in Hungary and Poland

Hungary	Adjusted 1	Adjusted 2
Basic needs (1)		
0-3	1	1
4-5	1.04 (0.71-1.51)	1.41 (0.93-2.15)
Socially oriented needs (2)		
0-2	1	1
3-5	0.55 (0.37-0.80)	0.54 (0.36-0.83)
6-7	0.63 (0.31-1.28)	0.48 (0.32-1.50)
p for linear trend	*0.01*	*0.03*
Luxury (3)		
0-1	1	1
2-4	0.70 (0.49-1.01)	0.78 (0.52-1.16)
5-11	0.34 (0.10-1.18)	0.34 (0.09-1.27)
p for linear trend	*0.02*	*0.10*

Poland	Adjusted 1	Adjusted 2
Basic needs (1)		
0	1	1
1	1.17 (0.71-1.93)	1.45 (0.85-2.50)
2	0.99 (0.58-1.71)	1.41 (0.75-2.64)
p for linear trend	*0.96*	*0.31*
Socially oriented needs (2)		
0	1	1
1	0.69 (0.32-1.48)	0.74 (0.34-1.63)
2	0.65 (0.28-1.49)	0.74 (0.30-1.80)
p for linear trend	*0.43*	*0.69*
Luxury (3)		
0	1	1
1	0.53 (0.33-0.86)	0.49 (0.29-0.84)
2-3	0.69 (0.40-1.17)	0.61 (0.33-1.12)
p for linear trend	*0.11*	*0.11*

Adjusted 1: age, sex, education, marital status, deprivation and perceived control over own life and health
Adjusted 2: age, sex, education, marital status, deprivation and perceived control over own life and health and all variables in the table

Hungary:
(1) washing machine, fridge, freezer, microwave, phone
(2) colour TV, radio, recorder, record player, motorcycle, car, car radio
(3) cable TV, satellite, video recorder, video camera, CD, PC, dishwasher, dacha, garden

Poland:
(1) washing machine, phone
(2) colour TV, car
(3) cable TV, satellite, video recorder

Table 5.3.1.6. An association between poor SRH and social and psychosocial factors in Russia

		Age-sex	Age-sex-SES	Fully adjusted
Sex	males	1	1	1
	females	1.68 (1.29-2.20)	1.54 (1.17-2.03)	1.24 (0.84-1.83)
Age	per 5 years	1.46 (1.39-1.53)	1.35 (1.28-1.43)	1.31 (1.24-1.39)
Deprivation	per 1 SD	1.61 (1.40-1.87)	1.59 (1.38-1.85)	1.49 (1.26-1.78)
Education	primary	1	1	1
	vocational	0.60 (0.40-0.92)	0.62 (0.40-0.95)	0.62 (0.38-0.99)
	secondary	0.39 (0.25-0.61)	0.40 (0.25-0.64)	0.40 (0.24-0.67)
	university	0.36 (0.21-0.63)	0.42 (0.24-0.73)	0.41 (0.22-0.77)
	p for linear trend	*<0.001*	*<0.001*	*0.001*
Control	per 1 SD	0.65 (0.57-0.75)	0.71 (0.61-0.82)	0.72 (0.61-0.84)
Smoking	no	1	1	1
	yes	1.31 (0.93-1.85)	1.18 (0.82-1.68)	1.31 (0.88-1.96)
Alcohol consumption	never	1	1	1
	<1x month	0.41 (0.29-0.58)	0.44 (0.31-0.62)	0.41 (0.28-0.61)
	1x month	0.45 (0.30-0.68)	0.48 (0.31-0.74)	0.45 (0.28-0.71)
	>1x month	0.29 (0.18-0.46)	0.30 (0.18-0.48)	0.26 (0.16-0.44)
	>1x week	1.24 (0.67-2.28)	1.19 (0.63-2.23)	0.97 (0.50-1.90)
Marital status	married	1	1	1
	unmarried	1.52 (1.14-2.04)	1.41 (1.05-1.89)	1.30 (0.93-1.79)
Reaction to economic change	pro-market	1	1	1
	always positive	1.40 (0.79-2.50)	1.25 (0.69-2.27)	1.16 (0.61-2.19)
	always negative	1.92 (1.08-3.41)	1.67 (0.93-3.01)	1.50 (0.79-2.85)
	nostalgic	1.90 (1.16-3.13)	1.31 (0.78-2.21)	1.17 (0.67-2.06)
Types of social relations	self only	1	1	1
	informal only	1.00 (0.74-1.34)	1.06 (0.78-1.44)	1.11 (0.80-1.54)
	informal+formal	1.04 (0.48-2.26)	1.21 (0.55-2.66)	1.25 (0.52-2.99)
	formal only	2.13 (1.43-3.17)	2.27 (1.51-3.42)	2.13 (1.37-3.29)
Trust in institutions	per 1 SD	0.93 (0.81-1.06)	0.95 (0.83-1.09)	0.99 (0.85-1.15)

SES = education and deprivation
Fully adjusted = all variables from the table in the same model

Table 5.3.1.7: An association between poor SRH and social and psychosocial factors in Baltic states (N=2920)

		Age-sex	Age-sex-SES*	Fully adjusted (1) (N=2583)	Fully adjusted (2) (N=1587)
Sex	males	1	1	1	1
	females	1.24 (1.02-1.52)	1.17 (0.95-1.44)	0.98 (0.77-1.25)	1.07 (0.78-1.46)
Age	less than 29	1	1	1	1
	30-39	2.07 (1.33-3.23)	2.03 (1.30-3.17)	2.25 (1.37-3.70)	1.64 (0.88-3.03)
	40-49	3.94 (2.58-6.01)	3.76 (2.45-5.76)	3.80 (2.34-6.17)	2.80 (1.55-5.04)
	50-59	6.16 (4.06-9.34)	5.32 (3.49-8.12)	4.19 (2.61-6.73)	3.98 (2.23-7.13)
	60+	12.24 (8.29-18.08)	9.08 (6.03-13.66)	6.01 (3.74-9.66)	6.26 (3.47-11.28)
	p for linear trend	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Deprivation	per 1 SD	1.48 (1.34-1.64)	1.45 (1.31-1.61)	1.32 (1.17-1.48)	1.36 (1.16-1.60)
Education	primary	1	1	1	1
	vocational	0.76 (0.55-1.05)	0.77 (0.55-1.08)	0.83 (0.57-1.22)	0.83 (0.49-1.41)
	secondary	0.65 (0.48-0.88)	0.67 (0.49-0.91)	0.90 (0.63-1.28)	0.74 (0.45-1.20)
	university	0.44 (0.31-0.64)	0.51 (0.35-0.74)	0.79 (0.52-1.21)	0.68 (0.38-1.21)
	p for linear trend	*<0.001*	*<0.001*	*0.53*	*0.13*
Perceived control	per 1 SD	0.54 (0.49-0.61)	0.59 (0.53-0.66)	0.56 (0.50-0.64)	0.57 (0.48-0.67)
Marital status	married	1	1	1	1
	unmarried	1.05 (0.84-1.32)	0.95 (0.76-1.19)	0.96 (0.75-1.23)	0.90 (0.65-1.25)
Employment	Empl. all year	1	1	1	1
	Current unempl.	1.67 (1.16-2.41)	1.19 (0.81-1.74)	0.94 (0.61-1.43)	0.67 (0.37-1.21)
	Former unempl.	1.20 (0.79-1.81)	0.96 (0.63-1.46)	0.90 (0.57-1.41)	0.81 (0.46-1.44)
	Outside labour force	2.17 (1.64-2.86)	1.86 (1.39-2.49)	1.86 (1.35-2.56)	1.56 (1.02-2.37)

Reaction to economic change	pro-market	1	1	1	1
	always positive	1.04 (0.69-1.58)	0.97 (0.63-1.47)	0.86 (0.56-1.33)	0.82 (0.47-1.44)
	always negative	1.21 (0.77-1.90)	1.03 (0.65-1.63)	0.88 (0.55-1.42)	0.78 (0.42-1.46)
	nostalgic	1.63 (1.11-2.41)	1.26 (0.85-1.89)	0.97 (0.64-1.48)	1.15 (0.67-1.97)
Types of social relations	self only	1	1	1	1
	informal only	0.90 (0.71-1.12)	0.93 (0.74-1.17)	0.87 (0.67-1.11)	0.99 (0.71-1.38)
	informal+formal	1.57 (0.84-2.97)	1.50 (0.78-2.86)	1.17 (0.56-2.45)	1.29 (0.45-3.66)
	formal only	1.35 (1.00-1.83)	1.21 (0.89-1.65)	1.03 (0.73-1.45)	1.32 (0.85-2.06)
Trust in institutions (N=1738)	1 quartile (high)	1	1		1
	2	1.46 (0.99-2.15)	1.55 (1.04-2.32)		1.77 (1.14-2.73)
	3	1.67 (1.12-2.49)	1.66 (1.10-2.52)		1.69 (1.07-2.67)
	4 (low)	2.61 (1.77-3.87)	2.43 (1.62-3.64)		2.24 (1.41-3.53)
	p for linear trend	*<0.001*	*<0.001*		*0.003*

All analyses are adjusted for population
Results in each analysis based on maximal available number of individuals
SES = education+deprivation
Fully adjusted (1) - all variables in the table except trust in institutions
Fully adjusted (2) - all variables in the table

Table 5.3.1.8: An association between poor SRH and social and psychosocial factors in the Czech Republic, Hungary and Poland

		Age-sex	Age-sex-SES*	Fully adjusted
Sex	males	1	1	1
	females	1.38 (1.13-1.70)	1.31 (1.06-1.62)	1.14 (0.90-1.45)
Age	less than 20	1	1	1
	20-29	0.91 (0.41-2.02)	1.23 (0.54-2.80)	1.90 (0.78-4.67)
	30-39	2.50 (1.20-5.22)	3.52 (1.66-7.47)	5.84 (2.44-13.96)
	40-49	4.33 (2.13-8.81)	5.88 (2.84-12.17)	10.48 (4.47-24.59)
	50-59	5.88 (2.89-11.98)	7.43 (3.60-15.32)	8.22 (3.60-18.78)
	60+	11.88 (5.95-23.73)	12.72 (6.32-25.59)	8.62 (3.97-18.75)
	p for linear trend	*<0.001*	*<0.001*	*<0.001*
Deprivation	per 1 SD	1.42 (1.30-1.55)	1.35 (1.23-1.48)	1.12 (1.01-1.25)
Education	primary	1	1	1
	vocational	0.64 (0.50-0.83)	0.66 (0.51-0.86)	0.77 (0.58-1.02)
	secondary	0.45 (0.34-0.59)	0.50 (0.38-0.66)	0.70 (0.52-0.96)
	university	0.29 (0.19-0.46)	0.36 (0.23-0.57)	0.59 (0.35-0.98)
	p for linear trend	*<0.001*	*<0.001*	*0.008*
Personal control	per 1 SD	0.50 (0.45-0.56)	0.55 (0.49-0.62)	0.58 (0.51-0.65)
Marital status	married	1	1	1
	unmarried	1.39 (1.09-1.79)	1.32 (1.02-1.69)	1.16 (0.89-1.54)
Employment	Empl. all year	1	1	1
	Current unempl.	3.35 (2.15-5.23)	2.44 (1.54-3.86)	1.94 (1.19-3.17)
	Former unempl.	2.02 (1.21-3.39)	1.65 (0.97-2.79)	1.26 (0.70-2.27)
	Outside labour force	4.21 (3.09-5.74)	3.46 (2.52-4.76)	3.09 (2.21-4.32)

Religion	catholic	1	1	1
	other religion	1.14 (0.83-1.56)	1.17 (0.84-1.62)	1.06 (0.74-1.51)
	none	0.78 (0.58-1.05)	0.84 (0.62-1.14)	0.80 (0.57-1.11)
	no answer	0.72 (0.37-1.38)	0.75 (0.38-1.46)	0.71 (0.34-1.48)
Reaction to economic change	pro-market	1	1	1
	always positive	1.33 (0.95-1.85)	1.25 (0.89-1.75)	1.17 (0.80-1.71)
	always negative	1.46 (1.05-2.04)	1.29 (0.92-1.81)	1.22 (0.84-1.78)
	nostalgic	1.82 (1.34-2.46)	1.42 (1.03-1.94)	1.25 (0.87-1.79)
Personal freedom index	1 quartile (high)	1	1	1
	2	1.05 (0.78-1.41)	1.01 (0.75-1.37)	0.82 (0.60-1.14)
	3	1.18 (0.88-1.59)	0.98 (0.72-1.33)	0.67 (0.47-0.94)
	4 (low)	1.91 (1.43-2.55)	1.49 (1.11-2.02)	0.96 (0.68-1.37)
	p for linear trend	*<0.001*	*0.01*	*0.70*
Trust in institutions	1 quartile (low)	1	1	1
	2	0.85 (0.65-1.13)	0.89 (0.67-1.18)	1.07 (0.78-1.45)
	3	0.74 (0.56-0.99)	0.75 (0.56-1.01)	0.89 (0.64-1.23)
	4 (high)	0.64 (0.48-0.85)	0.68 (0.50-0.91)	0.84 (0.60-1.18)
	p for linear trend	*0.001*	*0.006*	*0.21*
Country	Czech Republic	1	1	1
	Poland	1.15 (0.89-1.50)	0.98 (0.75-1.28)	0.86 (0.61-1.21)
	Hungary	1.90 (1.50-2.42)	1.71 (1.33-2.19)	1.47 (1.10-1.96)

All analyses adjusted for country
SES = deprivation + education
Fully adjusted = all variables from the table in the same model

Figure 5.3.1.1. Age-standardized prevalence of poor self-rated health by country, gender and control score (%)

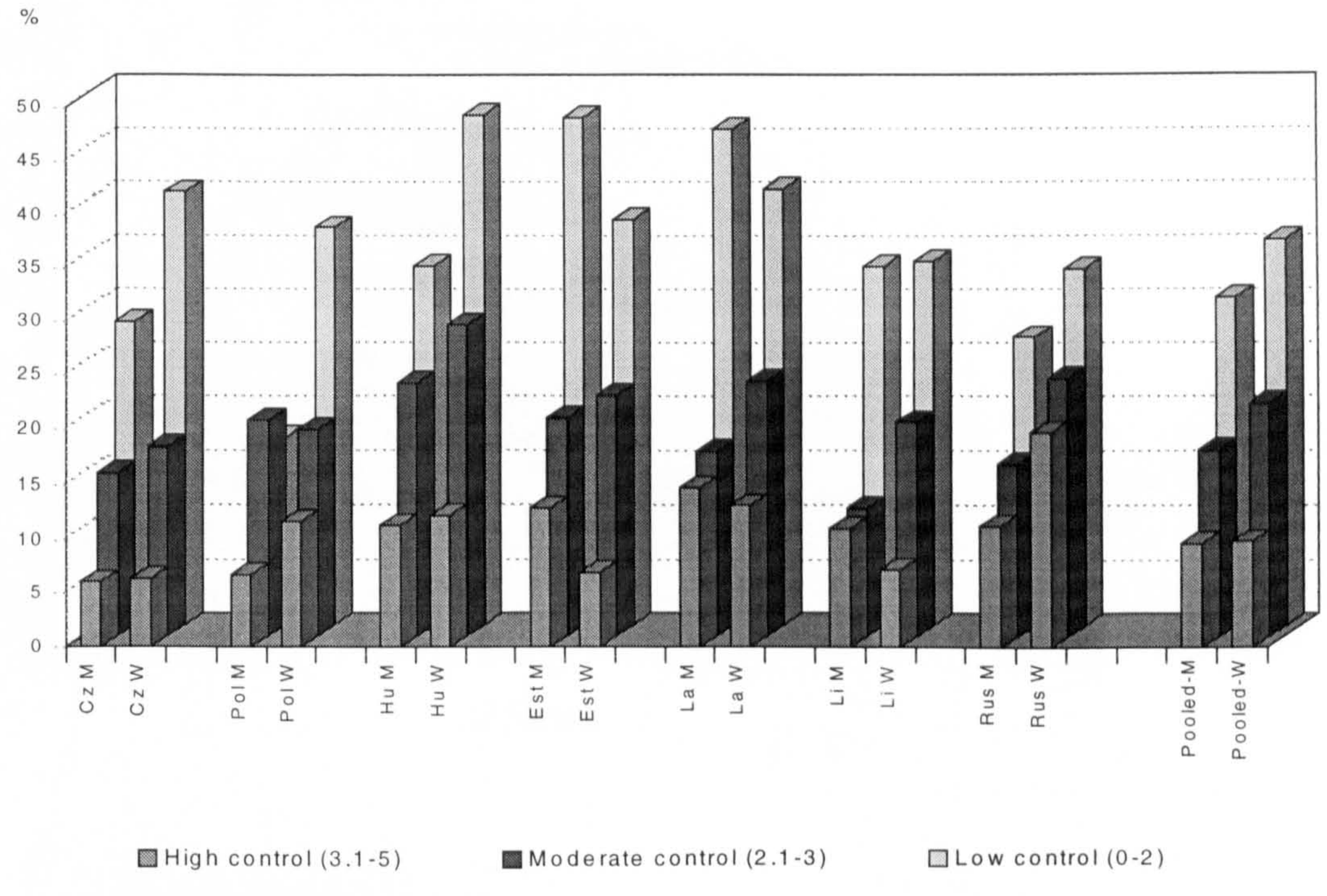
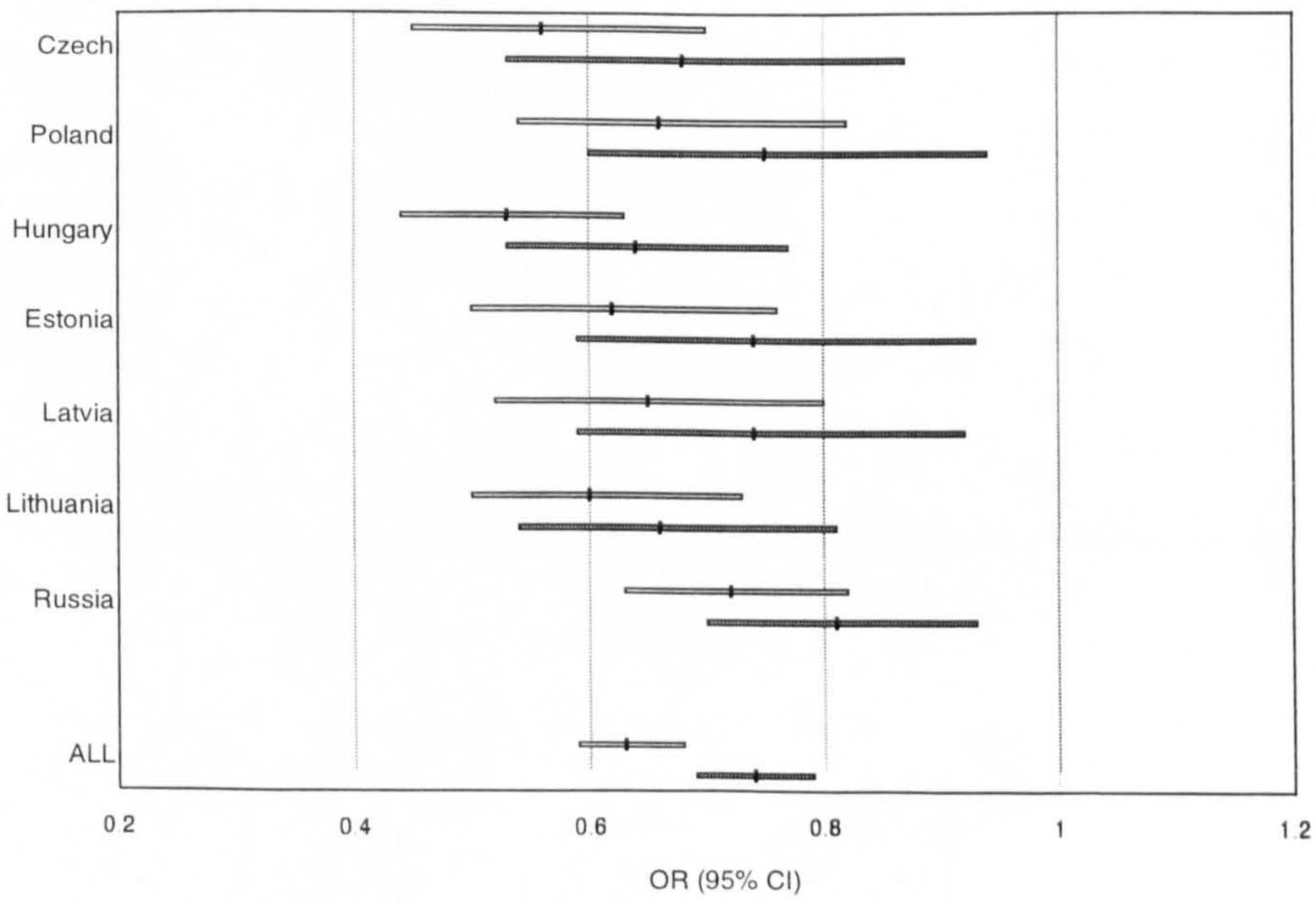
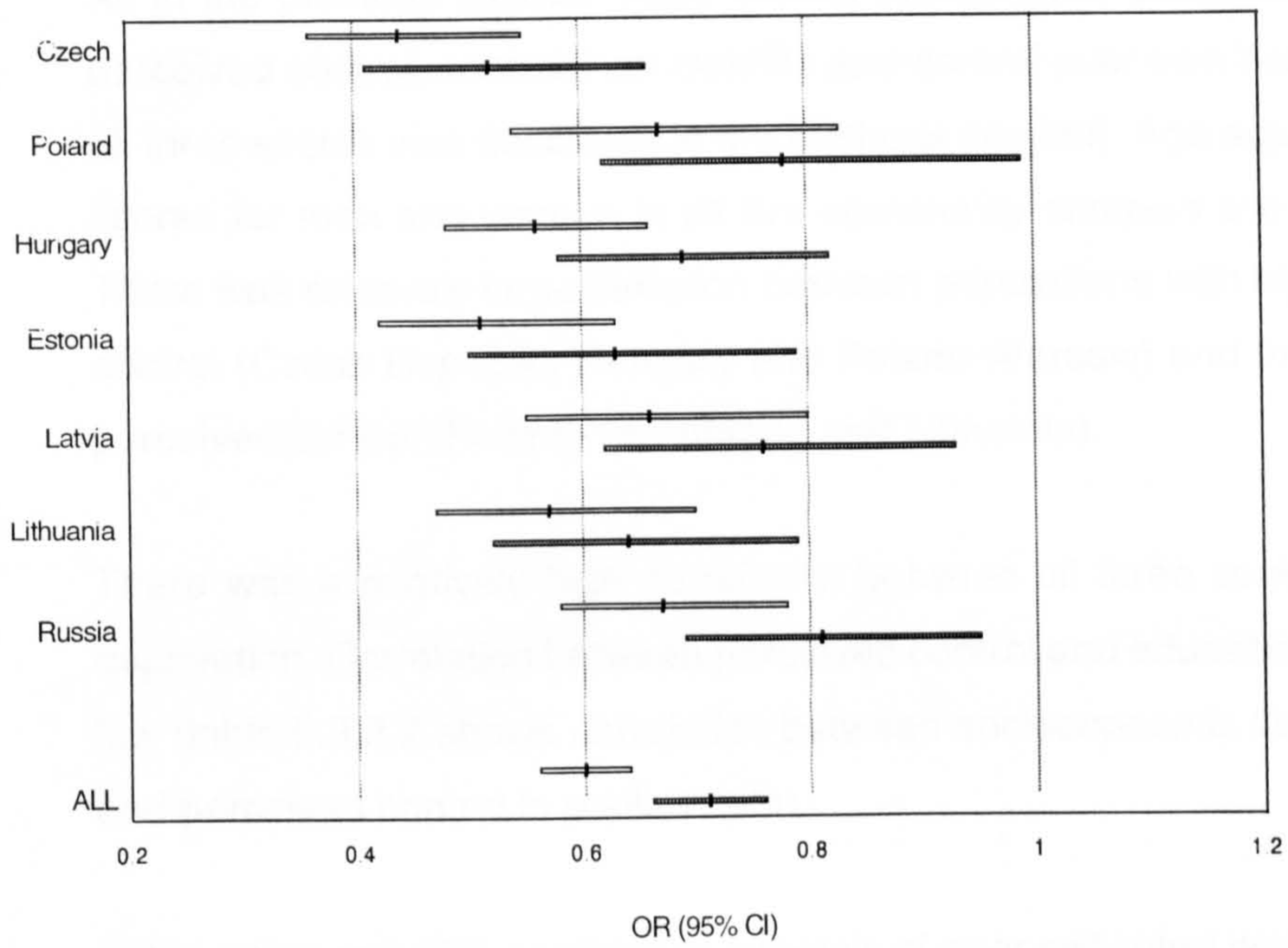


Figure 5.3.1.2. Odds ratio and 95% confidence intervals of poor self-rated health per 1 SD of perceived control by country (sex-age adjusted and sex-age-education-deprivation-marital status adjusted)

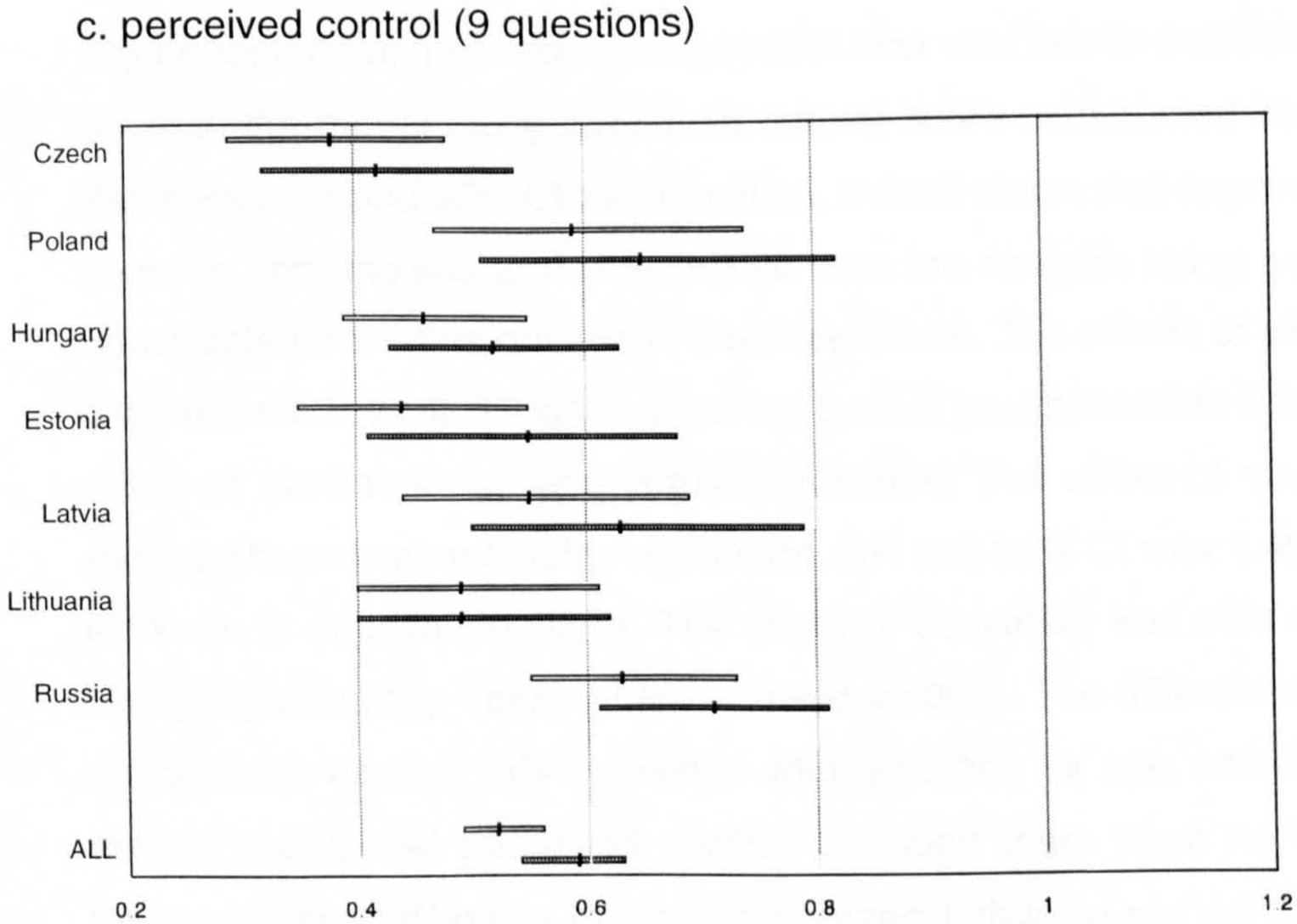
a. control over own health



b. control over own life



c. perceived control (9 questions)



5.3.2. The role of perceived control in five community samples

As in the previous section, three control scores were constructed for each individual: perceived control, control over own life and control over own health (the construction of all three scores was described in the Methods section). Age adjusted means of all three scores for men and women in all five community samples are shown in table 5.3.2.1. There was relatively large variation between populations with higher levels of perceived control (Czech Republic, Hungary and Poland-Warsaw) and those with lower levels of perceived control (Poland-Tarnobrzeg and Lithuania).

There was a relatively high correlation between all three control scores and material deprivation. Correlation between perceived control and education and marital status was low (table 5.3.2.2 shows correlation between socioeconomic factors and marital status, and perceived control in pooled data).

Odds ratios and 95% confidence intervals of poor self-rated health by perceived control, education, deprivation and marital status in sex-age and fully adjusted analysis of pooled data are presented in table 5.3.2.3. Two models of control were fitted in each level of adjustment. First, the model using control over own health and control over own life, and second, the model using perceived control score constructed from all nine questions. Estimated OR and 95% CI for education, marital status and deprivation were virtually the same in both models and only results from the analysis using perceived control score constructed from nine questions are shown here. The effects of all these three variables were reduced by adjusting for perceived control (compare table 5.2.2.6, last column). The effect of marital status was virtually removed. The effect of material deprivation was reduced but remained highly significant: OR and 95% CI was 1.49 (1.36-1.63) per 1 SD increase in deprivation score. The effect of education was also reduced but remained highly significant (p value for linear trend <0.001). The difference in prevalence of self-rated health was not fully explained after adjusting for age, sex, education, deprivation, marital status and perceived control: although there were no significant differences between Poland-Warsaw, Poland-Tarnobrzeg, Lithuania and the Czech Republic (OR and 95% CI in adjusted model was 1.00 for Pol-Warsaw (baseline), 0.92 (0.64-1.30) for Pol-Tarnobrzeg, 1.12 (0.79-1.61) for Lithuania, 0.86 (0.60-1.23) for the Czech Republic). Hungary was significantly different from the previous four (OR and 95% CI was 2.47 (1.76-3.45) compared to Pol-Warsaw).

The effect of perceived control was very strong. In age-sex adjusted analysis, OR (95% CI) of poor health by 1 SD increase in perceived control score (constructed from nine questions) was 0.52 (0.47-0.56). When adjusted for socioeconomic factors and marital status, the effect of perceived control was slightly reduced but remained strong: OR (95% CI) = 0.60 (0.55-0.66). The effects of control over own health and control over own life were also highly significant in both levels of adjustment.

In the next step, data in the Hungarian sample were analysed using additional variables. In addition to variables used in tables 5.2.2.8-11 and perceived control, data about changes in general social position since 1989 were available in this sample (answers on 5-point scale to the question whether changes since 1989 had been good or bad for their general social position).

When adjusted for age and sex, both psychosocial variables were strongly related to poor health: OR and 95% CI of poor health were 0.48 (0.41-0.57) per 1 unit increase on the general social position scale, and 0.48 (0.41-0.55) per 1 unit increase in the perceived control score (table 5.3.2.4). Both effects were reduced by adjustment for other variables but remained highly significant. Odds ratio of 0.70 for 1 unit increase on the general social position scale in the fully adjusted model means that there was a four-fold difference between those in the worst position and those in the best position. Among socioeconomic variables, education and material deprivation remained significantly associated with poor SRH but there was no statistically significant relation of household items ownership or reported financial circumstances to poor health (table 5.3.2.4, second column). When deprivation, household items ownership and financial circumstances scores were entered to the adjusted model separately (all other variables from the second column of table 5.3.2.4 in the model), results did not change. Material deprivation was significantly related to poor SRH: OR and 95% CI was 1.31 (1.10-1.55) per 1 SD increase in deprivation score. There was no association between household items ownership and reported health: OR and 95% CI of poor SRH were 1.00 (baseline), 1.18 (0.63-2.23), 1.28 (0.68-2.40), 1.20 (0.61-2.37), and 0.85 (0.35-2.04) for categories 0-1, 2-3, 4-5, 6-7, and 8-10 items with p value for linear trend of 0.86. The financial circumstances score also was not related to poor health: OR and 95% CI was 0.89 (0.69-1.15) per 1 unit increase in score. Perceived control and general social position explained a part of the socioeconomic differences in poor SRH in this population (compare results above with results in table 5.2.2.9) although the effect of education virtually did not change (compare table 5.2.2.8, last column, and table 5.3.2.4, last column). Both perceived control and general social

position were relatively highly correlated with poor SRH and all socioeconomic factors (table 5.3.2.5). Those with higher perceived control and reporting better social position were less deprived, better educated, owned more household items, reported better personal financial circumstances, and reported better health.

An analysis similar to that in table 5.2.2.11 was conducted on a subsample of individuals with valid measurements of body-mass index. The effect of the body-mass index did not change after adjustment for psychosocial factors (table 5.3.2.6; compare with results from table 5.2.2.11). Including body-mass index to the analysis did not affect the effect of psychosocial variables on poor SRH (non-significance of general social position score was the result of smaller sample size rather than different adjustment).

Table 5.3.2.1. Mean of control scores by sex and population (age adjusted)

a. Men

	General control*	Health control**	Perceived control***
Czech	2.81	3.76	3.13
Poland-W	2.86	3.9	3.21
Poland-T	2.42	3.54	2.79
Lithuania	2.38	3.28	2.68
Hungary	2.95	3.55	3.15

b. Women

	General control*	Health control**	Perceived control***
Czech	2.57	3.68	2.95
Poland-W	2.67	3.47	2.94
Poland-T	2.33	3.64	2.77
Lithuania	2.23	2.94	2.47
Hungary	2.9	3.45	3.08

* 6 questions (39a,f,g,h,i,n) ** 3 questions (39c,d,e) *** 9 questions: * and **

Table 5.3.2.2. Correlation matrix of socioeconomic factors and perceived control in pooled data (5 community samples)

a. Perceived control score (9 questions)

	Males	Females	All
Education	0.14	0.15	0.16
Deprivation	-0.38	-0.37	-0.38
Marital status*	-0.01	0.09	0.06

b. Control over own health score (3 questions)

	Males	Females	All
Education	0.07	0.06	0.07
Deprivation	-0.19	-0.18	-0.19
Marital status*	0	0.03	0.01

c. Control over own life score (6 questions)

	Males	Females	All
Education	0.14	0.16	0.16
Deprivation	-0.37	-0.36	-0.37
Marital status*	-0.02	0.1	0.07

* married/unmarried

Table 5.3.2.3. Odds ratios (95% confidence intervals) of poor self-rated health by control in the pooled data (sex-age adjusted, fully adjusted)

		Sex-age adjusted	Fully adjusted**
		OR (95% CI)	OR (95% CI)
Education	Primary	1	1
	Vocational	0.58 (0.47-0.73)	0.70 (0.56-0.88)
	Secondary	0.47 (0.37-0.58)	0.60 (0.47-0.76)
	University	0.25 (0.18-0.35)	0.42 (0.30-0.59)
	p for linear trend	*<0.001*	*<0.001*
Marital status	Married	0.75 (0.62-0.91)	0.95 (0.78-1.17)
	Unmarried	1	1
Deprivation	1 SD increase	1.81 (1.66-1.97)	1.49 (1.36-1.63)
Control over own life[1]	1 SD increase	0.55 (0.50-0.60)	0.66 (0.60-0.73)
Control over own health[1]	1 SD increase	0.71 (0.66-0.77)	0.80 (0.74-0.86)
Perceived control*[2]	1 SD increase	0.52 (0.47-0.56)	0.60 (0.55-0.66)

*score constructed from control over own life and control over own health (39a,c,d,e,f,g,h,i,n)

** Fully adjusted model:

[1] Model 1: age, sex, education, marital status, deprivation, control over own life, control over own health, population

[2] Model 2: age, sex, education, marital status, deprivation, perceived control, population

Table 5.3.2.4: Odds ratios (95% confidence intervals) of poor self-rated health by potential risk factors in Hungary (sex-age adjusted, fully adjusted) (N=1665)

		age-sex adjusted	*fully adjusted***
Gender	males	1	1
	females	1.54 (1.16-2.05)	1.13 (0.79-1.62)
Age	1 year increase	1.07 (1.06-1.08)	1.06 (1.04-1.08)
Education	Primary	1	1
	Vocational	0.59 (0.41-0.84)	0.69 (0.47-1.03)
	Secondary	0.38 (0.26-0.56)	0.56 (0.36-0.86)
	University	0.09 (0.03-0.21)	0.16 (0.06-0.41)
	p for linear trend	*<0.001*	*<0.001*
Household items	0-1	1	1
	2-3	0.75 (0.43-1.31)	1.28 (0.67-2.42)
	4-5	0.57 (0.33-0.96)	1.43 (0.75-2.71)
	6-7	0.37 (0.21-0.64)	1.43 (0.71-2.87)
	8-10	0.17 (0.08-0.36)	1.06 (0.43-2.58)
	p for linear trend	*<0.001*	*0.67*
Deprivation	1 SD increase	1.87 (1.63-2.14)	1.31 (1.10-1.56)
Marital status	Married	1	1
	Single	1.17 (0.67-2.04)	0.99 (0.53-1.85)
	Divorced	1.27 (0.81-1.99)	1.07 (0.63-1.81)
	Widowed	1.24 (0.73-2.09)	0.84 (0.47-1.48)
Alcohol consumption (pure alcohol)	0	1	1
	≤50 ml/week	0.46 (0.32-0.66)	0.45 (0.31-0.68)
	≤100 ml/week	0.70 (0.29-1.65)	0.48 (0.20-1.19)
	≤150 ml/week	1.41 (0.28-7.06)	0.66 (0.12-3.69)
	>150 ml/week	5.12 (0.32-83.05)	2.89 (0.16-52.80)
Current smoking	yes	1	1
	no	0.74 (0.54-1.01)	0.96 (0.67-1.39)
Financial circumstances	1 unit increase*	0.53 (0.45-0.62)	0.94 (0.73-1.22)
General social position	1 unit increase*	0.48 (0.41-0.57)	0.70 (0.54-0.91)
Perceived control	1 SD increase	0.48 (0.41-0.55)	0.62 (0.52-0.73)

* scale 1-5; 1=very bad, 5=very good

** all variables in the table

Table 5.3.2.5 Correlation matrix of psychosocial variables with all other variables used in analysis (Hungary, 1665 individuals)

	Control	General social position
Poor health*	-0.3	-0.27
Gender**	-0.06	-0.01
Age	-0.17	-0.24
Education	0.24	0.23
Household items***	0.3	0.37
Deprivation	-0.37	-0.45
Married****	0.05	-0.05
Alcohol consumption*****	-0.05	-0.06
Current smoking******	0.04	0.1
Financial circumstances	0.34	0.76

* 1=yes, 0=no
** 1=males, 2=females
*** number of items owned by household (microwave, video recorder, washing machine, freezer, PC, hifi/CD played, colour TV, bicycle, car, summer cottage)
**** 1=yes, 0=no
***** alcohol consumption (in ml/week of pure alcohol)
****** 1=yes, 2=no

Table 5.3.2.6. OR and 95% CI of poor SRH for socioeconomic variables, psychosocial factors and classical risk factors in subsample of Kalocsa population with known body-mass index

		*fully adjusted***
Gender	males	1
	females	1.28 (0.79-2.08)
Age	1 year increase	1.05 (1.02-1.07)
Education	Primary	1
	Vocational	0.57 (0.34-0.96)
	Secondary	0.47 (0.26-0.84)
	University	0.19 (0.06-0.57)
	p for linear trend	*<0.001*
Household items	0-1	1
	2-3	1.10 (0.45-2.70)
	4-5	1.06 (0.43-2.60)
	6-7	0.96 (0.36-2.54)
	8-10	0.96 (0.29-3.14)
	p for linear trend	*0.87*
Deprivation	1 SD increase	1.45 (1.16-1.80)
Marital status	Married	1
	Single	0.95 (0.39-2.34)
	Divorced	1.30 (0.67-2.51)
	Widowed	0.90 (0.44-1.85)
Alcohol consumption (pure alcohol)	0	1
	≤50 ml/week	0.55 (0.33-0.91)
	≤100 ml/week	0.76 (0.23-2.58)
	≤150 ml/week	0.95 (0.14-6.40)
Current smoking	yes	1
	no	0.97 (0.59-1.62)
Financial circumstances	1 unit increase*	0.87 (0.63-1.20)
General social position	1 unit increase*	0.74 (0.53-1.01)
Control over life	1 SD increase	0.62 (0.50-0.77)
Body-mass index	1kg/m^2 increase	1.07 (1.03-1.11)

* scale 1-5; 1=very bad, 5=very good

** all variables in the table

5.4 Measures of socioeconomic inequality at the population level

This chapter examines the effect of measures of socioeconomic inequality at population level on self-rated health in seven national samples. We concentrated on the effects of two measures: inequality index generated from collected data and Gini coefficient of income inequality based on external sources of data. The effect of these factors was tested both in analyses using data at individual level and in ecological analysis.

For each population, an ecological index of material inequality was calculated as the difference between the 10th and 90th percentile of deprivation score. A larger value of the inequality index meant a larger spread of deprivation in a population. Gini coefficient of income inequality as an independent measure of inequality for each country was taken from UNICEF (United Nations Children's Fund, 1998). For Estonia, there were no available data of Gini coefficient in the UNICEF Report. Therefore, data from the World Development Report (World Bank, 1996) were used. Gini coefficient from 1994 was used in analysis (for Estonia, data from 1993 were used as it was the only year with reported Gini coefficient). Gini coefficient of income inequality says how large a proportion of national income (in percentage) must be redistributed to achieve equal income in full population. Larger values of Gini coefficient mean larger inequality in income distribution within a particular country. The inequality index and Gini coefficient for seven countries are summarized in table 5.4.1. Both inequality indices were lowest in the Czech Republic and highest in Russia. A scattergram in figure 5.4.1 shows the association between an inequality index and Gini coefficient of income inequality for all seven countries. The correlation between these two variables was 0.82, which suggested a close relation of these variables. The reason for the relatively high inequality index in Latvia compared to the Gini coefficient may be due to oversampling of non-native citizens (mostly ethnic Russians) in Latvia to a larger extent than in other two Baltic countries (non-native subjects were oversampled in all three Baltic populations). When comparing deprivation scores of native and non-native subjects in the three Baltic countries in age-sex adjusted analysis, the deprivation score was on average more than one point higher in non-native citizens ($p<0.001$ in unpaired t-test).

We compared prevalence of our main outcome, poor self-rated health, with all cause standardised death rates (figure 5.4.2). The correlation between these two health measures was 0.85. Prevalence of poor self-rated health was slightly higher than

expected in Hungary compared to all-cause SDR.

The association between poor self-rated health and the two measures of inequality was firstly tested in analysis of individual data. All subjects were assigned the values of the two measures of inequality that characterised their country. As the material inequality index was constructed from material deprivation score, these two measures were not entirely independent. The Gini coefficient of income inequality is, however, completely independent from individual material deprivation.

Tables 5.4.2 and 5.4.3 show the effect of both measures on poor SRH in several levels of adjustment. In analysis adjusted for age and sex, we found a strong effect of both inequality measures on poor health. OR (95% CI) was 1.88 (1.55-2.28) per 20% increase in Gini coefficient, and 1.81 (1.52-2.22) per 4 units increase in inequality index (20% increase in Gini coefficient and 4 units in inequality index are approximately the differences between the most and the least unequal populations). When additionally adjusted for education and marital status, the effect of inequality increased: odds ratios were 2.13 for Gini coefficient and 2.07 for inequality index. When additionally adjusted for material deprivation, the effect of inequality was reduced substantially. The effect of Gini coefficient was reduced to OR (95% CI) of 1.27 (1.02-1.57). The effect of inequality index was reduced even more: OR (95% CI) was 1.17 (0.92-1.41). The reduction in the effect of inequality measures was even larger when adjusted for age, sex, marital status, education, perceived control but not for deprivation. For Gini coefficient, OR (95% CI) was 1.08 (0.87-1.34). For inequality index, OR (95% CI) was 1.04 (0.81-1.26). When deprivation and perceived control were entered into the same model, the effect of inequality was reversed: OR was 0.82 for Gini coefficient and 0.72 for inequality index. In summary, the effect of inequality was removed by individual deprivation and perceived control.

The effect of socioeconomic variables and perceived control in the fully adjusted model is summarized in table 5.4.4. The effect of education, deprivation, marital status and perceived control on poor SRH virtually did not change after adjusting for inequality (compare table 5.1.3.4, last column).

Finally, data from national samples were analysed ecologically. Ecological analysis was conducted to reduce a possibility that the effects described above appeared because deprivation and perceived control were measured on the individual level (and therefore

more precisely). Therefore they could be more strongly related to outcome in multivariate analysis. Figures 5.4.3-6 show the association between prevalence of poor SRH and socioeconomic factors and perceived control. All four variables were strongly related to poor SRH (|R|>0.5 in all figures). In all four figures, Hungary was clear outlier. When Hungary was excluded, the associations between poor SRH and four predictor variables were even stronger.

Table 5.4.5 shows results from univariate ecological analysis. Results documented the associations displayed in figures. When all seven countries were used in statistical analysis, no association was significant. When Hungary was excluded from analysis, the effects of perceived control, deprivation and inequality index were significant. The effects of all five predictor variables had the same direction in both analyses (with and without Hungary).

Multivariate analysis was limited because of small number of countries. When perceived control and deprivation were included in the same model, none of these two variables was significantly associated with prevalence of poor SRH. The effects of both variables remained in the same direction as in the univariate analysis. When deprivation and one of the inequality measures were included simultaneously into the model, the effect of deprivation was significant (OR 2.35 and 3.89, respectively) but odds ratios for either Gini coefficient or inequality index were less than one (OR 0.80 and 0.47, respectively). When perceived control and one of the inequality measures were included in the same model, the effect of inequality measures was totally removed. The results on ecological level showed similar results as the analysis on individual level: material deprivation and perceived control removed the effect of inequality measures which appeared in univariate statistical analysis.

Table 5.4.1. Descriptive table of inequality measures at population level for seven CCEE

	Inequality index	Gini coefficient of income inequality					
		1989	1991	1993	1994	1995	1996
Czech R.	4	20.4	21.2	25.8	26	27.1	-
Poland	5	20.7	23.9	25.6	28.1	29	-
Hungary	5	26.8	-	31.5	33.7	-	-
Estonia*	6	-	-	39.5	-	-	-
Latvia	7	24.4	24.7	28.3	32.5	34.6	34.9
Lithuania	6	26	-	-	34.9	34.1	35
Russia	8	27.1	32.5	46.1	44.6	47.1	48.3

from Education for All? UNICEF Regional Monitoring Report No 5, 1998
* from World Development Report 1996

Table 5.4.2. The effect of Gini coefficient of income inequality on poor self-rated health (OR and 95%CI)

Adjustment	20% increase
sex + age	1.88 (1.55-2.28)
sex + age + education	2.18 (1.79-2.66)
sex + age + education + marital status	2.13 (1.75-2.59)
sex + age + education + marital status + deprivation	1.27 (1.02-1.57)
sex + age + education + marital status + control	1.08 (0.87-1.34)
sex + age + education + marital status + deprivation + control	0.82 (0.65-1.03)

Table 5.4.3. The effect of inequality index on poor SRH (OR and 95%CI)

Adjustment	4 units increase
sex + age	1.81 (1.52-2.22)
sex + age + education	2.14 (1.81-2.60)
sex + age + education + marital status	2.07 (1.75-2.52)
sex + age + education + marital status + deprivation	1.17 (0.92-1.41)
sex + age + education + marital status + control	1.04 (0.81-1.26)
sex + age + education + marital status + deprivation + control	0.72 (0.57-0.89)

Table 5.4.4. OR (95% CI) for the effect of socioeconomic factors and control on poor SRH (7464 individuals from 7 countries; adjusted for age, sex and variables in the table)

	Gini coefficient	Inequality index
	20% increase	*4 units increase*
Education		
Primary	1	1
Vocational	0.68 (0.57-0.82)	0.69 (0.58-0.83)
Secondary	0.52 (0.44-0.63)	0.54 (0.45-0.64)
University	0.47 (0.36-0.60)	0.48 (0.38-0.62)
p for linear trend	*<0.001*	*<0.001*
Marital status		
Married	0.88 (0.76-1.02)	0.88 (0.76-1.02)
Unmarried	1	1
Inequality	0.82 (0.65-1.03)	0.72 (0.57-0.89)
Deprivation *(per 1 SD)*	1.33 (1.24-1.42)	1.35 (1.26-1.45)
Perceived control *(per 1 SD)*	0.64 (0.60-0.69)	0.64 (0.59-0.68)

Table 5.4.5. OR (95% CI) of prevalence of poor SRH comparing the best and the worst population in ecological analysis

a/ 7 countries

	Crude
Control	0.69 (0.36-1.30)
Deprivation	1.47 (0.75-2.91)
Inequality index	1.57 (0.76-3.25)
Gini income inequality	1.60 (0.80-3.22)
Education (mean level)	1.17 (0.53-2.57)

b/ 6 countries (Hungary excluded)

	Crude
Control	0.57 (0.37-0.86)
Deprivation	1.95 (1.44-2.63)
Inequality index	1.97 (1.29-3.01)
Gini income inequality	1.70 (0.92-3.13)
Education (mean level)	1.68 (0.77-3.66)

Figure 5.4.1. Scattergram of an inequality index and Gini coefficient of income inequality for seven CCEE (r=0.82)

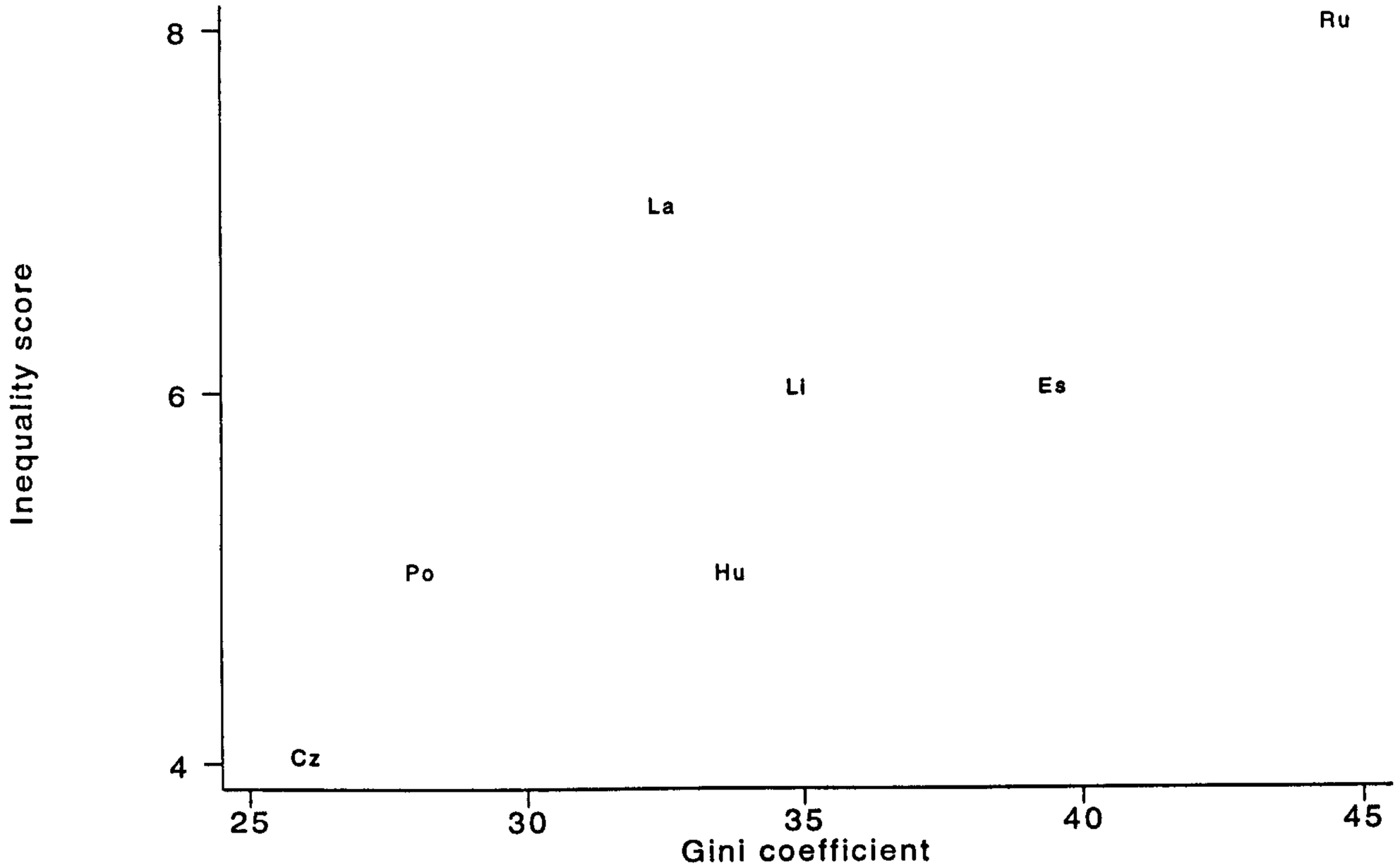


Figure 5.4.2. Prevalence of poor SRH and all cause SDR in seven CCEE (r=0.85)

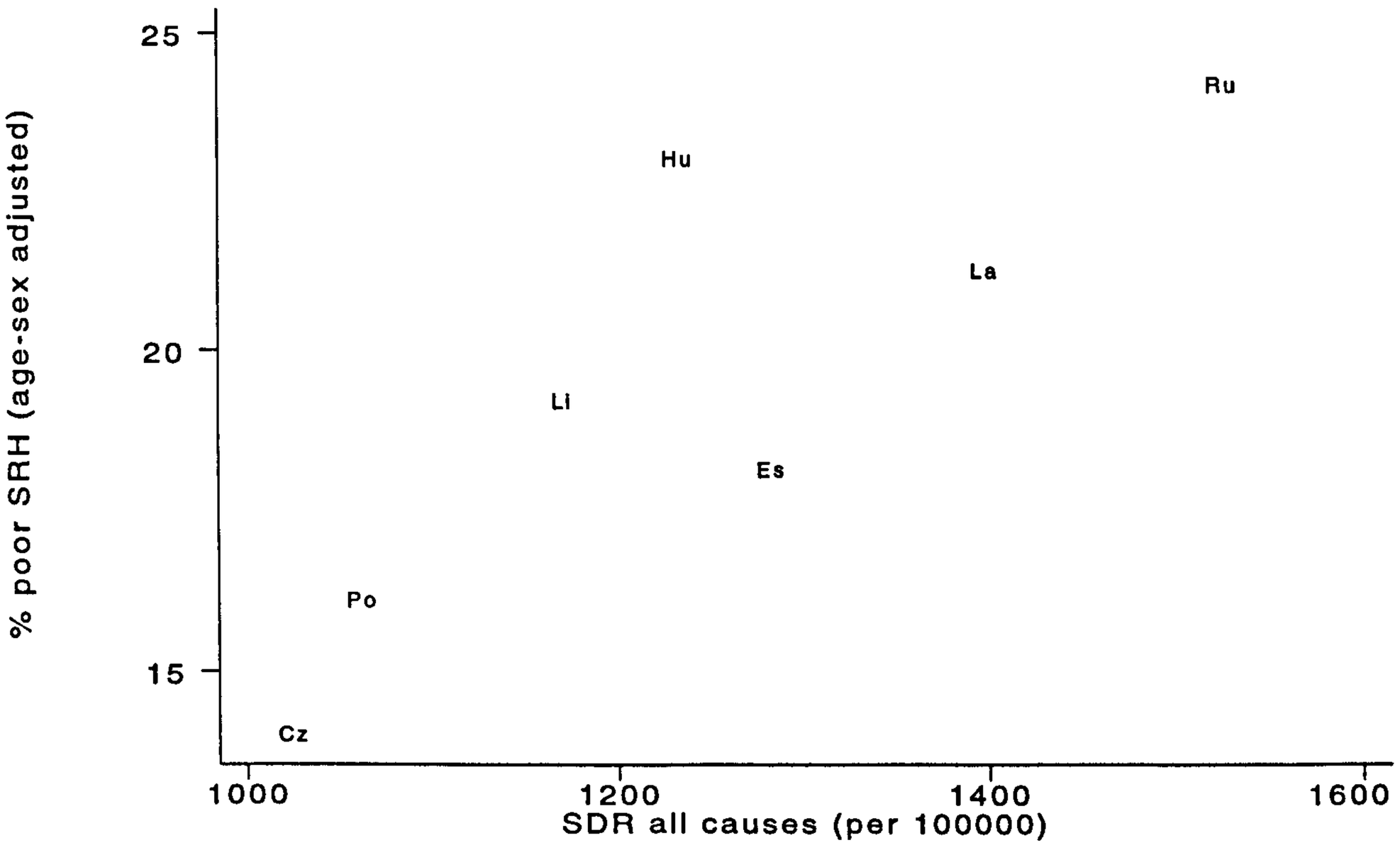


Figure 5.4.3. Prevalence of poor SRH and mean deprivation score in seven CCEE (r=0.65)

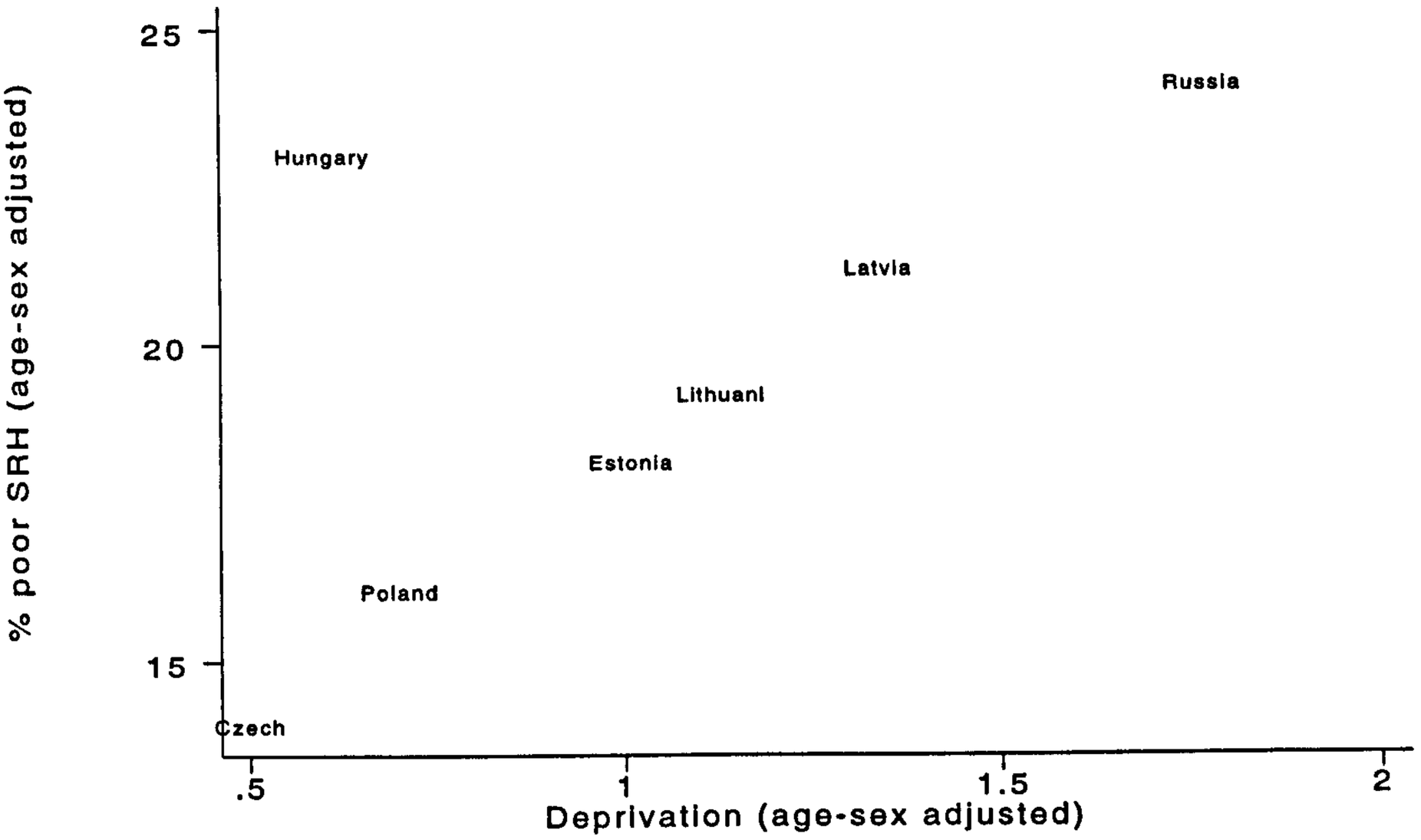


Figure 5.4.4. Prevalence of poor SRH and inequality score in seven CCEE (r=0.74)

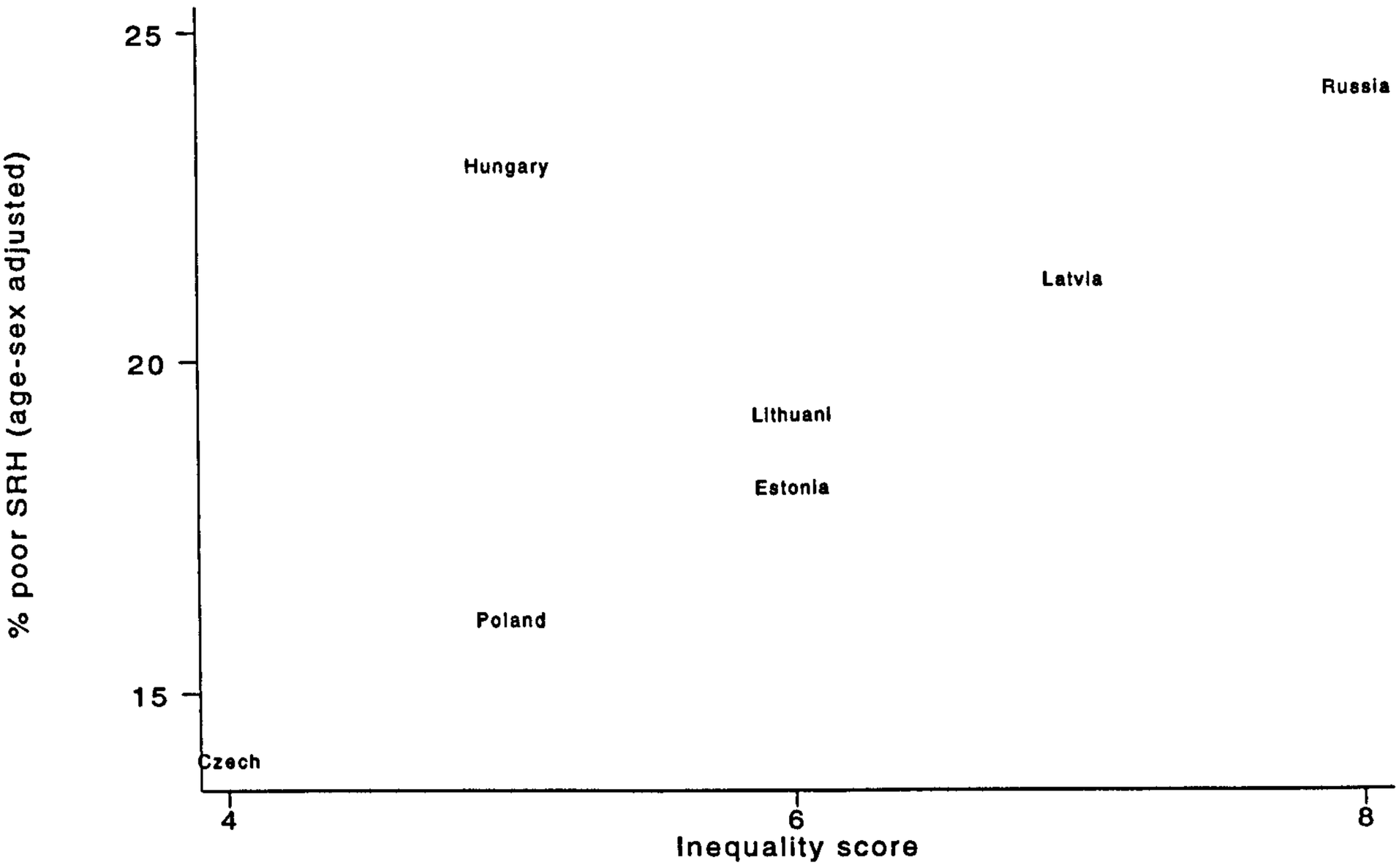


Figure 5.4.5. Prevalence of poor SRH and Gini coefficient of income inequality in seven CCEE (r=0.73)

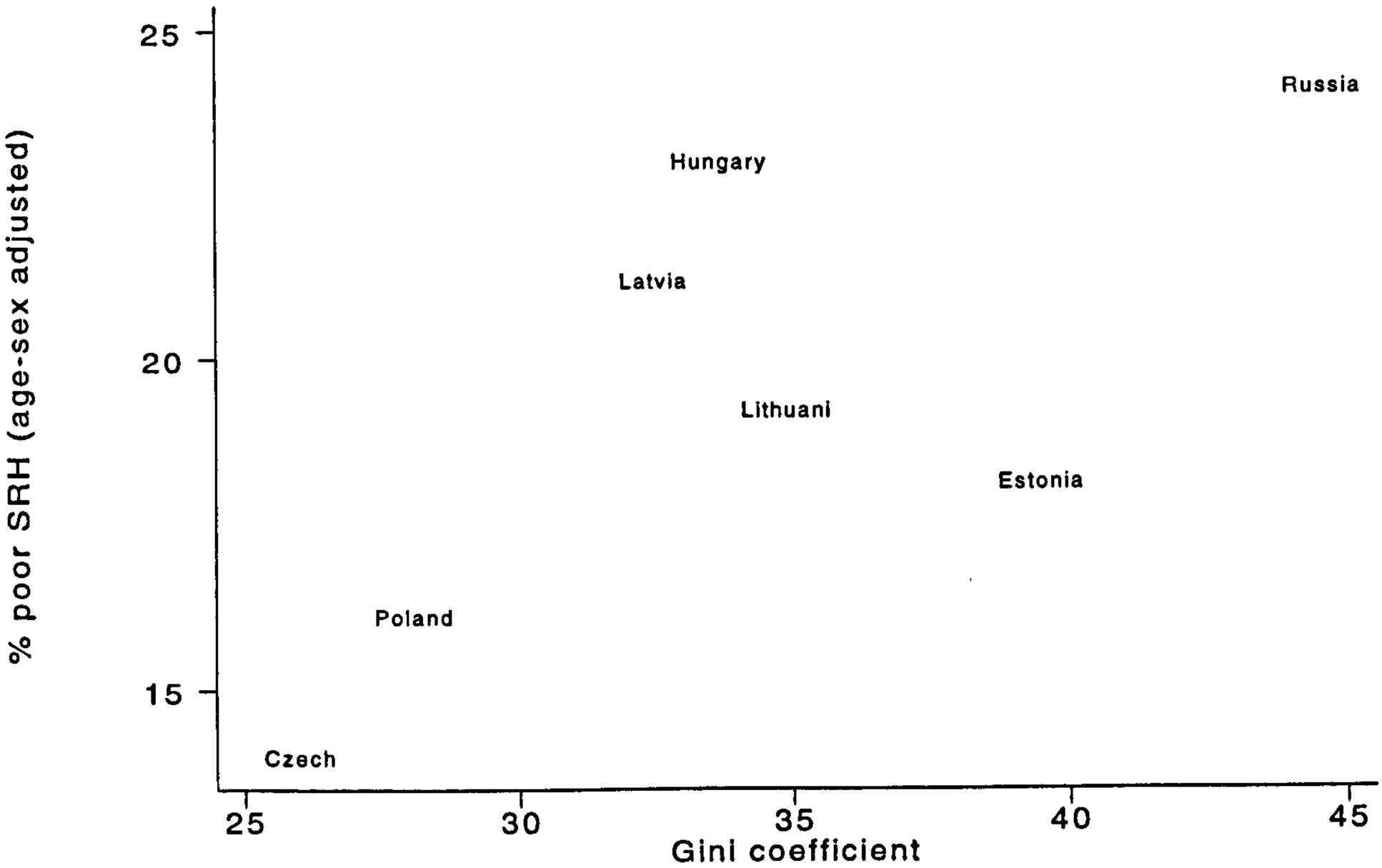
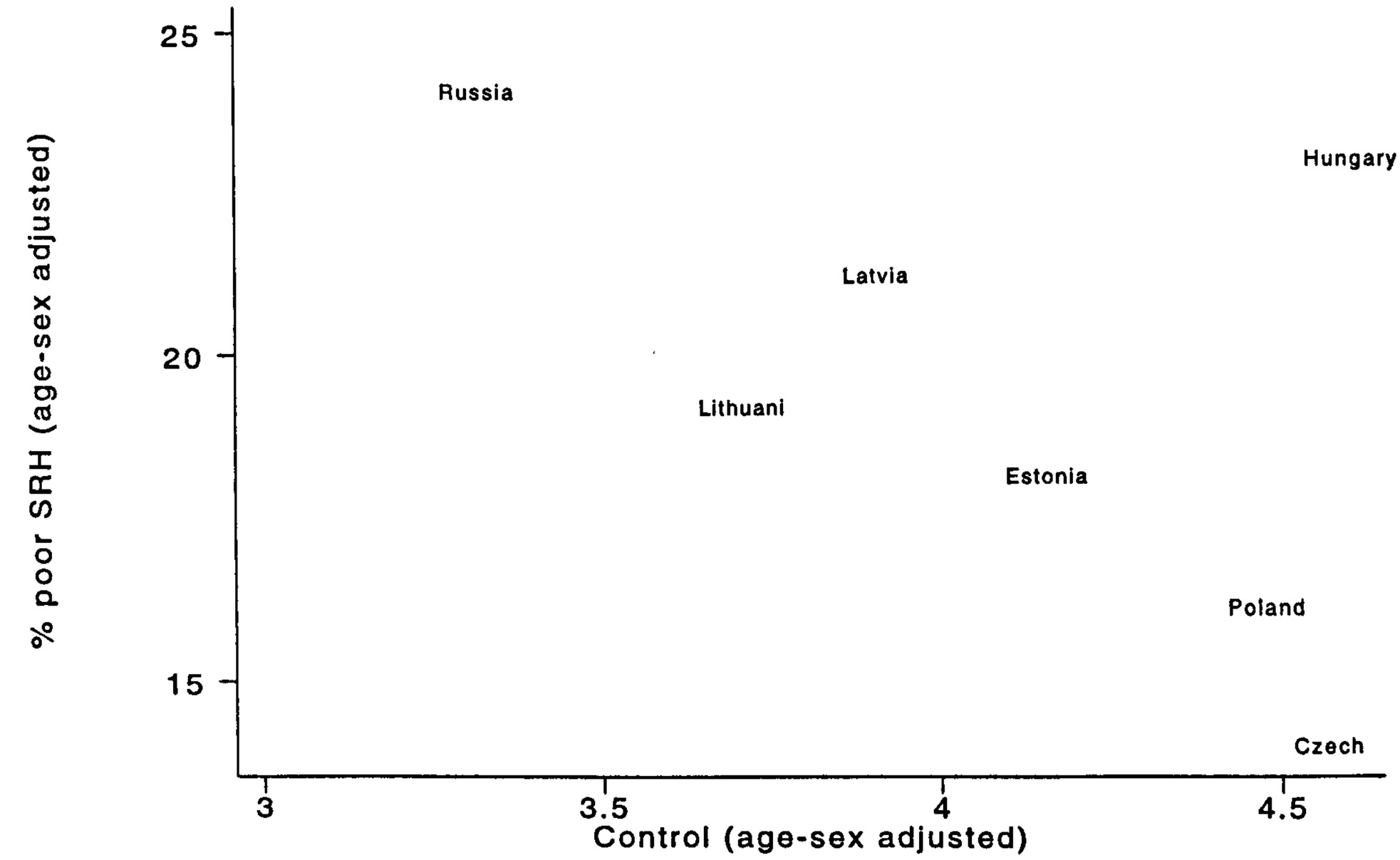


Figure 5.4.6. Prevalence of poor SRH and mean control in seven CCEE (r=-0.56)



5.5. Work-related psychosocial factors

This chapter examines the effect of work-related psychosocial factors on self-rated health. Results of the chapter are presented in two sections. First, in the analysis of national samples, we concentrated on the effect of perceived control at work. Second, in the analysis of community samples, extensive analysis of the effects of a wide range of psychosocial factors at work on poor health was conducted.

5.5.1 Work-related psychosocial factors in national samples

In national samples, perceived control at work was the only work-related psychosocial factor which was available for the analysis. Analysis in this section is restricted to the population with valid data about perceived control at work in seven countries. The data are available for 4953 individuals. The number of men and women available in each sample for the analysis together with the mean control at work score standardised for age is shown in table 5.5.1.1. The highest level of control at work was among both genders in the Czech Republic, with the lowest among Hungarians.

There was strong gradient in the prevalence of poor self-rated health by level of control at work in most of the populations and in the pooled data (table 5.5.1.2, figure 5.5.1.1). Among women in the Czech Republic and Estonia, the prevalence of poor SRH was highest in the middle category of perceived control at work. Lower prevalence in the lowest control category could be due to the small number of individuals in this category (21 women in the Czech Republic, 24 women in Estonia). In Russian women, the highest prevalence of poor health was among subjects with the highest control at work but differences between control categories were minimal. In the pooled data, the difference in prevalence of poor SRH between the lowest and the highest control categories was approximately 15% in both men and women.

The effect of perceived control at work on poor health was estimated in several levels of adjustment (table 5.5.1.3). When adjusted for age and sex, OR (95% CI) per 1 SD increase in control was 0.74 (0.68-0.80). When additionally adjusted for education, material deprivation and marital status, the effect of work control reduced slightly: OR (95% CI) was 0.79 (0.72-0.86). The effect of control at work was further reduced to 0.88 (0.80-0.97) by adding perceived control (defined in section 5.4) to the model. The effect of all variables in the fully adjusted model is shown in table 5.5.1.4. Education, deprivation, perceived control and control at work were all significantly related to poor self-rated health.

Table 5.5.1.1. Mean control at work and number of men and women in each country (age standardized)

	Men		Women	
	Mean	N	Mean	N
Czech Republic	4.64	275	4.54	251
Poland	3.77	454	3.49	586
Hungary	3.35	386	3.32	533
Estonia	4.44	315	4.33	289
Latvia	4.32	276	4.17	212
Lithuania	3.89	224	3.65	261
Russia	4.26	463	4.05	428

control at work: 1 (low control) - 6 (high control)

Table 5.5.1.2. Crude prevalence of poor self-rated health by level of control at work (%)

Control	Czech	Poland	Hungary	Estonia	Latvia	Lithuania	Russia	Pooled
Men								
Low (1-2)	16.7	22.4	30.4	20	15.4	9.1	14	22.1
Moderate (3-4)	6	8.1	18.3	12.3	10.6	8.7	9.5	10.4
High (5-6)	3.5	4.1	8.9	10.1	11.6	6.8	8.6	7.8
Women								
Low (1-2)	9.5	27.6	37.4	8.3	21.7	18.8	15	26.7
Moderate (3-4)	11.4	10.5	22.7	16.1	13.8	9.7	15	14.4
High (5-6)	3.8	9.6	17.1	8.2	12.6	9.6	18.8	11.5

Table 5.5.1.3. OR and 95% CI of poor self-rated health for control at work by level of adjustment in pooled data

Level of adjustment	OR (95% CI) per 1 SD increase
crude	0.69 (0.63-0.75)
sex-age	0.74 (0.68-0.80)
sex-age-SES	0.79 (0.72-0.86)
sex-age-SES-general control	0.88 (0.80-0.97)

Adjusted for country in each level of adjustment
SES = education + material deprivation + marital status

Table 5.5.1.4. OR and 95% CI of poor self-rated health for control at work, general control and socioeconomic variables in pooled data (adjusted for all variables in the table and country)

		OR (95% CI)
Sex	Male	1
	Female	1.24 (1.03-1.50)
Age	less than 20	1
	20-29	1.69 (0.79-3.63)
	30-39	2.64 (1.24-5.63)
	40-49	4.50 (2.14-9.48)
	50-59	5.02 (2.39-10.56)
	60 and more	8.03 (3.89-16.59)
	p for linear trend	*<0.001*
Education	Primary	1
	Vocational	0.60 (0.46-0.80)
	Secondary	0.59 (0.44-0.77)
	University	0.56 (0.40-0.78)
	p for linear trend	*0.001*
Marital status	Unmarried	1
	Married	1.06 (0.85-1.31)
Deprivation	1 SD increase	1.31 (1.19-1.45)
Perceived control score*	1 SD increase	0.62 (0.56-0.69)
Control at work	1SD increase	0.88 (0.80-0.97)

Perceived control score - 9 questions - 39a,c,d,e,f,g,h,i,n

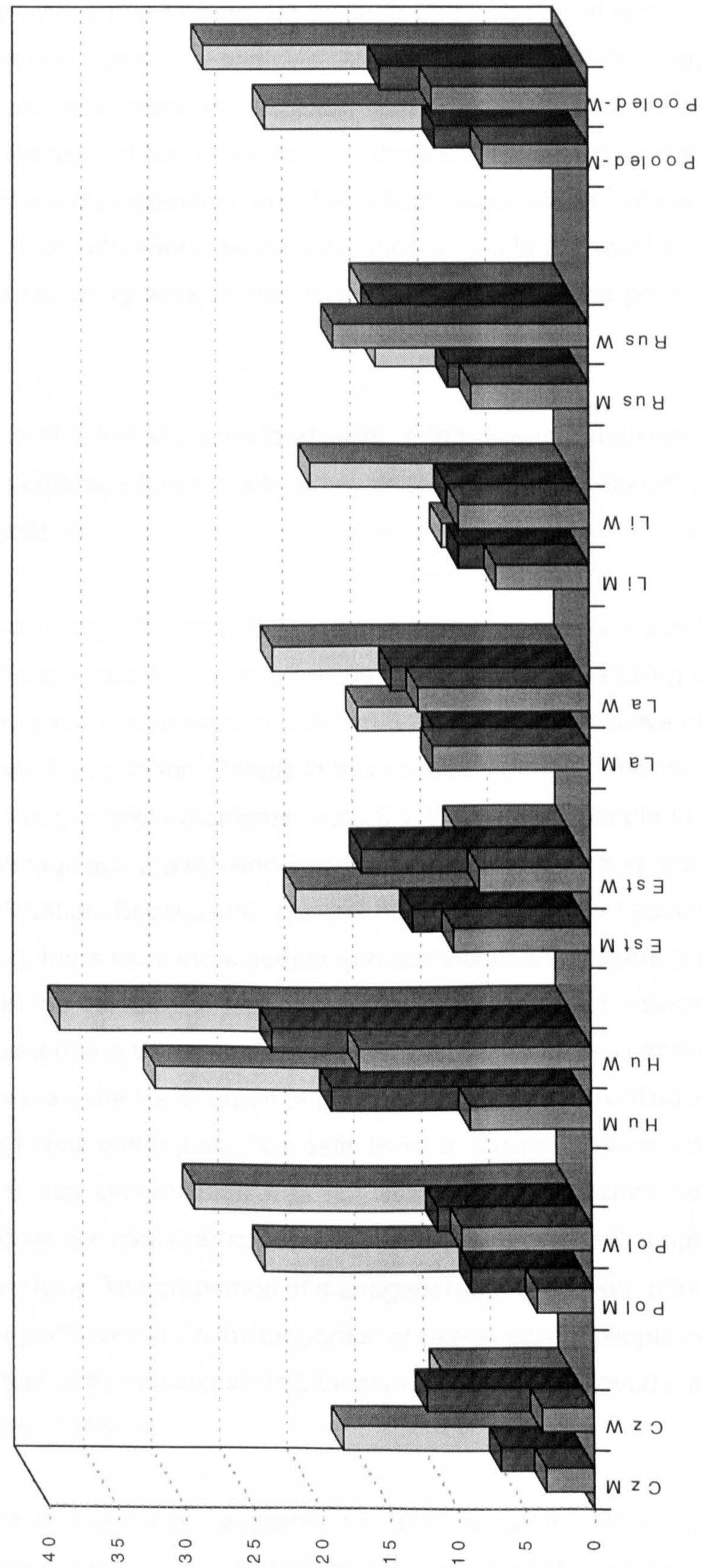


Figure 5.5.1.1. Crude prevalence of poor self-rated health by level of control at work (%)

5.5.2 Work-related psychosocial factors in community samples

This section provides results from the analysis of psychosocial factors related to work environment in five community samples. After a description of the sample used in this section the association between the effort-reward imbalance model and poor SRH is examined. In the second part of the section, the job strain model, social support at work and job variety are also examined and their effect on poor SRH is presented separately and in combination with effort-reward imbalance. In the final part of the section, results from the analysis using work-related psychosocial factors and perceived control are shown.

The calculation of effort and reward at work, effort-reward imbalance score, decision latitude, work demand, job strain, job variety and social support at work was described in the Methods section.

Data on 3941 working subjects (2024 men and 1917 women) were used in the analysis. All analyses were conducted on maximal datasets; the analysis using data without any missing values gave similar results. Table 5.5.2.1 shows descriptive characteristics of individuals in each population. People in this sample reported better health than people in a full community sample (compare table 5.1.4). Because people in this sample are younger on average and are still working, this is an expected finding. Similar findings can be seen for education. Because the number of people with higher education has risen in recent decades, there were more people with secondary and university education in this sample than in the full data. A high proportion of subjects with university education in Kaunas (Lithuania) and Warsaw (Poland) was probably the result of the fact that these two samples were samples of urban population where better qualified individuals had a better chance to find better jobs. Two definitions of occupation were possible. Because manual/non-manual classification was not available in Hungarian data, employment categories defined as 'manager/supervisor', 'other employee', 'self employed' were used in statistical analysis. The proportion of managerial jobs was lower in the Czech sample. There were large differences in the proportion of self-employed people, with an extremely large percentage of these subjects in Lithuania. Most self-employed subjects in Poland-Tarnobrzeg were farmers.

Data on effort at work were available for 3789 subjects. 3630 subjects answered questions about reward at work. Both data were valid for 3596 individuals. Effort at work

and reward at work were dichotomised for some of the analyses. Scales of these two variables could not be divided into equal subgroups because there were too few subjects in the low reward and in the high effort categories.

Table 5.5.2.2 presents frequency distribution of subjects by reward and effort scores by gender and population. In each population, the highest number of individuals was in the low effort-high reward category. In each of the other three categories, there was a substantially smaller number of individuals. This situation made it difficult to estimate the effect of the effort-reward imbalance on poor SRH in separate populations. The results of this analysis are shown in table 5.5.2.3. The effect of effort and reward was estimated in six models in three levels of adjustment (described in footnotes at table 5.5.2.3). In the first model, the dichotomised work effort variable was included in the analysis. Second, dichotomised work reward (but not work effort) was included in the model. In the third model, both effort and reward were included as two independent predictor variables. Fourth, interaction between effort and reward was additionally included in the model. Fifth, the effort-reward ratio was calculated and dichotomised as greater than or equal to one (effort at work larger than rewards), or smaller than one (rewards larger than effort). This dichotomised variable was entered into the model. Finally, a logarithm of the effort-reward ratio was entered into the model as a continuous variable and the effect of one standard deviation increase in this variable was estimated. Model 5 could not be estimated in Poland-Warsaw because there were no individuals with effort-reward ratio greater than or equal to one.

Results from the analyses varied substantially between centres. This is mostly due to the small number of individuals and cases in some categories of predictor variables (as can be seen from wide confidence intervals). Estimates in both populations in Poland are especially imprecise. In all five centres, high effort in model 1 and low reward in model 2 were associated with increased risk of poor SRH. When both variables entered into the same model (model 3), high effort was associated with poor health more strongly than a reward variable was. In a multiplicative model (model 4), results partly varied. In the Czech Republic and Lithuania, the high effort-low reward category was associated with the largest increase of odds ratio of poor SRH. The high effort-high reward category was also associated with significant increase of risk of poor SRH. In Hungary, both high effort categories were related to poor SRH. But the highest odds ratio was estimated for the high effort-high reward category. In Polish populations no significant results were found. The risk of poor SRH was lowest among those with low effort and high reward in all five

populations. Effort-reward imbalance (model 5) was associated (significantly or non-significantly) with poor SRH in all four populations where model could be fitted. When the effort-reward ratio was used as a continuous variable on a logarithmic scale (model 6), the risk of poor SRH increased with increasing imbalance between effort and reward in all five samples. The effect of 1 SD increase in the logarithm of the effort-reward imbalance ratio on poor SRH is shown in figure 5.5.2.1. The association was significant in the Czech Republic, Lithuania, Hungary, and in the pooled data.

In the analysis of pooled data, the same three levels of adjustment were used as in the analysis of separate samples (table 5.5.2.4). When effort or reward variables were included in the model separately, their effect on poor health was strong and significant. In an additive model, the effect of reward was reduced by the adjustment for work effort and was not significant when additionally adjusted for socioeconomic variables. The risk of poor SRH was lowest in the low effort-high reward category in a multiplicative model. The risk of poor SRH was similar in both categories with high effort. Effort-reward imbalance was associated with poor health (model 5 and 6).

We tried to compare models 3-6. We used a likelihood-ratio test for these four constructions in a final level of adjustment with the following results: $\chi^2_{(2)}=43.62$ ($p<0.001$) for model 3, $\chi^2_{(3)}=46.15$ ($p<0.001$) for model 4, $\chi^2_{(1)}=17.84$ ($p<0.001$) for model 5, and $\chi^2_{(1)}=54.63$ ($p<0.001$) for model 6. Model 6 seems to be slightly better than models 3 and 4, with model 5 worse than the three others.

For models 4 and 6, the effect of all variables in the fully adjusted model on poor self-rated health is summarized in table 5.5.2.5. The risk of poor SRH was lower in higher educated people. There was almost a 2.5-fold difference in risk of poor SRH between primary and university educated subjects. Deprivation was also significantly related to poor health. For example in model 4, OR and 95% CI per 1 SD increase in deprivation score was 1.37 (1.18-1.59). Employment status was not associated with poor SRH.

For further analysis, decision latitude, work demand, social support at work and work variety were used. Frequency distribution of these factors is shown in table 5.5.2.6. Because of the low frequency of individuals in some categories (especially low work demand), data from both Polish centres were analysed together. Distribution of work characteristics was similar in four countries with few exceptions. There was a large proportion of subjects with low decision latitude in Lithuania and a high proportion of

subjects reporting low social support at work in Poland. In the Czech Republic, more people reported high work variety than in other countries.

The effect of the available psychosocial factors at work on self-rated health is presented separately for each country in table 5.5.2.7. First, the effect of each variable is examined separately (top of the table). Second, the effect of psychosocial factors is estimated in the model with all variables in the table entered simultaneously (bottom two panels of the table). In both steps, decision latitude, job demand, social support at work and job variety were used both as dichotomous or continuous variables.

The risk of poor SRH was higher in subjects who reported low decision latitude in the Czech Republic, Hungary and Poland when adjusted for age and sex (table 5.5.2.7). There was no effect of decision latitude in Lithuania. When decision latitude score was used as a continuous variable, the risk of poor SRH decreased (significantly or non-significantly) with increasing decision latitude in all countries. Job demand was not strongly related to poor SRH. When it was used as a continuous variable, the risk of poor health was significantly associated with high demand in Lithuania. The inconsistency between results from the analyses using dichotomous and continuous variables (job demand - the Czech Republic, Poland; decision latitude (to some extent) - Lithuania) was probably due a very small proportion of individuals in one of the two categories when the dichotomous variable was used. The small number of subjects in one of the two categories was also the reason for very inaccurate estimates (large confidence intervals) in analyses using the dichotomous variables.

Job strain was not consistently related to poor health. The interaction terms of job demand and decision latitude were not statistically significant in any population. The inconsistencies in estimated effect could be largely due to the small number of individuals in some categories of job strain (see wide confidence intervals in all 4 centres).

Social support at work was consistently related to poor SRH: those reporting larger support at work had lower risk of poor SRH. Low job variety was related to risk of poor SRH in the Czech Republic, Hungary and Poland. No association between job variety and poor health was found in Lithuania.

All six psychosocial measures (effort, reward, demand, decision latitude, job variety and social support at work) were available for 1157 subjects in the Czech Republic, 837 in

Hungary, 734 in Poland and 507 in Lithuania (a total of 3235 individuals). All six psychosocial measures, plus all socioeconomic variables, age and sex were available for 3083 subjects.

When decision latitude, work demand, social support at work, job variety and effort-reward imbalance were entered into the same model, the effects of effort-reward imbalance and job variety remained relatively strong and consistent in all four countries (table 5.5.2.7, bottom two panels). The effort-reward ratio was the strongest predictor of poor SRH. The association between decision latitude and reported health weakened but remained relatively consistent (bottom panel). The effect of social support at work and job demand was almost removed.

In an analysis using all samples, high decision latitude was significantly associated with lower risk of poor SRH when adjusted for age and sex (table 5.5.2.8). This effect was reduced when adjusted for socioeconomic status. High job demand was associated with higher risk of poor SRH in both levels of adjustment, and this association was significant when demand was used as a continuous variable. Job strain was not related to poor SRH in any level of adjustment. Social support at work was strongly related to self-rated health. Odds ratios of poor SRH were 0.58 and 0.62 for the high compared to the low social support group when adjusted for age and sex, and when additionally adjusted for socioeconomic status. Odds ratio of poor health was 0.84 per 1 SD increase in the social support score when adjusted for socioeconomic status. The association between job variety and poor health was slightly smaller. In age-sex adjusted analysis, OR was 0.62 when comparing high to low job variety and 0.81 when used as continuous variable. When adjusted for socioeconomic variables, the effect of job variety was somewhat reduced.

When all work-related psychosocial factors were included in the same model, the association between decision latitude and poor SRH was virtually removed (table 5.5.2.8, bottom two panels). No associations between poor SRH and either job demand or social support at work were found. Job variety was related to poor health on the borderline of significance in the fully adjusted model: OR (95% CI) of poor health was 0.70 (0.49-1.00) for subjects reporting high job variety compared to those reporting low variety. Effort-reward imbalance remained strongly related to poor health: OR (95% CI) was 1.66 (1.44-1.92) per 1 SD increase in the logarithm of effort-reward ratio.

The final part of this chapter describes results of the analysis using work-related

psychosocial factors and perceived control.

Correlations between work-related psychosocial factors, perceived control and socioeconomic factors are summarised in table 5.5.2.9. The highest correlation was found between job variety and decision latitude (0.44). It means that subjects in positions with higher work variety reported higher decision latitude at work. People with higher work variety had better education (R=0.29), were less deprived (R=-0.19) and reported higher control over own life and health (R=0.18). Subjects with higher decision latitude also had better education (R=0.16), were less deprived (R=-0.21) and had higher perceived control over own life and health (R=0.19). In most cases, correlations were low, suggesting that work-related psychosocial factors were relatively independent and not strongly related to perceived control, socioeconomic factors or each other.

All data were available for 2877 individuals. Numbers of subjects in separate populations were low. Therefore we do not report results for individual populations. Results from analyses adjusted for age, sex, marital status, socioeconomic variables and population in the pooled data are shown in table 5.5.2.10. Effort-reward imbalance was strongly related to poor SRH in this analysis. It was the only psychosocial factor at work significantly related to poor health: OR (95% CI) per 1 SD increase in the logarithm of effort-reward ratio was 1.51 (1.29-1.77). The risk of poor SRH was lower in subjects reporting higher job variety: OR (95% CI) = 0.84 (0.70-1.01) per 1 SD increase in variety score. Decision latitude, job demand and social support at work were not related to poor health. The effect of perceived control remained strong. The odds ratio of poor health per 1 SD increase in perceived control was 0.64 (95% CI 0.53-0.77). Differences between populations in poor SRH were not fully explained after full adjustment. There was no difference in poor SRH among two Polish and Czech populations, although OR was 1.55 (95% CI 0.81-2.94) for Hungary and 2.19 (1.11-4.34) for Lithuania.

In additional analyses we explored whether the effects of work related psychosocial factors on self-rated health varied by socio-economic circumstances. To do this, the odds ratios for the psychosocial factors at work were estimated within each stratum of education, material deprivation, and marital status (table 5.5.2.11). We found only two statistically significant interactions: the effect of high work demand on poor health was stronger among the better educated, and low decision latitude and low social support increased the risk of poor health in unmarried, but not in married, subjects.

In an attempt to find the most influential variables on self-rated health, stepwise logistic regression was used. Results of this analysis are shown in table 5.5.2.12. Deprivation, education, perceived control, effort-reward imbalance and job variety remained in the model as the socioeconomic and psychosocial variables influencing the risk of poor self-rated health. The first column shows results adjusted additionally for age, sex and population. The effect of perceived control and effort-reward imbalance was highly significant. Education was also significantly related to poor health: there was a two-fold difference in poor SRH between primary and university educated subjects. Material deprivation and job variety were also related to poor health although the association was less strong than in the above variables.

In an attempt to adjust for current health status, we included self-reported history of cardiovascular disease in the model. The effect of deprivation was further reduced although the effects of all other variables did not change. Therefore, these variables may be independent socioeconomic and psychosocial predictors of poor self-rated health.

Table 5.5.2.1 Prevalence (%) of self-rated health, age groups and socioeconomic characteristics in working populations in 5 community samples (number of individuals in brackets)

	Czech (N=1557)		Hungary (N=958)		Pol-Warsaw (N=356)		Pol-Tarnobrzeg (N=452)		Lithuania (N=618)	
	Men (N=830)	Women (N=727)	Men (N=476)	Women (N=482)	Men (N=184)	Women (N=172)	Men (N=213)	Women (N=239)	Men (N=321)	Women (N=297)
Self-rated health										
Very good	8.0 (66)	6.2 (45)	10.9 (52)	9.8 (47)	8.2 (15)	2.3 (4)	4.2 (9)	1.7 (4)	2.2 (7)	0.7 (2)
Good	50.0 (415)	51.6 (375)	44.3 (211)	35.9 (173)	47.8 (88)	43.0 (74)	41.8 (89)	27.2 (65)	35.2 (113)	20.2 (60)
Average	36.1 (300)	39.1 (284)	38.9 (185)	47.5 (229)	40.8 (75)	46.5 (80)	45.1 (96)	62.3 (149)	52.0 (167)	62.6 (186)
Poor	5.5 (46)	3.0 (22)	5.9 (28)	6.2 (30)	3.3 (6)	8.1 (14)	8.0 (17)	8.0 (19)	10.3 (33)	15.2 (45)
Very poor	0.4 (3)	0.1 (1)	-	0.6 (3)	-	-	0.9 (2)	0.8 (2)	0.3 (1)	1.4 (4)
Age										
20-34	19.1 (157)	19.5 (141)	35.3 (159)	36.1 (164)	-	-	-	-	8.1 (26)	8.8 (26)
35-44	35.0 (288)	37.0 (268)	31.5 (142)	35.2 (160)	33.7 (62)	40.1 (69)	33.8 (72)	33.5 (80)	29.4 (94)	36.2 (107)
45-54	31.0 (255)	35.3 (256)	29.3 (132)	27.1 (123)	40.8 (75)	39.5 (68)	42.7 (91)	46.5 (111)	36.3 (116)	35.8 (106)
55+	14.8 (122)	8.3 (60)	4.0 (18)	1.5 (7)	25.5 (47)	20.4 (35)	23.5 (50)	20.1 (48)	26.3 (84)	19.3 (57)
missing	(8)	(2)	(25)	(28)	-	-	-	-	(1)	(1)
Education										
Primary	5.8 (48)	14.9 (108)	15.9 (72)	18.5 (84)	7.6 (14)	11.6 (20)	36.3 (77)	41.1 (97)	4.7 (15)	2.1 (6)
Vocational	26.4 (219)	42.9 (311)	40.8 (185)	20.3 (92)	2.7 (5)	15.7 (27)	40.6 (86)	22.9 (54)	26.7 (85)	25.4 (74)
Secondary	54.9 (456)	34.1 (247)	26.7 (121)	41.6 (189)	47.3 (87)	48.8 (84)	15.1 (32)	28.4 (67)	34.3 (109)	31.6 (92)
University	12.9 (107)	8.1 (59)	16.6 (75)	19.6 (89)	42.4 (78)	23.8 (41)	8.0 (17)	7.6 (18)	34.3 (109)	40.9 (119)
missing	-	(2)	(23)	(28)	-	-	(1)	(3)	(3)	(6)

Table 5.5.2.1 - cont.

	Czech		Hungary		Pol-Warsaw		Pol-Tarnobrzeg		Lithuania	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
*Material deprivation**										
Low (<5)	83.9 (658)	79.4 (555)	80.6 (381)	76.7 (369)	72.8 (134)	65.7 (113)	57.8 (123)	51.9 (124)	42.1 (134)	29.5 (86)
High (≥5)	16.1 (126)	20.6 (144)	19.5 (92)	23.3 (112)	27.2 (50)	34.3 (59)	42.3 (90)	48.1 (115)	57.9 (184)	70.5 (206)
Missing	(46)	(28)	(3)	(1)	-	-	-	-	(3)	(5)
Occupation										
Manual	55.5 (461)	31.8 (231)	not available		36.4 (117)	71.5 (123)	54.0 (115)	20.1 (48)	49.5 (159)	30.3 (90)
Non-manual	36.0 (299)	63.1 (459)			63.6 (67)	27.3 (47)	14.1 (30)	37.2 (89)	30.8 (99)	46.8 (139)
Not specified	8.4 (70)	5.1 (37)			-	1.2 (2)	31.9 (68)	42.7 (102)	19.6 (63)	22.9 (68)
Employment category	9.4 (78)	8.9 (65)	24.8 (118)	14.3 (69)	27.7 (51)	22.1 (38)	15.5 (33)	13.8 (33)	23.4 (75)	16.2 (48)
Manager/supervisor	54.9 (456)	51.0 (371)	65.1 (310)	80.3 (387)	57.1 (105)	69.2 (119)	47.4 (101)	43.5 (104)	19.9 (64)	10.4 (31)
Other employee	33.9 (281)	38.0 (276)	10.1 (48)	5.4 (26)	14.7 (27)	5.8 (10)	37.1 (79)	42.7 (102)	48.9 (157)	65.3 (194)
Self-employed	1.8 (15)	2.1 (15)	-	-	0.5 (1)	2.9 (5)	-	-	7.8 (25)	8.1 (24)
Not specified										

** scale 0-10*

Table 5.5.2.2: Frequency distribution of reward and effort scores

a. Czech Republic (N=1449)

Men (N=768)

		Reward: High	Reward: Low	
Effort	Low	56.8%	17.6%	74.3%
	High	12.8%	12.9%	25.7%
		69.5%	30.5%	

Women (N=681)

		Reward: High	Reward: Low	
Effort	Low	54.2%	19.8%	74.0%
	High	10.4%	15.6%	26.0%
		64.6%	35.4%	

b. Pol-Warsaw (N=348)

Men (N=180)

		Reward: High	Reward: Low	
Effort	Low	55.6%	10.0%	65.6%
	High	16.7%	17.8%	34.4%
		72.2%	27.8%	

Women (N=168)

		Reward: High	Reward: Low	
Effort	Low	50.0%	16.7%	66.7%
	High	19.6%	13.7%	33.3%
		69.6%	30.4%	

c. Pol-Tarnobrzeg (N=405)

Men (N=196)

		Reward: High	Reward: Low	
Effort	Low	55.6%	11.7%	67.3%
	High	15.3%	17.4%	32.7%
		70.9%	29.1%	

Women (N=209)

		Reward: High	Reward: Low	
Effort	Low	48.8%	10.0%	58.8%
	High	23.0%	18.2%	41.2%
		71.8%	28.2%	

d. Lithuania (N=533)

Men (N=282)

		Reward		
		High	Low	
Effort	Low	73.0%	6.4%	79.4%
	High	15.6%	5.0%	20.6%
		88.6%	11.4%	

Women (N=251)

		Reward		
		High	Low	
Effort	Low	68.9%	10.0%	78.9%
	High	15.5%	5.6%	21.1%
		84.5%	15.5%	

e. Hungary (N=841)

Men (N=417)

		Reward		
		High	Low	
Effort	Low	66.9%	17.3%	84.2%
	High	6.2%	9.6%	15.8%
		73.1%	26.9%	

Women (N=424)

		Reward		
		High	Low	
Effort	Low	65.8%	17.9%	83.7%
	High	8.0%	8.3%	16.3%
		73.8%	26.2%	

reward score: 1/1.75 = low reward; 1.76/2 = high reward
effort score: 1/1.35 = low effort; 1.4/2 = high effort

Table 5.5.2.3. An association between poor SRH and effort-reward model - OR (95% CI)

a. CZECH REPUBLIC		Adjusted 1	Adjusted 2	Adjusted 3
Model 1:				
Effort	Low	1	1	1
	High	4.00 (2.43-6.58)	3.44 (2.06-5.77)	3.38 (2.01-5.68)
Model 2:				
Reward	High	1	1	1
	Low	2.78 (1.68-4.60)	2.01 (1.18-3.43)	1.95 (1.14-3.34)
Model 3: additive model				
Effort	Low	1	1	1
	High	3.43 (2.02-5.82)	3.07 (1.79-5.29)	3.05 (1.77-5.25)
Reward	High	1	1	1
	Low	2.09 (1.23-3.57)	1.59 (0.91-2.80)	1.57 (0.89-2.76)
Model 4: multiplicative model				
Effort low + Reward high		1	1	1
Effort low + Reward low		1.92 (0.89-4.15)	1.53 (0.69-3.37)	1.48 (0.67-3.29)
Effort high + Reward high		3.14 (1.44-6.84)	2.94 (1.33-6.48)	2.87 (1.30-6.36)
Effort high + Reward low		7.13 (3.77-13.47)	4.89 (2.49-9.61)	4.77 (2.41-9.44)
Model 5:				
E-R imbalance	ER ratio <1	1	1	1
	ER ratio ≥1	6.93 (4.04-11.87)	5.35 (3.03-9.44)	5.29 (2.99-9.35)
Model 6:				
log(ERratio)	1 SD increase	2.19 (1.77-2.73)	1.93 (1.53-2.43)	1.92 (1.52-2.43)

b. POLAND-WARSAW		Adjusted 1	Adjusted 2	Adjusted 3
Model 1:				
Effort	Low	1	1	1
	High	1.47 (0.57-3.82)	1.45 (0.56-3.78)	1.75 (0.64-4.75)
Model 2:				
Reward	High	1	1	1
	Low	1.19 (0.43-3.31)	1.01 (0.35-2.95)	1.13 (0.37-3.51)
Model 3: additive model				
Effort	Low	1	1	1
	High	1.43 (0.54-3.82)	1.45 (0.54-3.90)	1.71 (0.61-4.74)
Reward	High	1	1	1
	Low	1.08 (0.38-3.10)	0.91 (0.30-2.76)	1.01 (0.32-3.20)
Model 4: multiplicative model				
Effort low + Reward high		1	1	1
Effort low + Reward low		2.33 (0.64-8.52)	1.98 (0.52-7.55)	2.13 (0.50-9.10)
Effort high + Reward high		2.52 (0.80-7.96)	2.58 (0.81-8.25)	2.86 (0.85-9.54)
Effort high + Reward low		1.01 (0.20-5.15)	0.86 (0.16-4.52)	1.17 (0.21-6.49)
Model 5:				
E-R imbalance	ER ratio <1	-	-	-
	ER ratio ≥1			
Model 6:				
log(ERratio)	1 SD Increase	1.05 (0.67-1.65)	0.99 (0.62-1.58)	1.12 (0.68-1.85)

c. POLAND-TARNOBRZEG		Adjusted 1	Adjusted 2	Adjusted 3
Model 1:				
Effort	Low	1	1	1
	High	2.34 (1.20-4.58)	2.07 (1.02-4.22)	(0.96-4.08)
Model 2:				
Reward	High	1	1	1
	Low	1.59 (0.72-3.51)	1.77 (0.76-4.17)	1.76 (0.75-4.16)
Model 3: additive model				
Effort	Low	1	1	1
	High	1.48 (0.66-3.35)	1.41 (0.60-3.27)	1.41 (0.59-3.35)
Reward	High	1	1	1
	Low	1.38 (0.59-3.22)	1.59 (0.65-3.90)	1.58 (0.64-3.90)
Model 4: multiplicative model				
Effort low + Reward high		1	1	1
Effort low + Reward low		2.59 (0.83-8.08)	3.21 (0.97-10.66)	3.20 (0.96-10.62)
Effort high + Reward high		2.31 (0.86-6.16)	2.27 (0.82-6.29)	2.33 (0.82-6.61)
Effort high + Reward low		1.82 (0.63-5.23)	2.02 (0.65-6.26)	1.99 (0.64-6.20)
Model 5:				
E-R imbalance	ER ratio <1	1	1	1
	ER ratio ≥1	1.53 (0.62-3.76)	1.52 (0.58-3.98)	1.52 (0.57-4.03)
Model 6:				
log(ERratio)	1 SD increase	1.23 (0.89-1.70)	1.28 (0.90-1.81)	1.29 (0.90-1.84)

d. LITHUANIA		Adjusted 1	Adjusted 2	Adjusted 3
Model 1:				
Effort	Low	1	1	1
	High	2.96 (1.77-4.95)	3.02 (1.77-5.14)	2.93 (1.72-5.01)
Model 2:				
Reward	High	1	1	1
	Low	1.86 (0.99-3.50)	1.76 (0.91-3.41)	1.75 (0.90-3.38)
Model 3: additive model				
Effort	Low	1	1	1
	High	3.02 (1.74-5.24)	3.10 (1.75-5.49)	3.04 (1.71-5.43)
Reward	High	1	1	1
	Low	1.58 (0.82-3.04)	1.60 (0.81-3.14)	1.58 (0.80-3.11)
Model 4: multiplicative model				
Effort low + Reward high		1	1	1
Effort low + Reward low		1.98 (0.83-4.72)	1.88 (0.77-4.60)	1.86 (0.75-4.56)
Effort high + Reward high		3.39 (1.82-6.20)	3.36 (1.76-6.43)	3.30 (1.72-6.36)
Effort high + Reward low		4.05 (1.62-10.09)	4.42 (1.72-11.41)	4.30 (1.66-11.13)
Model 5:				
E-R imbalance	ER ratio <1	1	1	1
	ER ratio ≥1	2.11 (0.80-5.57)	2.05 (0.75-5.58)	1.97 (0.72-5.40)
Model 6:				
log(ERratio)	1 SD increase	2.11 (1.57-2.82)	2.15 (1.58-2.93)	2.12 (1.56-2.89)

e. HUNGARY		Adjusted 1	Adjusted 2	Adjusted 3
Model 1:				
Effort	Low	1	1	1
	High	3.40 (1.81-6.35)	2.97 (1.55-5.70)	3.17 (1.64-6.13)
Model 2:				
Reward	High	1	1	1
	Low	1.57 (0.84-2.92)	1.27 (0.66-2.42)	1.24 (0.65-2.39)
Model 3: additive model				
Effort	Low	1	1	1
	High	3.60 (1.83-7.07)	3.38 (1.69-6.79)	3.75 (1.84-7.65)
Reward	High	1	1	1
	Low	1.07 (0.55-2.11)	0.90 (0.45-1.81)	0.85 (0.42-1.72)
Model 4: multiplicative model				
Effort low + Reward high		1	1	1
Effort low + Reward low		1.34 (0.58-3.12)	1.05 (0.44-2.53)	1.04 (0.43-2.49)
Effort high + Reward high		4.53 (1.92-10.64)	3.97 (1.62-9.70)	4.68 (1.87-11.70)
Effort high + Reward low		3.51 (1.52-8.12)	2.85 (1.20-6.79)	2.91 (1.22-6.97)
Model 5:				
E-R imbalance	ER ratio <1	1	1	1
	ER ratio ≥1	3.12 (1.35-7.23)	2.85 (1.19-6.82)	2.78 (1.16-6.67)
Model 6:				
log(ERratio)	1 SD increase	1.89 (1.43-2.49)	1.74 (1.30-2.34)	1.74 (1.30-2.33)

Adjusted 1 - sex, age
Adjusted 2 - sex, age, deprivation, education
Adjusted 3 - sex, age, deprivation, education, occupation

reward score: 1/1.75 = low reward; 1.76/2 = high reward
effort score: 1/1.35 = low effort; 1.4/2 = high effort

Table 5.5.2.4. An association between self-rated poor health and effort-reward model in pooled data: OR (95% CI)

		Adjusted 1	Adjusted 2	Adjusted 3
Model 1:				
Effort	**Low**	1	1	1
	High	2.93 (2.25-3.83)	2.63 (2.00-3.47)	2.62 (1.99-3.45)
Model 2:				
Reward	**High**	1	1	1
	Low	1.91 (1.43-2.55)	1.61 (1.19-2.17)	1.58 (1.17-2.14)
Model 3: additive model				
Effort	**Low**	1	1	1
	High	2.65 (1.98-3.55)	2.47 (1.83-3.33)	2.47 (1.83-3.23)
Reward	**High**	1	1	1
	Low	1.48 (1.09-2.00)	1.30 (0.95-1.78)	1.28 (0.93-1.75)
Model 4: multiplicative model				
Effort low + Reward high		1	1	1
Effort low + Reward low		1.88 (1.25-2.82)	1.65 (1.09-2.51)	1.62 (1.07-2.46)
Effort high + Reward high		3.19 (2.22-4.57)	2.98 (2.06-4.31)	2.97 (2.05-4.30)
Effort high + Reward low		3.69 (2.53-5.36)	3.04 (2.05-4.49)	2.98 (2.01-4.41)
Model 5:				
E-R imbalance	**ER ratio <1**	1	1	1
	ER ratio ≥1	2.81 (1.97-3.99)	2.31 (1.60-3.32)	2.29 (1.59-3.29)
Model 6:				
log(ERratio)	**1 SD increase**	1.77 (1.56-2.00)	1.65 (1.45-1.89)	1.65 (1.45-1.88)

Adjusted 1 - sex, age, population
Adjusted 2 - sex, age, deprivation, education, population
Adjusted 3 - sex, age, deprivation, education, occupation, population

reward score: 1/1.75 = low reward; 1.76/2 = high reward
effort score: 1/1.35 = low effort; 1.4/2 = high effort

Table 5.5.2.5. An association between poor self-rated health, effort-reward and socioeconomic variables in pooled data: OR (95% CI)

		Model 4	Model 6
Sex	**Male**	1	1
	Female	1.00 (0.76-1.33)	1.01 (0.76-1.34)
Age	**20-29**	1	1
	30-34	1.88 (0.72-4.88)	1.86 (0.72-4.83)
	35-39	1.75 (0.70-4.39)	1.67 (0.67-4.20)
	40-44	2.36 (0.97-5.72)	2.23 (0.92-5.41)
	45-49	2.04 (0.83-4.99)	1.92 (0.78-4.70)
	50-54	3.06 (1.25-7.52)	2.87 (1.17-7.03)
	55+	2.73 (1.08-6.90)	2.69 (1.07-6.81)
	p for linear trend	*0.01*	*0.01*
Education	**Primary**	1	1
	Vocational	0.60 (0.39-0.92)	0.61 (0.40-0.94)
	Secondary	0.52 (0.34-0.79)	0.52 (0.34-0.79)
	University	0.42 (0.25-0.71)	0.42 (0.25-0.72)
	p for linear trend	*0.001*	*0.001*
Deprivation	**1 SD increase**	1.37 (1.18-1.59)	1.30 (1.12-1.51)
Employment category	**Manager/supervisor**	1	1
	Other employee	0.98 (0.65-1.47)	1.00 (0.66-1.50)
	Self-employed	0.82 (0.53-1.28)	0.85 (0.54-1.32)
Effort low + Reward high		1	
Effort low + Reward low		1.62 (1.07-2.46)	
Effort high + Reward high		2.97 (2.05-4.30)	
Effort high + Reward low		2.98 (2.01-4.41)	
log(E-R ratio)	**1 SD increase**		1.65 (1.45-1.88)

MODEL 4: sex, age, education, deprivation, occupation, multiplicative effort-reward model, population
MODEL 6: sex, age, education, deprivation, occupation, effort-reward ratio, population

reward score: 1/1.75 = low reward; 1.76/2 = high reward
effort score: 1/1.35 = low effort; 1.4/2 = high effort

Table 5.5.2.6: Frequency distribution of work psychosocial characteristics in community samples

		Czech Republic	Hungary	Poland	Lithuania
Decision latitude	**Low**	30.0%	31.1%	24.4%	50.2%
	High	70.0%	68.9%	75.6%	49.8%
Job demand	**Low**	12.2%	10.5%	8.4%	12.2%
	High	87.8%	89.5%	91.6%	87.8%
Job strain					
Low demand-low latitude		3.4%	4.3%	2.9%	7.9%
Low demand-high latitude		8.9%	6.1%	5.4%	4.3%
High demand-low latitude		26.7%	26.8%	21.6%	42.3%
High demand-high latitude		61.1%	62.7%	70.2%	45.4%
Social support	**Low**	22.0%	17.4%	47.0%	29.6%
	High	78.0%	82.6%	53.0%	70.4%
Job variety	**Low**	11.6%	33.7%	28.2%	26.0%
	High	88.4%	66.3%	71.8%	74.0%

Job decision latitude: 0/1.5=low; 1.51/3=high
Social support: 0/1.5=low; 1.51/3=high
Job demand: 0/1=low; 2/3=high
Job variety: 0/1.5=low; 1.51/3=high

Table 5.5.2.7: The effect of working factors on self-rated health in the Czech Republic, Hungary, Poland and Lithuania (sex-age adjusted OR and 95% CI)

		Czech Republic (N=1109)	Hungary (N=770)	Poland (N=734)	Lithuania (N=505)
Decision latitude	**Low**	1	1	1	1
	High	0.48 (0.27-0.84)	0.54 (0.30-0.97)	0.82 (0.44-1.50)	1.04 (0.63-1.70)
	1 SD increase	*0.75 (0.57-0.98)*	*0.70 (0.53-0.92)*	*0.87 (0.65-1.18)*	*0.97 (0.77-1.22)*
Job demand	**Low**	1	1	1	1
	High	0.62 (0.34-1.14)	1.42 (0.49-4.07)	0.93 (0.36-2.44)	1.44 (0.65-3.16)
	1 SD increase	*1.05 (0.80-1.40)*	*1.03 (0.77-1.37)*	*1.11 (0.82-1.50)*	*1.55 (1.17-2.03)*
Job strain					
Low demand-low latitude		1	1	1	1
Low demand-high latitude		0.37 (0.09-1.48)	0.18 (0.02-1.85)	2.38 (0.25-22.89)	2.61 (0.58-11.80)
High demand-low latitude		0.57 (0.18-1.78)	0.95 (0.26-3.53)	2.16 (0.27-17.41)	1.99 (0.66-5.96)
High demand-high latitude		0.28 (0.09-0.87)	0.55 (0.16-1.96)	1.59 (0.21-12.21)	1.83 (0.61-5.54)
Social support	**Low**	1	1	1	1
	High	0.70 (0.33-1.48)	0.37 (0.20-0.70)	0.44 (0.24-0.81)	0.83 (0.49-1.41)
	1 SD increase	*0.81 (0.61-1.09)*	*0.73 (0.55-0.96)*	*0.71 (0.54-0.95)*	*0.98 (0.75-1.28)*
Job variety	**Low**	1	1	1	1
	High	0.57 (0.27-1.22)	0.37 (0.20-0.66)	0.57 (0.32-1.01)	0.97 (0.56-1.67)
	1 SD increase	*0.80 (0.57-1.13)*	*0.66 (0.52-0.84)*	*0.74 (0.57-0.97)*	*1.01 (0.80-1.26)*
log (E-R ratio)	**1 SD increase**	2.19 (1.77-2.73)	1.89 (1.43-2.49)	1.16 (0.89-1.50)	2.11 (1.57-2.82)

Table 5.5.2.7 - cont.

		Czech Republic (N=1109)	Hungary (N=770)	Poland (N=734)	Lithuania (N=505)
Decision latitude	**Low**	1	1	1	1
	High	0.53 (0.28-0.99)	0.89 (0.45-1.73)	0.83 (0.42-1.66)	1.13 (0.63-2.04)
Job demand	**Low**	1	1	1	1
	High	0.39 (0.17-0.89)	1.18 (0.39-3.57)	0.82 (0.30-2.28)	0.87 (0.32-2.34)
Social support	**Low**	1	1	1	1
	High	0.92 (0.47-1.81)	0.76 (0.36-1.60)	0.55 (0.28-1.06)	1.19 (0.64-2.04)
Job variety	**Low**	1	1	1	1
	High	0.68 (0.29-1.61)	0.47 (0.23-0.94)	0.58 (0.29-1.16)	0.72 (0.37-1.40)
log(E-R ratio)	**1 SD increase**	2.29 (1.77-2.96)	1.68 (1.24-2.29)	1.09 (0.83-1.44)	2.21 (1.62-3.03)
Decision latitude	**1 SD increase**	0.77 (0.56-1.07)	0.94 (0.66-1.34)	0.91 (0.63-1.32)	0.98 (0.73-1.32)
Job demand	**1 SD increase**	0.77 (0.56-1.07)	0.98 (0.72-1.34)	1.00 (0.72-1.41)	1.55 (1.08-2.21)
Social support	**1 SD increase**	1.02 (0.72-1.45)	1.06 (0.75-1.51)	0.82 (0.59-1.14)	1.21 (0.87-1.68)
Job variety	**1 SD increase**	0.91 (0.60-1.41)	0.71 (0.52-0.97)	0.78 (0.54-1.11)	0.80 (0.58-1.10)
log(E-R ratio)	**1 SD increase**	2.30 (1.77-2.98)	1.82 (1.33-2.48)	1.10 (0.83-1.47)	1.99 (1.45-2.72)

Job decision latitude: 0/1.5=low; 1.51/3=high
Social support: 0/1.5=low; 1.51/3=high
Job demand: 0/1=low; 2/3=high
Job variety: 0/1.5=low; 1.51/3=high
E-R ratio = effort-reward imbalance ratio

Table 5.5.2.8. The effect of working factors on poor self-rated health in 5 CEE populations (population adjusted)

		Sex, age adjusted	Sex, age, deprivation, education, occupation adjusted
Job decision latitude	**Low**	1	1
	High	0.72 (0.54-0.95)	0.85 (0.63-1.14)
	1 SD increase	*0.83 (0.73-0.95)*	*0.91 (0.79-1.05)*
Job demand	**Low**	1	1
	High	1.06 (0.69-1.63)	1.05 (0.68-1.63)
	1 SD increase	*1.19 (1.03-1.37)*	*1.17 (1.01-1.35)*
Job strain			
Low demand-low latitude		1	1
Low demand-high latitude		0.97 (0.43-2.20)	1.16 (0.50-2.69)
High demand-low latitude		1.27 (0.67-2.41)	1.23 (0.63-2.41)
High demand-high latitude		0.88 (0.47-1.65)	1.01 (0.52-1.97)
Social support	**Low**	1	1
	High	0.58 (0.43-0.77)	0.62 (0.46-0.83)
	1 SD increase	*0.81 (0.71-0.94)*	*0.84 (0.73-0.97)*
Job variety	**Low**	1	1
	High	0.62 (0.46-0.82)	0.74 (0.54-1.01)
	1 SD increase	*0.81 (0.71-0.92)*	*0.89 (0.77-1.02)*
log (E-R ratio)	**1 SD increase**	1.77 (1.56-2.00)	1.65 (1.45-1.88)
Job decision latitude	**Low**	1	1
	High	0.87 (0.64-1.20)	0.92 (0.67-1.28)
Job demand	**Low**	1	1
	High	0.74 (0.46-1.19)	0.73 (0.45-1.19)
Social support	**Low**	1	1
	High	0.85 (0.61-1.18)	0.83 (0.60-1.15)
Job variety	**Low**	1	1
	High	0.62 (0.44-0.87)	0.70 (0.49-1.00)
log (E-R ratio)	**1 SD increase**	1.75 (1.52-2.00)	1.66 (1.44-1.92)
Job decision latitude	**1 SD increase**	0.93 (0.79-1.10)	0.96 (0.81-1.13)
Job demand	**1 SD increase**	1.03 (0.88-1.21)	1.01 (0.86-1.19)
Social support	**1 SD increase**	1.02 (0.87-1.21)	1.00 (0.85-1.18)
Job variety	**1 SD increase**	0.79 (0.67-0.94)	0.86 (0.72-1.02)
log (E-R ratio)	**1 SD increase**	1.74 (1.51-2.00)	1.66 (1.43-1.92)

Job decision latitude: 0/1.5=low; 1.51/3=high
Social support: 0/1.5=low; 1.51/3=high
Job demand: 0/1=low; 2/3=high
Job variety: 0/1.5=low; 1.51/3=high
E-R ratio = effort-reward imbalance ratio

Table 5.5.2.9: Correlation between work psychosocial factors, perceived control, deprivation and education in pooled data of working population in community samples

	Support	Demand	Latitude	Variety	log(ER)	Control	Deprivation	Education
support								
demand	-0.03							
latitude	0.18	0.06						
variety	0.24	0.2	0.44					
log(ER)	-0.23	0.21	-0.09	-0.01				
control	0.23	0.01	0.19	0.18	-0.24			
deprivation	-0.14	0.03	-0.21	-0.19	0.23	-0.36		
education	0.08	0.02	0.16	0.29	-0.06	0.16	-0.11	

Table 5.5.2.10. Poor self-rated health and home and work psychosocial factors in pooled data (adjusted for age, sex, education, deprivation, marital status and occupation) (N=2877)

		OR (95% CI)
Decision latitude	1 SD increase	1.00 (0.84-1.19)
Social support	1 SD increase	1.05 (0.88-1.25)
Job demand	1 SD increase	1.02 (0.86-1.22)
Job variety	1 SD increase	0.84 (0.70-1.01)
log (Effort-reward imbalance)	1 SD increase	1.51 (1.29-1.77)
Perceived control	1 SD increase	0.64 (0.53-0.77)

Table 5.5.2.11. Odds ratios of poor SRH by psychosocial work characteristics (per 1 SD increase) at different levels of education, material deprivation and marital status

	log (E/R)	latitude	demand	support	variety
Education					
primary	1.73	1.01	0.82	0.69	0.86
vocational	1.57	0.95	1.13	0.94	0.78
secondary	1.68	0.77	1.35	0.85	0.79
university	2.42	0.82	2.38**	0.95	1.11
Deprivation					
low (0-4.9)	1.73	0.76	1.04	0.82	0.73
high (5-10)	1.63	0.89	1.25	0.88	0.81
Marital status					
married	1.78	0.72	1.18	0.74	0.70
unmarried	1.85	1.34**	1.15	1.32*	0.97

P-values for interaction: * p<0.05 ** p<0.01

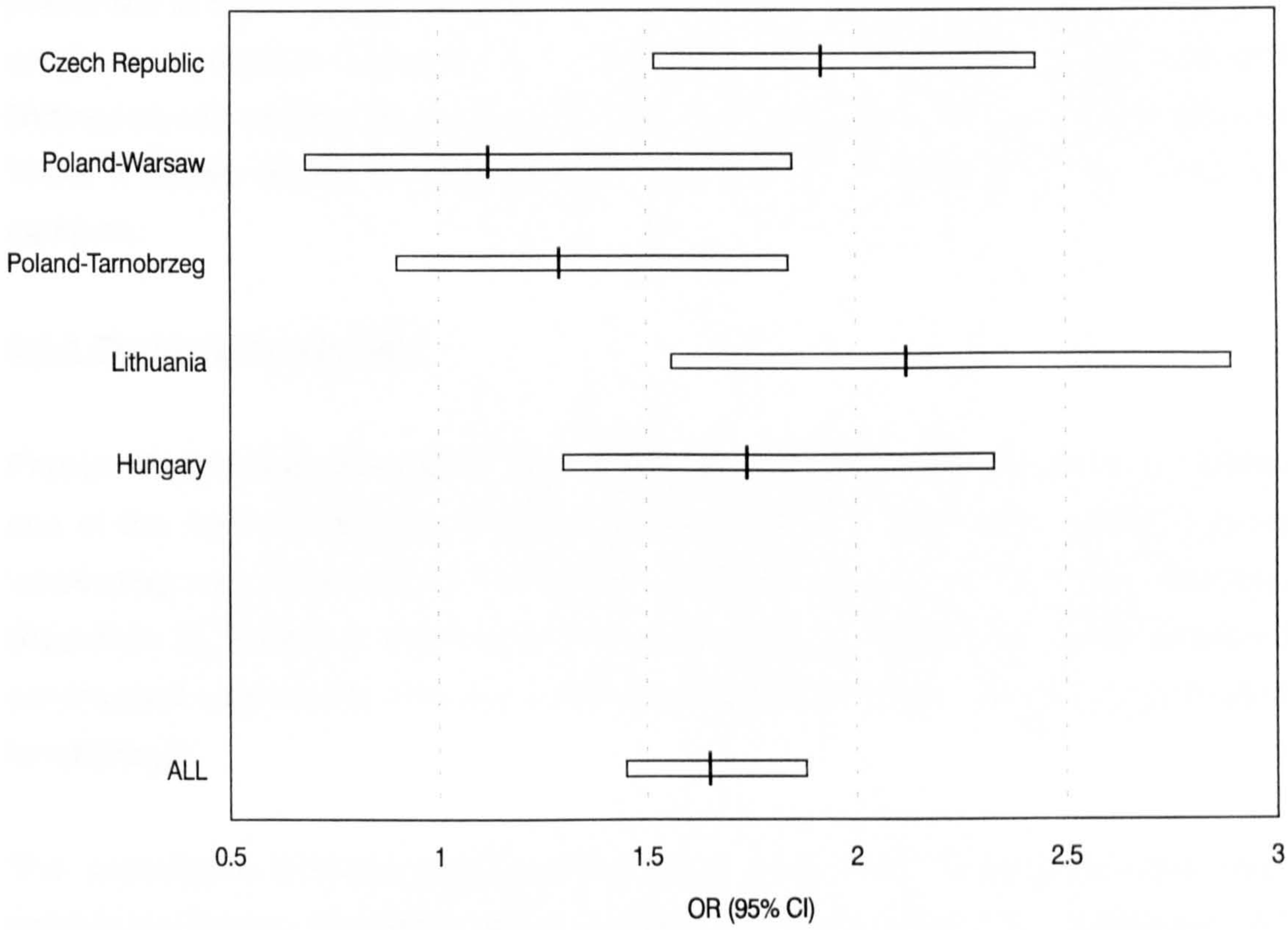
Table 5.5.2.12. OR and 95% CI for poor self-rated health and social and psychosocial predictors (pooled data; working population)

		Adjusted 1	Adjusted 2
deprivation	1 SD	1.17 (0.99-1.38)	1.12 (0.95-1.33)
education	primary	1	1
	vocational	0.70 (0.45-1.11)	0.73 (0.46-1.17)
	secondary	0.52 (0.33-0.82)	0.56 (0.35-0.89)
	university	0.48 (0.27-0.85)	0.47 (0.26-0.85)
	p for linear trend	*0.003*	*0.005*
control	1 SD	0.65 (0.54-0.77)	0.64 (0.53-0.78)
log (E-R imbalance)	1 SD	1.51 (1.30-1.74)	1.51 (1.30-1.75)
job variety	1 SD	0.88 (0.75-1.03)	0.87 (0.74-1.02)
history of CVD	no		1
	yes		2.54 (1.84-3.51)

Adjusted 1: education, deprivation, control, effort-reward imbalance, job variety, age, sex, population

Adjusted 2: as Adjusted 1 + history of cardiovascular disease

Figure 5.5.2.1. OR and 95% CI of poor self-rated health by logarithm of effort-reward ratio (per 1SD increase)



adjusted for sex, age, deprivation, education, occupation

5.6 Analyses using other endpoints

The effects of socioeconomic and psychosocial factors on other available outcomes are presented in this chapter. This chapter is divided into three sections. First, it describes analyses of physical functioning in the Russian national sample. Second, it presents findings on self-rated health assessed by a different question in four community samples. Third, it shows results on self-reported history of heart problems in five community samples.

5.6.1 Physical functioning

Physical functioning examined in Russia was the only other health outcome available in one of the national samples. As already described in the Methods chapter, physical functioning was measured by a set of ten questions taken from the SF36 instrument (Appendix 2). Based on answers to these questions, a physical functioning score was constructed with values between 0 (low physical functioning) and 100 (high physical functioning).

The association between physical functioning and social, psychosocial and health behavioural factors (the same set of variables as used in table 5.3.1.5) was tested by linear regression. The results are shown in table 5.6.1.1, again at three levels of adjustment: (1) for age and sex; (2) for age, sex, education and material deprivation; and (3) for all variables in the table.

Physical functioning in women was lower than in men in all levels of analysis, although the gender difference was substantially reduced in the fully adjusted model. Physical functioning decreased with increasing age. Controlling for covariates did slightly reduce this association but it remained very strong (3.58 decrease in physical functioning per 5 years increase of age in the fully adjusted model). Material deprivation and education were related to physical functioning. More educated and less deprived people reported better physical functioning. The effect of both was reduced by adjusting for psychosocial factors and health behaviour. Marital status was strongly related to physical functioning. Married individuals reported better physical functioning (the difference between married and unmarried was 5.39 points in fully adjusted analysis). Smoking (non-significantly) and alcohol consumption (significantly) were positively related to physical functioning: person who smoked and drank alcohol reported better physical functioning. The possible reasons for this unexpected result will be discussed in the next chapter. Perceived control was

related to physical functioning in all levels of analysis. An increase of perceived control by 1 SD was associated with 2.22 points (95% CI 1.24, 3.20) increase in physical functioning. Reaction to economic changes was strongly related to physical functioning after adjustment for age and sex. This association was mostly removed when adjusted for other factors. Subjects who relied on formal institutions only and those relying on both formal and informal institutions reported 6.18 and 5.98 points lower physical functioning than those relying only on themselves when adjusted for all other factors. Trust in institutions was not significantly related to physical functioning.

Table 5.6.1.1. An association between physical functioning and social, psychosocial and health behavioural factors in Russia

		Age-sex	Age-sex-education-depriv.	Fully adjusted
Sex	males			
	females	-7.90 (-9.77,-6.03)	-7.47 (-9.34,-5.60)	-2.91 (-5.23,-0.58)
Age	per 5 years	-4.39 (-4.68,-4.10)	-3.95 (-4.28,-3.62)	-3.58 (-3.93,-3.23)
Deprivation	per 1 SD	-2.33 (-3.28,-1.37)	-2.23 (-3.19,-1.26)	-1.35 (-2.39,-0.31)
Education	primary			
	vocational	5.20 (1.66,8.74)	5.15 (1.63,8.67)	4.04 (0.49,7.59)
	secondary	6.65 (3.04,10.26)	6.40 (2.81,9.99)	5.00 (1.37,8.63)
	university	7.61 (3.50,11.73)	6.77 (2.66,10.88)	5.23 (1.06,9.40)
	p for linear trend	*0.001*	*0.003*	*0.03*
Control	per 1 SD	2.94 (2.00,3.88)	2.49 (1.52,3.46)	2.22 (1.24,3.20)
Smoking	no			
	yes	1.58 (-0.71,3.88)	2.18 (-0.11,4.47)	0.66 (-1.68,3.00)
Alcohol consumption	never			
	<1x month	8.04 (5.45,10.63)	7.63 (5.05,10.21)	6.94 (4.28,9.59)
	1x month	8.99 (6.05,11.94)	8.37 (5.44,11.30)	7.94 (4.92,10.96)
	>1x month	11.58 (8.56,14.59)	11.16 (8.17,14.15)	10.14 (7.05,13.23)
	>1x week	9.85 (5.26,14.44)	9.90 (5.35,14.46)	9.48 (4.80,14.17)
	p for linear trend	*<0.001*	*<0.001*	*<0.001*
Marital status	unmarried			
	married	6.87 (4.89,8.86)	6.34 (4.36,8.32)	5.39 (3.37,7.42)
Reaction to economic change	pro-market			
	always positive	-1.12 (-4.48,2.24)	-0.72 (-4.08,2.64)	0.32 (-3.02,3.66)
	always negative	-2.95 (-6.37,0.47)	-2.33 (-5.75,1.10)	-1.68 (-5.10,1.74)
	nostalgic	-4.39 (-7.26,-1.52)	-2.93 (-5.91,0.05)	-2.00 (-4.99,0.99)
Types of social relations	self only			
	informal only	-2.18 (-4.20,-0.16)	-2.22 (-4.22,-0.22)	-2.65 (-4.66,-0.65)
	informal+formal	-4.44 (-10.23,1.35)	-4.91 (-10.66,0.84)	-5.98 (-11.62,-0.34)
	formal only	-7.20 (-10.35,-4.06)	-6.95 (-10.07,-3.84)	-6.18 (-9.26,-3.10)
Trust in institutions	per 1 SD	0.50 (-0.44,1.45)	0.39 (-0.56,1.35)	0.69 (-0.27,1.65)

5.6.2 Other definition of self-rated health

Another definition of self-rated health, defined as rating of own health compared to the health of other people of the same age, was available in four community samples (Poland-Warsaw, Poland-Tarnobrzeg, Lithuania, Hungary). A binary variable "poor health" was defined as health worse than that of people of the same age, as opposed to those rating their health as the same or better than other people's.

The prevalence of poor self-rated health, using the above definition, was 22.4% (1012 subjects reporting poor SRH in sample of 4511 individuals). It was 20.0% in Poland-Warsaw, 30.7% in Poland-Tarnobrzeg, 25.2% in Lithuania and 17.8% in Hungary. In the working subpopulation, the prevalence of poor SRH compared to others was 12.8%.

The effect of socioeconomic factors and perceived control is summarized in table 5.6.2.1. Education and deprivation were strongly related to poor self-rated health. The odds ratio of poor health by 1 SD increase in material deprivation was 1.50 (95% CI 1.37-1.63) in the fully adjusted model. Perceived control was also associated with poor health. Odds ratio of poor health by 1 SD of perceived control score was 0.70 (95% CI 0.63-0.77). There was a significant interaction between gender and marital status. Unmarried men reported poor health almost twice as often as married men. In women, there was almost no difference between married and unmarried women.

The results from analysis in the working population, using variables selected as the most influential in chapter 5.5, are shown in table 5.6.2.2. The effect of deprivation and education was partly reduced. The association between material deprivation and poor SRH remained borderline significant. There was no significant association between poor SRH and education. Three psychosocial variables were significantly related to poor self-rated health: perceived control, job variety and effort/reward imbalance. Odds ratios of poor SRH compared to others by 1 SD increase in risk factor were 0.68 (95% CI 0.57-0.80) for perceived control, 0.84 (0.73-0.96) for job variety, and 1.27 (1.11-1.46) for the logarithm of effort-reward imbalance ratio. In general, these results are similar to the main analyses presented in the previous chapters.

Table 5.6.2.1. OR and 95% CI of poor SRH compared to health of others of same age by psychosocial and socioeconomic variables

		age-sex adjusted	fully adjusted
Education	primary	1	1
	vocational	0.65 (0.53-0.80)	0.73 (0.59-0.91)
	secondary	0.50 (0.40-0.61)	0.62 (0.49-0.77)
	university	0.35 (0.27-0.46)	0.54 (0.40-0.72)
	p for linear trend	*<0.001*	*<0.001*
Material deprivation	per 1 SD	1.66 (1.53-1.79)	1.50 (1.37-1.63)
Marital status	Men		
	Married	1	1
	Unmarried	1.96 (1.47-2.63)	1.64 (1.19-2.22)
	Women		
	Married	1	1
	Unmarried	1.16 (0.94-1.45)	1.02 (0.80-1.28)
Perceived control	per 1 SD	0.60 (0.55-0.67)	0.70 (0.63-0.77)

Table 5.6.2.2. OR and 95% CI for poor SRH compared to health of others of same age in working population (N=1935)

		OR (95% CI)
deprivation	per 1 SD	1.20 (1.03-1.39)
education	primary	1
	vocational	0.88 (0.57-1.36)
	secondary	0.71 (0.46-1.10)
	university	0.87 (0.53-1.45)
Perceived control	per 1 SD	0.68 (0.57-0.80)
log (E-R imbalance)	per 1 SD	1.27 (1.11-1.46)
job variety	per 1 SD	0.84 (0.73-0.96)

Adjusted for education, deprivation, control, effort-reward imbalance, job variety, age, sex, population

5.6.3. Self-reported history of cardiovascular disease

Self-reported history of cardiovascular problems was assessed by the question 'Have you ever had heart trouble suspected or confirmed by a doctor?' (question 8a in appendix 1). This question was available in all five community samples.

The prevalence of the self-reported history of CVD in the study population was 33.1% (29.1% in men and 36.5% in women). It was 40.2% in Poland-Warsaw, 47.5% in Poland-Tarnobrzeg, 44.3% in Lithuania, 27.6 in the Czech Republic and 23.2 in Hungary. The prevalence of outcome was lower in the working population (24.7%).

The ORs (95% CI) of history of CVD by socioeconomic factors and perceived control are shown in table 5.6.3.1. Education was not related to a history of CVD (p for linear trend was 0.19 in age-sex adjusted analysis and decreased further when adjusted for other socioeconomic variables and perceived control). Deprivation, on the other hand, was significantly related to self-rated CVD problems. The odds ratio of poor health for 1 SD increase in material deprivation was 1.17 (95% CI 1.10-1.26) in the fully adjusted model. Perceived control was also associated with a self-reported history of CVD. Odds ratio by 1 SD of perceived control was 0.83 (95% CI 0.77-0.90). There was no association between marital status and self-reported history of CVD problems.

The results of the analysis in working subjects are shown in table 5.6.3.2. The effect of deprivation and education was smaller than in the full sample. The association between material deprivation and a history of CVD problems was not significant; the odds ratio was reduced to 1.07 (95% CI 0.97-1.18). There was no association between the outcome and education. Job variety was not related to a history of CVD problems reported by study subjects. The remaining two psychosocial variables were significantly related to self-reported history of CVD problems. The risk of CVD problems reported by individuals decreased with increasing perceived control (OR 0.81 per 1 SD; 95% CI 0.73-0.90) and increased with increasing effort-reward imbalance (OR 1.13 per 1 SD in logarithm of effort-reward ratio; 95% CI 1.03-1.24).

The effects of social and psychosocial risk factors on self-reported history of cardiovascular problems were smaller than the effects on self-rated health. Although perceived control and effort-reward imbalance (and partly material deprivation) were associated with higher risk of this outcome, a temporal association is not entirely clear, and this finding must be interpreted cautiously.

Table 5.6.3.1. OR and 95% CI of poor self-rated history of heart problems by psychosocial and socioeconomic variables

		age-sex adjusted	fully adjusted
Education	primary	1	1
	vocational	0.94 (0.81-1.09)	1.04 (0.87-1.24)
	secondary	0.91 (0.79-1.05)	1.00 (0.84-1.19)
	university	0.90 (0.74-1.08)	1.08 (0.86-1.34)
	p for linear trend	*0.19*	*0.69*
Material deprivation	per 1 SD	1.21 (1.13-1.29)	1.17 (1.10-1.26)
Marital status	Unmarried	1	1
	Married	1.03 (0.90-1.17)	1.09 (0.93-1.28)
Perceived control	per 1 SD	0.80 (0.74-0.86)	0.83 (0.77-0.90)

fully adjusted = adjusted for age, sex, education, material deprivation, marital status, perceived control and population

Table 5.6.3.2 OR and 95% CI of self-rated heart problems in working population

		OR (95% CI)
deprivation	1 SD	1.07 (0.97-1.18)
education	primary	1
	vocational	0.99 (0.73-1.34)
	secondary	0.99 (0.73-1.33)
	university	1.20 (0.85-1.70)
control	1 SD	0.81 (0.73-0.90)
log (E-R imbalance)	1 SD	1.13 (1.03-1.24)
job variety	1 SD	1.06 (0.96-1.17)

Adjusted for education, deprivation, control, effort-reward imbalance, job variety, age, sex, population

Chapter 6
Discussion

The main purpose of this project was to study the social and psychosocial determinants of poor self-rated health in the general population of seven east and central European countries, and to find out whether the concepts previously established in western populations are valid in the former communist countries of central and eastern Europe. To our knowledge, the question of the applicability of many of the concepts has not yet been investigated in such detail. Our main findings can be summarized as follows. First, there were strong socioeconomic gradients at the individual level; they were pronounced by education, and in particular by material deprivation. Second, perceived control was strongly related to SRH. Third, the effort-reward imbalance was found as the strongest predictor of poor SRH among work related psychosocial factors; particularly when measured as a continuous variable. Work variety was also associated with SRH. And fourth, the effect of inequality measures characterising whole populations - the Gini index of income inequality and inequality index - has been associated with poor SRH, but their effect was substantially reduced by adjusting for individual based factors (mostly by adjusting for individual's material deprivation and perceived control).

In this chapter, I will examine whether methodological questions may have invalidated our findings (section 6.1), and I will put our results in the context of previous research (section 6.2). Finally, I will attempt to answer the question whether this research helps to understand the health crisis in CCEE (section 6.3).

6.1 Methodological issues

The findings of the present study should be interpreted in relation to its methodological strengths and weaknesses.

This study had a number of strengths. Firstly, it examined random samples of populations from all socioeconomic groups in seven countries of CCEE. Secondly, to our knowledge, the sample size of this study was much larger than any other study assessing effects of social and psychosocial factors on self-rated health in CCEE. Thirdly, the wide range of variables available in the study allowed us to consider the simultaneous effects of several variables, and to test concepts and models used in Western populations (such as job-strain model and effort-reward imbalance model) but not yet examined in CCEE.

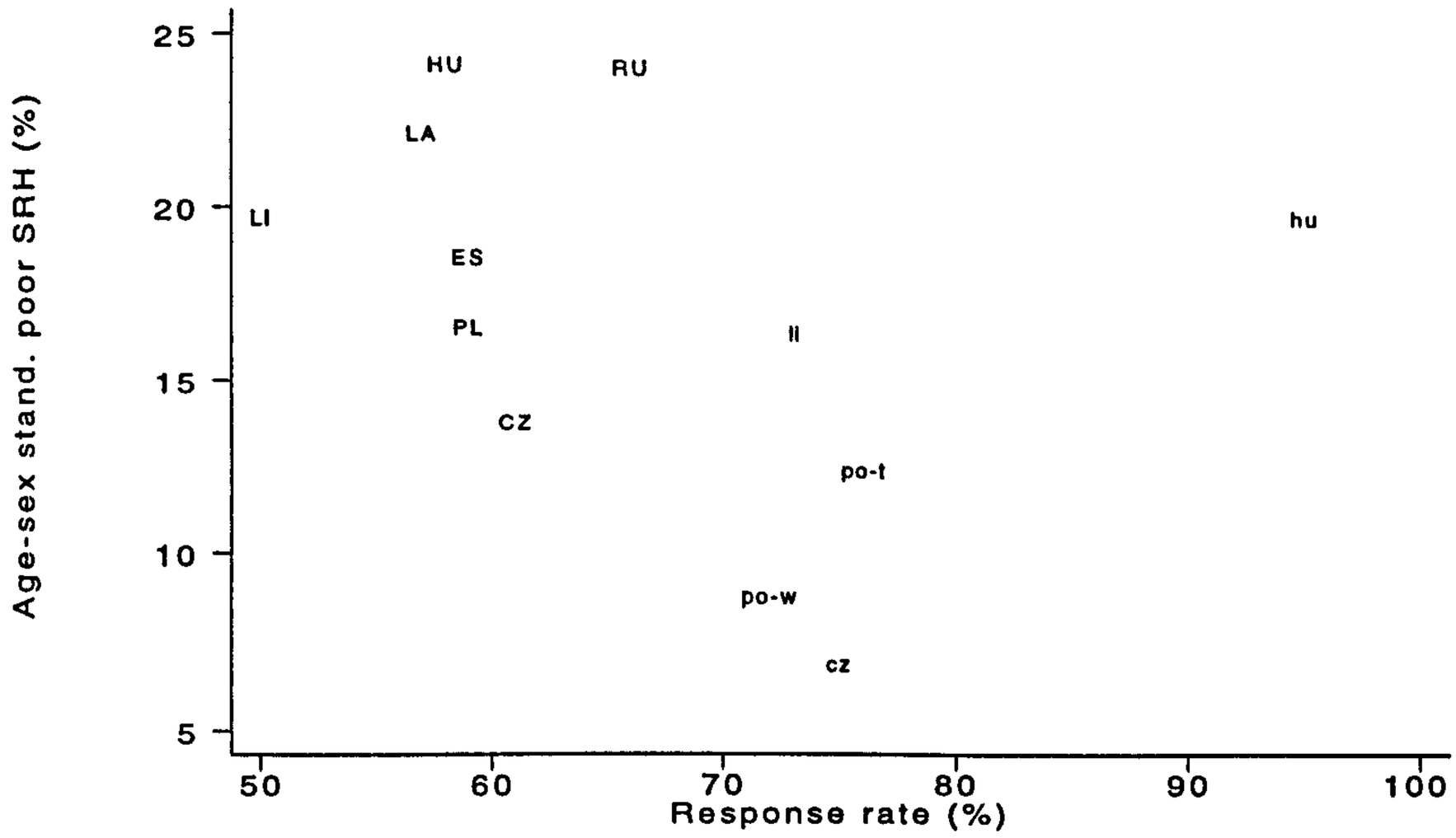
The study, however, also has a number of limitations.

6.1.1 Representativeness of the sample

The questionnaires/interviews were administered to random samples of population in each country or community. Response rate varied between 72% and 95% in the community samples, but only between 50% and 66% in the national samples. The distribution of persons who completed interviews in national samples agreed well with age, sex and education distribution of population in these countries (for Russia, see Rose, 1996; for Estonia, Latvia, Lithuania, see Rose, 1997; for the Czech Republic, data from the study were compared to those in Czech Statistical Yearbook 1996; for Hungary and Poland, R.Rose, personal communication). However, this does not necessarily mean that the study samples were representative for their study populations. It is usually thought that non-responders differ from responders in that they are less healthy and have less favourable risk factor profiles. We can only speculate how the economic or other reasons for non-participation would influence the validity of presented results. For example, if non-responders were less healthy, less educated, more deprived and less socially connected, then our national estimates of the prevalence of poor health, material deprivation and other unfavourable characteristics were underestimated in this study. The associations between these socioeconomic measures and self-rated health may, however, be unbiased. If, on the other hand, the lowest socioeconomic category (with presumably the worst health) was considerably underrepresented, the full effect of low socioeconomic status may be underestimated.

First, we examined possible bias in estimating the prevalence of poor SRH. Figure 6.1.1 shows the association between response rates and age-sex standardised prevalence of poor self-rated health in our samples (the national samples are marked by upper-case letters and the community samples by lower-case letters). The overall trend and the difference between national and community samples within countries in this figure suggest that the prevalence of poor self-rated health may be inversely related to the response rate. We cannot exclude the possibility that the prevalence of SRH may be overestimated in some countries in our study. However, when we compared the seven national samples or the four MONICA samples separately (samples with identical data collection protocol), there was no relation between response rate and prevalence of poor SRH. This suggests that this bias, if it exists, is not large.

Figure 6.1.1. The association between response rate and prevalence of poor SRH in each study population



Response rates in the community samples differed from national samples in the same countries. The community samples, however, did not aim to be representative of the whole countries; rather, they were designed to represent the study areas. It is unlikely that the results were substantially influenced by the response rates. Recently, the Czech MONICA investigators focussed specifically on this question. They examined non-responders in the 1997 survey. Non-responders were more healthy (in terms of prevalence of hypertension) than individuals who responded to the original survey (Z.Skodova - personal communication). This finding, plus the fact that within national and community samples prevalence of SRH was not related to the response rate, suggests that our estimates of poor health were not substantially biased.

The second, and more important, issue is whether non-response could have affected the observed associations between variables, and thus invalidated the generalizability of the findings to the whole (real) national populations. We do not have the data to evaluate this question numerically. The associations observed in our data were plausible, made sense, were similar in the national and community samples, and were consistent with other studies elsewhere (see below in Discussion). Our findings should be seen as hypothesis generating, and the results should be confirmed in further studies.

Third, missing values could influence the validity of the data. Not all collected records

were complete. Missing data in categorical variables, such as education, were coded as special category and individuals with such data were not excluded from the analysis. Individuals with missing information about the outcome or about continuous variables (such as perceived control) were excluded from the analysis. However, the numbers of individuals excluded for this reason were small. It is unlikely that exclusion of individuals with missing values would substantially affect the results.

6.1.2 Limitations of the cross-sectional character of the study

Whenever the exposure and disease status are assessed at the same time, the temporality issue complicates the process of establishing a clear causal relationship. This study collected recent and retrospective data about both health status and social and psychosocial status of individuals. The temporal sequence of events is not always easy to distinguish.

The easiest way to obtain a clear evidence that the exposure preceded the onset of disease would be to collect the information prospectively. Unfortunately, this was not possible.

The problem of temporality is relevant to several aspects of our study. For example, in the Russian national sample better physical functioning was associated significantly with higher consumption of alcohol and non-significantly with current smoking (table 5.6.1.1). It is possible that this effect was found because those who were still healthy enough smoked and drank more than those who were too ill to do so (the additional results that do not fully support this argument are shown in section 6.2.2). This problem occurred with several variables, and the temporality issue will be discussed where appropriate. At the general level, we have to admit that this is the main problem of the study.

6.1.3 Random error

Odds ratios can differ from unity (or regression coefficients can differ from zero) merely due to chance. Statistical tests are used to assess this possibility. Throughout the analysis, emphasis has been placed on the 95% confidence intervals of odds ratios and the estimates of prevalence of poor self-rated health. Formal tests of statistical significance were performed where appropriate. As a large number of tests was done, there is still a possibility that some "significant" findings occurred, in fact, by chance (using 95% confidence levels we can expect that 5% of tests would appear to be significant only by chance).

However there are several reasons why we believe that this was not the case in this study.

First, the results were consistent in all (or at least most) populations under study, and they were consistent in different steps of the analysis. Second, the hypotheses were created a priori, before beginning statistical analysis. Finally, the results are plausible and largely consistent with the literature.

6.1.4 Misclassification

Appropriate design, selection of individuals, and careful analysis can improve the possibility of assessing the evidence of the effects of risk factors studied in this project on self-rated health. However, there are other important limitations of epidemiological studies, and misclassification is one of them. Self-reports of health status, health-related behaviours, social and psychosocial status may be subject to such misclassification.

Non-differential misclassification

Non-differential misclassification is independent from the disease or exposure status - the misclassification of the variable in question is assumed to be incorrect for the same proportion of individuals in the compared groups.

If the misclassification of the outcome is random (ie independent from the classification of the explanatory variables), the effect of such misclassification would be a dilution of the associations and a reduction in the power of the study (in the situation when a real association exists). In our study, classification of health is based on subjective self-report. Clearly, there is substantial space for misclassification. Such misclassification, if random, will underestimate the strength of the associations between independent and dependent variables (ORs or regression coefficients).

Non-differential misclassification of explanatory variables cannot be excluded either. Such a misclassification would result in underestimation of the size of the effect of explanatory variables (bias towards unity). There are no strong reasons for large misclassification of education and demographic factors. These factors are stable over time and can easily be checked against identification documents. There is a possibility of underestimation of economic variables because of the tendency of people in CCEE to hide their own wealth. This would lead to an overestimation of the effects of these variables. A slightly different situation may occur with psychosocial factors. Apart from differential misclassification, which is discussed in the next section, there is a possibility of non-differential misclassification, too. There is a long tradition in CCEE of behaving as the “average”. People may tend to answer questions in psychosocial measures around the middle of the

scale, instead of using the extreme points of these scales; this would lead to overestimation of the effects.

Differential misclassification

Differential misclassification of exposure is a misclassification which depends on disease status - the proportion of individuals giving incorrect information would be different in healthy and ill people. It is possible that people with worse health would report some variables differently than healthy people (eg psychosocial factors, smoking, alcohol consumption). A variant of this bias is the "cross-contamination" between exposure and outcome. For example, persons with poor health may perceive lower control over their life because they are less healthy. Such differential misclassification (a recall bias) can be a serious problem of this study as it is impossible to quantify the size of this misclassification. The results must be interpreted cautiously but there is one possible argument against this type of misclassification: there is no a priori reason why it should apply to some psychosocial variables and not others. The fact that some psychosocial variables were strongly related to SRH while others were not points against such differential misclassification or reporting bias.

6.1.5 Confounding

Confounding is a situation when the observed association between exposure and disease could be explained by the fact that the exposure is correlated with another exposure which affects disease risk. Confounding can be dealt with either at the design stage (restriction, matching, randomisation), or in statistical analysis (stratification, regression modelling). In our study, we used the regression modelling - a multivariate technique allowing the effects of a whole range of exposures to be estimated simultaneously, each one being adjusted for the potential confounding effect(s) of the other variable(s). The best method to evaluate the presence of confounding is to compare crude and adjusted estimates. If the adjusted estimate of the exposure effect is substantially different from the unadjusted one, we can conclude that the unadjusted estimate is confounded. However, it is necessary to distinguish between a confounding and causal pathways, as both would behave identically in the analysis. A priori knowledge is necessary to distinguish confounding from a possible mediating effect.

In our study, the effects of potential independent factors were estimated in multivariate analyses (logistic regression, linear regression, ordered polytomous regression). This should control for potential confounding factors. Despite this, several limitations appeared. First, several variables, such as smoking, alcohol consumption or obesity, could be tested

only in some populations; these variables were not available in all datasets. Second, more importantly, some factors such as physical activity data, dietary data, passive smoking or objective measures of health status, were not available in any dataset, and therefore could not be considered in an analysis. Third, it has been documented (Phillips and Davey Smith, 1991) that factors measured with better precision (for example using more precise scales or better designed questions) are related to outcome more strongly in multivariate analysis than factors using less precise measures. Therefore multivariate analysis can sometimes give misleading or imprecise estimates of the real effects.

6.1.6 Relevance of statistical techniques and models used in the analysis

The main outcome measure

In this project SRH was assessed by questions 'Over the last 12 months, how do you rate your health?' (community samples) or 'In general, over the last 12 months, how do you rate your physical health?' (national samples). Poor SRH was assigned to those who answered 'poor' or 'very poor' to those answers. In several other studies (e.g. Fylkesnes and Forde, 1991) poor SRH was defined as SRH worse than good (average, poor, very poor). It is important to assess whether difference in definition of poor SRH makes a difference in results presented in this thesis. There have been several studies looking at continuity of self-rated health.

Smith et al (1994) compared two models of SRH defined as (1) rating of health as worse than that of people of the same age compared to those rating own health as the same as others; and (2) rating of health as better than that of people of the same age compared to those rating own health as the same as others. Only three identical variables predicted these outcomes, and only the model using "health worse than that of people of the same age" included socioeconomic characteristics. This would suggest that it does matter which cut-off point is used to define the binary outcome variable. On the other hand, Manderbacka et al (1998) found continuity of SRH from poor to good health when they compared models with outcomes defined as (1) average versus good/excellent self-rated health, and (2) poor versus good/excellent self-rated health. They also showed that the results for men and women were almost identical.

I examined the suitability of the definition of SRH by (1) using a different cut-off point for definition of poor SRH, and (2) by using the 5-point scale of SRH in ordered polytomous regression.

To follow the first approach, I defined poor SRH by answers "very poor", "poor", "average" to the question 'In general, over the last 12 months, how would you rate your physical health?' in all national samples and we used this newly defined variable as an outcome in multivariate logistic regression. Figure 6.1.2 shows prevalence of this outcome by gender in each national sample. The prevalence varied between 40% (men in the Czech Republic) and 75% (women in Russia) and was higher among women in all samples. Table 6.1.1 shows results from logistic regression in two levels of adjustment. The effects of education, deprivation and perceived control were almost identical as in the analysis using only answers 'poor' or 'very poor' in definition of poor SRH (compare table 5.3.1.4, last column).

The second approach was to use ordered polytomous regression for analysis of SRH on a 5-point scale. This type of regression can be used when the outcome variable has more than two categories which are regarded as ordered. An ordered polytomous regression model assumes that the parameters of interest (for example odds ratios for the effect of education) do not vary with the choice of cut-off in outcome variable and summarizes the parameter effect with a single statistic (odds ratio and 95% confidence interval). Table 6.1.2 shows results from age-sex adjusted and fully adjusted analysis. Results were again almost identical to those found for the binary outcome (table 5.3.1.4).

These two analyses suggest a continuity of self-rated health from very poor to very good. Therefore, the results presented in this report should not be influenced by the use of a specific cut-off point for our main outcome variable.

Figure 6.1.2. Prevalence of poor or average SRH in seven national samples (age standardised)

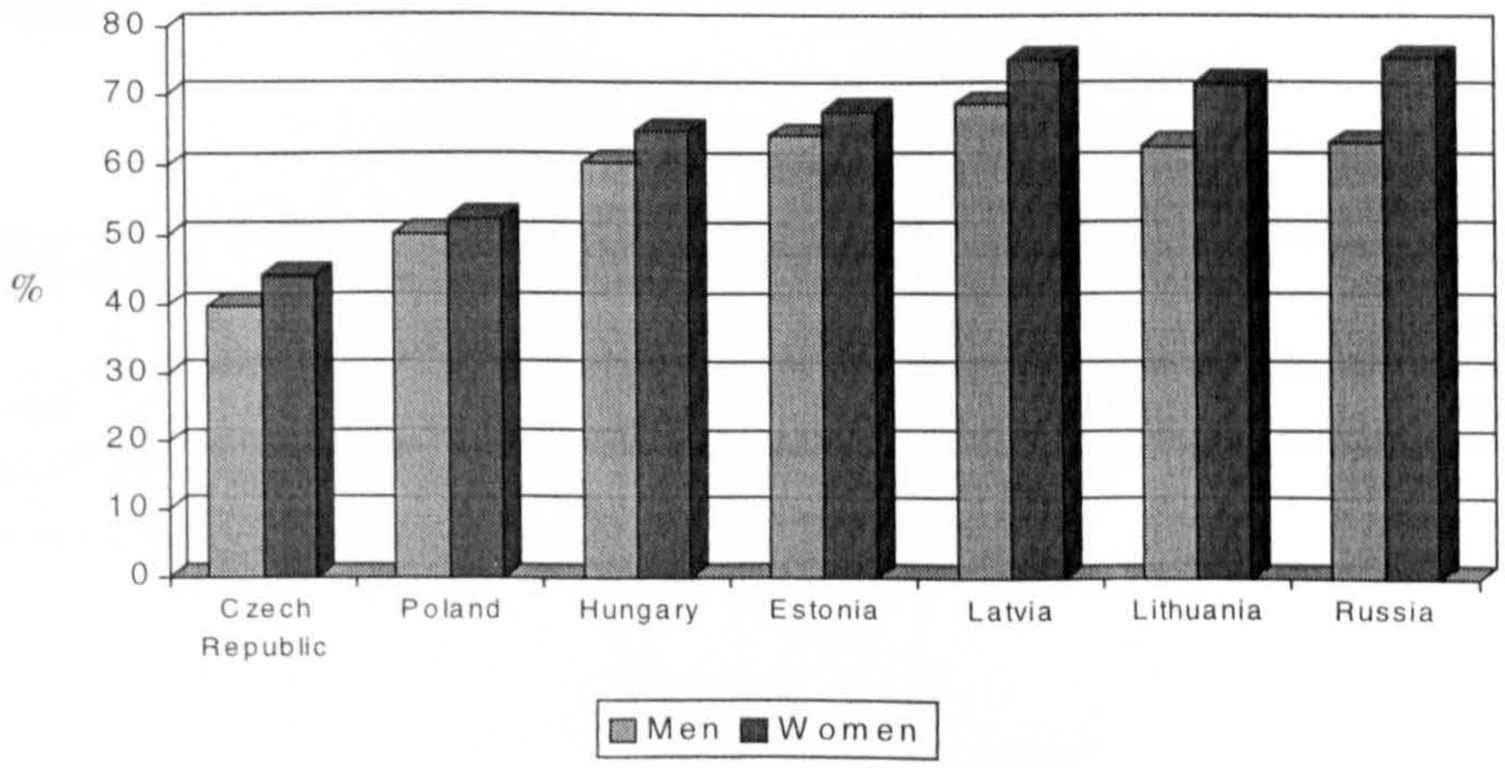


Table 6.1.1. OR (95% CI) of poor self-rated health by sex, age, social and psychosocial variables in seven national samples

		Sex-age adjusted	Fully adjusted*
Sex	Males	1	1
	Females	1.44 (1.30-1.61)	1.35 (1.21-1.52)
Age	<20	1	1
	20-29	1.23 (0.94-1.60)	1.37 (1.02-1.84)
	30-39	2.35 (1.81-3.07)	2.50 (1.85-3.39)
	40-49	4.93 (3.78-6.43)	5.05 (3.72-6.86)
	50-59	8.95 (6.77-11.83)	8.40 (6.14-11.50)
	60+	18.45 (13.92-24.46)	14.95 (11.03-20.28)
Deprivation	1 SD increase	1.57 (1.47-1.67)	1.33 (1.25-1.43)
Education	Primary	1	1
	Vocational	0.66 (0.54-0.80)	0.73 (0.59-0.89)
	Secondary	0.54 (0.45-0.66)	0.70 (0.57-0.86)
	University	0.34 (0.27-0.42)	0.52 (0.41-0.66)
Marital status	Unmarried	1	1
	Married	1.00 (0.88-1.14)	1.06 (0.93-1.22)
Control	1 SD increase	0.51 (0.48-0.55)	0.57 (0.53-0.61)

all analyses adjusted for population

* all variables in table included in the model

Table 6.1.2. OR (95% CI) for the effect of socioeconomic factors and perceived control on SRH when used as 5-point scale categorical variable

		Sex-age adjusted	Fully adjusted*
Sex	Males	1	1
	Females	1.39 (1.28-1.52)	1.28 (1.17-1.40)
Age	<20	1	1
	20-29	1.52 (1.21-1.91)	1.74 (1.37-2.21)
	30-39	2.92 (2.33-3.67)	3.25 (2.53-4.18)
	40-49	5.93 (4.72-7.44)	6.12 (4.75-7.88)
	50-59	9.86 (7.79-12.47)	9.09 (7.04-11.73)
	60+	21.71 (17.23-27.37)	17.35 (13.57-22.20)
Deprivation	1 SD increase	1.55 (1.48-1.64)	1.32 (1.25-1.39)
Education	Primary	1	1
	Vocational	0.66 (0.57-0.76)	0.71 (0.62-0.83)
	Secondary	0.53 (0.46-0.61)	0.66 (0.57-0.76)
	University	0.35 (0.30-0.41)	0.53 (0.44-0.63)
Marital status	Unmarried	1	1
	Married	0.93 (0.84-1.03)	1.02 (0.92-1.13)
Control	1 SD increase	0.51 (0.48-0.53)	0.56 (0.53-0.59)

all analyses adjusted for population

* all variables in table included in the model

6.2 Consistency of our results with other studies

6.2.1 Prevalence of self-rated health

In the Whitehall II study, 3.9% of men and 7.3% of women rated their health as poor or very poor (Stansfeld et al, 1993), and 22.3% of men and 36.1% of women rated their health as average or worse (Marmot, 1993). In the MIDUS survey (National survey of Midlife Development in the United States), 14.3% of men and 16.8% of women aged 25 to 74 rated own health as worse than average (Marmot et al, 1998).

In our study, the overall prevalence of poor self-rated health was higher than in the Whitehall II study but it was similar to that reported in the MIDUS study (table 5.1.4, figures 5.1.1, 6.1.2). However, the prevalence of poor SRH varied substantially between populations. The lowest prevalence of poor SRH was found in Czech and Polish samples, while the highest rates were seen in Russia followed by the Baltics and Hungary. The high prevalence of poor SRH in CCEE observed in our data is consistent with data from the World Value Survey (figure 2.2.; Carlson, 1998).

The high rates of poor health in our study are unlikely to be an artefact, although low response rates could lead to overestimation of the prevalence of poor SRH (see section 6.1.1). Previous studies found consistently that SRH was poor in CCEE. Moreover, the ranking of populations seems sensible. There was a good correlation between SRH and mortality in the seven countries for which national samples were available (figure 5.4.2). This further supports the validity of SRH as an outcome in epidemiological studies.

6.2.2 Life-style risk factors

From the conventional life-style factors, our data included only alcohol consumption and smoking, and only in the Russian national and Hungarian community samples.

Smoking was not significantly associated with poor health in our data. Fylkesnes and Forde (1991) found that smoking was related to poor self-rated health after adjustment for other risk factors. Smith et al (1994) did not find any association between smoking and self-rated health.

The association between alcohol consumption and poor self-rated health in our data was J shaped: self-rated health was best among subjects consuming low or moderate levels of alcohol. A recent cross sectional study in Denmark including about 12,000 subjects (Gronbaek et al, 1999) also found that after controlling for covariates there was a J-

shaped relation between alcohol consumption and prevalence of poor SRH. Only low or moderate wine consumption was associated with good SRH. No such association was found for beer or spirits. Previously, Smith et al (1994) did not find an association between alcohol consumption and poor self-rated health.

Thus, there were only a few studies using self-rated health that have included smoking and alcohol. Our result are mostly consistent with previous research but the limited amount of data did not allow firm conclusions as to the association between self-rated health and life-style.

The results on physical functioning were somewhat different. Subjects who never consumed alcohol reported worse physical functioning than individuals consuming low, moderate or even high levels of alcohol. Smokers reported slightly better physical functioning than non-smokers. One could speculate that those who are healthy do smoke and consume alcohol. Unfortunately, as discussed in section 6.1.2, this hypothesis cannot be investigated in cross-sectional data. However, we could divide non-smokers into two subgroups (those who smoked in the past and those who never smoked), and examined differences in physical functioning among these categories. Surprisingly, the worst physical functioning was found among subjects who have never smoked (the physical functioning score was 2.9 points lower than in current smokers; 95% CI 0.3, 5.4) when controlled for age, sex, education and material deprivation. Physical functioning of individuals who reported smoking in the past was only marginally worse than physical functioning of current smokers (1.0 point lower; 95% CI -2.0, 4.0). These results do not support the health selection hypothesis; poor health was not probably the reason for quitting smoking. We could not conduct a similar analysis with alcohol as data about alcohol consumption in the past were not available.

Obesity (in terms of body-mass index) could only be investigated in a subpopulation of the Hungarian community sample. We found that higher body-mass index was significantly associated with poor SRH. This is consistent with most of published work (eg. Cairney and Wade, 1998; Malmstrom et al, 1999).

6.2.3 Socioeconomic factors on individual level

Virtually all studies which have examined the associations between socioeconomic status and health have found that health status was worse among individuals in a lower socioeconomic position. The vast majority of studies were conducted in Western populations.

The association between socioeconomic status and health has been studied less extensively in countries of central and eastern Europe than in the West, but published studies suggest relatively large educational gradients in mortality (Kunst, 1997; Shkolnikov et al, 1998; Brajczewski and Rogucka, 1993), incidence of myocardial infarction (Bobak et al, 2000), and prevalence of risk factors (Bobak et al, 1999). Kunst (1997) also showed large mortality differences between manual and non-manual classes in Hungary and the Czech Republic. Educational differences in self-rated health were recently reported from the Czech Republic (Hraba et al, 1998) and Russia (Palosuo et al, 1998). From other socioeconomic indicators, income and occupational status were reported to be associated with self-rated health in a Russian population (Palosuo et al, 1998).

Selection of socioeconomic measures

We decided to use education and material deprivation as two variables representing two dimensions of social environment- general social standing and material conditions. A third dimension - employment relations and conditions - was represented by employment status, and was used where data were available.

Some earlier studies used other indicators of material conditions such as car ownership or crowding (Bobak, 1996), but these variables did not predict the health outcome. There were two additional reasons for not using car ownership and crowding.

In CCEE, crowding reflects aspects other than material circumstances because the housing market was limited, and in some areas such a market was almost non-existent. In communist era, new flats were mostly allocated by employers or local authorities on the basis of political reliability and labour force needs. These criteria were not related to other life (or financial) circumstances. Therefore there were large regional differences in housing which were not primarily socioeconomic. People in a good financial position often lived in worse housing circumstances because they could not find better flats/houses in the areas of their jobs. The situation changed somewhat in the most recent period, but we think that our data largely reflect the "old" situation.

Car ownership is also not a good indicator of socioeconomic status. First, the car market was limited until early 1990s: even with money cars were not easily available (there were waiting lists for cars in many CCEE). Second, the average age of cars is high (more than ten years in all countries of central and eastern Europe), and a simple question about car ownership does not reflect the underlying socioeconomic circumstances.

Education, on the other hand, seems to be an important factor discriminating between social groups. Although higher education was not always rewarded by higher income (but the relation between education and income was different in different CCEE), it commanded high prestige (Machonin et al, 1996; Vecernik and Mateju, 1998). In addition, education is a stable indicator, and it was probably reported correctly by most subjects.

Education has been previously shown to be related to SRH (eg. Johnson and Wolinsky, 1993; Idler, 1993; Hraba et al, 1998; Palosuo et al, 1998). Similarly, we found a strong association between poor self-rated health and highest achieved level of education, both in national and community samples. For example, when adjusted for other socioeconomic variables and perceived control, there was more than a 2-fold difference in prevalence of poor self-rated health between university and primary educated subjects in the national samples (table 5.4.4). The effect of education was consistent, strong, and only partly reduced by other risk factors.

Material conditions are an important aspect of socioeconomic status. We did not use income as one of socioeconomic indicators, because it is widely believed that people in central and eastern Europe would not answer questions on income. Most researchers worry that such question could decrease the response rate of the study. Instead, we used the questions asking about the problems with buying basic necessities, from which we calculated a "material deprivation" index. There has been little research on this construct. The Czech study on myocardial infarction and risk factors for coronary heart disease have suggested that indicators of material conditions are poor predictors of health (Bobak et al, 1999; Bobak et al, 2000). The strong gradient in poor self-rated health by material deprivation was therefore not expected. Hraba et al (1998) used a concept of "economic stress" similar to our definition of material deprivation, and like us, they found a significant association between economic hardship and poor SRH.

The strong relation between material deprivation and SRH may have several explanations. First, it is possible that, as the reporting of deprivation is to some extent subjective, recall bias may lead to overestimation of the association. Second, the increase in the levels of deprivation (well documented in CCEE; for example in the reports by UNICEF, 1995, 1998) did result in poor health in groups characterised by deprivation. This may have been missed in the studies conducted early in the transition. Third, material deprivation may, to some extent, reflect relative deprivation (relative to those with better economic situation); the gradient in poor SRH by deprivation may thus represent, in part, the effects of relative deprivation. In our study, this association was only partly reduced by adjusting

for education and other socioeconomic variables and perceived control. The effect of material deprivation was further reduced by additional adjusting for work-related psychosocial factors (table 5.5.2.12). This may suggest that work-related psychosocial factors may explain a part of deprivational inequalities (but not educational inequalities) in working populations. This result also confirms the theory that material deprivation and education measure different parts of the socioeconomic environment.

We also examined an alternative indicator of economic circumstances. Information about household items was available in the Hungarian and Polish national samples, and in the Hungarian community sample (although the lists of household items were not the same in each dataset; see the Methods and the Results sections). In general, there were strong associations between household items ownership and SRH which were partly reduced after adjustment for other socioeconomic indicators, but which remained relatively strong in the Hungarian national sample. The strong effects are consistent with findings on "material deprivation" score. However, there is a reason for caution - it may also be a statistical artefact. The wider range and higher number of household items (and thus a relatively precise measurement of socioeconomic status) can be a possible reason for the stronger effect of this variable in the Hungarian national sample when adjusted for material deprivation and education (Phillips and Davey Smith, 1991).

We also looked at the question of absolute or relative deprivation. In the Hungarian national sample, we arbitrarily classified the household items into three categories: "basic needs", "socially oriented needs", and "luxury" (for details see Methods and Results). The results suggest that the social aspect of household items ownership may be possibly more important than the material one. This would indicate relative deprivation. One may speculate that people try to own more items than their neighbours, friends or relatives. Such comparison of poverty (in terms of things which are not the most important for everyday living) may then be reflected in feelings about their position on the social ladder and possibly in their health. Although the categorisation of household items was based on hypotheses about social participation and relative position, it was somewhat arbitrary. Some of the items could be classified to different categories (for example, should a video recorder be in socially oriented needs or luxury, or should a telephone be in basic or socially oriented needs). However, such changes in classification of household items did not influence the results of these analyses.

<u>Measures of socioeconomic inequality at the individual level</u>

We used two other summary measures of the magnitude of socioeconomic inequalities

in self-rated health, the Slope Index of Inequality (SII) and the Relative Index of Inequality (RII), to illustrate different approaches in estimating the effects of socioeconomic variables on poor health. These two measures were originally developed by Pamuk (1985; 1988), and were widely used in the literature (eg. Mackenbach and Kunst, 1997; Hart et al, 1998).

The Slope Index of Inequality expresses the health inequality between the top and bottom of the social hierarchy (e.g. education, deprivation) in terms of difference in prevalence of health outcome. It is calculated by regressing rates of health outcome in different socioeconomic groups on their relative position (the proportion of the population that has a higher position in the social hierarchy). The Relative Index of Inequality is a relative version of SII: it is a ratio of health outcome rate at the bottom of the hierarchy and at the top of the hierarchy. The main advantage of the indices is that it takes into account the size of each social group (education or material deprivation). This may be an important issue in our data as, for example, the proportion of people in the same levels of education differed substantially in different populations. We used education and material deprivation as two socioeconomic indicators to calculate the two indices for age-sex adjusted prevalence of poor self-rated health.

The age-sex adjusted association between poor SRH and the cumulative population share of educational categories in the pooled data from national samples is presented in Figure 6.2.1a. The association between poor SRH and the cumulative population share of deprivation categories in pooled national data is shown in Figure 6.2.1b. For education, the Slope Index of Inequality (SII) was 15.27% and the Relative Index of Inequality was 2.3. For deprivation, SII was 24.06% and and RII was 4.65. Using the two indices, the socioeconomic inequalities were similar to the odds ratios (presented in the Results section).

These two indices (SII and RII) allow us to examine the potential effects of health inequality on the overall health status of different populations, because these indices take into account the sizes of particular socioeconomic groups. In other words, we could investigate whether populations with steeper socioeconomic gradient have higher prevalence of poor health. For education, country-specific comparisons could only be done for the age group 50+ years, because the number of subjects in younger age groups for primary education was too small in several countries. The associations between RII and SII for education, and age-sex adjusted prevalence of poor SRH are shown in figure

6.2.2. There were no significant associations between the inequality indices and prevalence of poor SRH in seven countries of central and eastern Europe.

The associations between RII and SII for deprivation, and age-sex adjusted prevalence of poor SRH are shown in figure 6.2.3. In the case of RII, Estonia had to be excluded because prevalence of poor SRH on the top of hierarchy (deprivation=0) was estimated as negative (and therefore RII could not be calculated). Only SII could be used for all 7 countries. Again, for both measures, there was no significant association between indices of inequality and age-sex adjusted prevalence of poor SRH, although the prevalence of poor SRH was increasing with both indices of inequality.

The relative position of each country was similar using education or deprivation as the measure of socioeconomic status (figures 6.2.2 and 6.2.3). The only exception was Estonia, where health inequalities by level of deprivation were large but inequalities by level of education were small.

Overall, these graphs do not provide a strong support for the hypothesis that steep socioeconomic gradients in health are related to poor health of the population. However, we only had seven points for these analyses, and the statistical power to demonstrate such an association was low.

Figure 6.2.1. Regression based index of inequality in seven countries (pooled data)
a. education **b.deprivation**

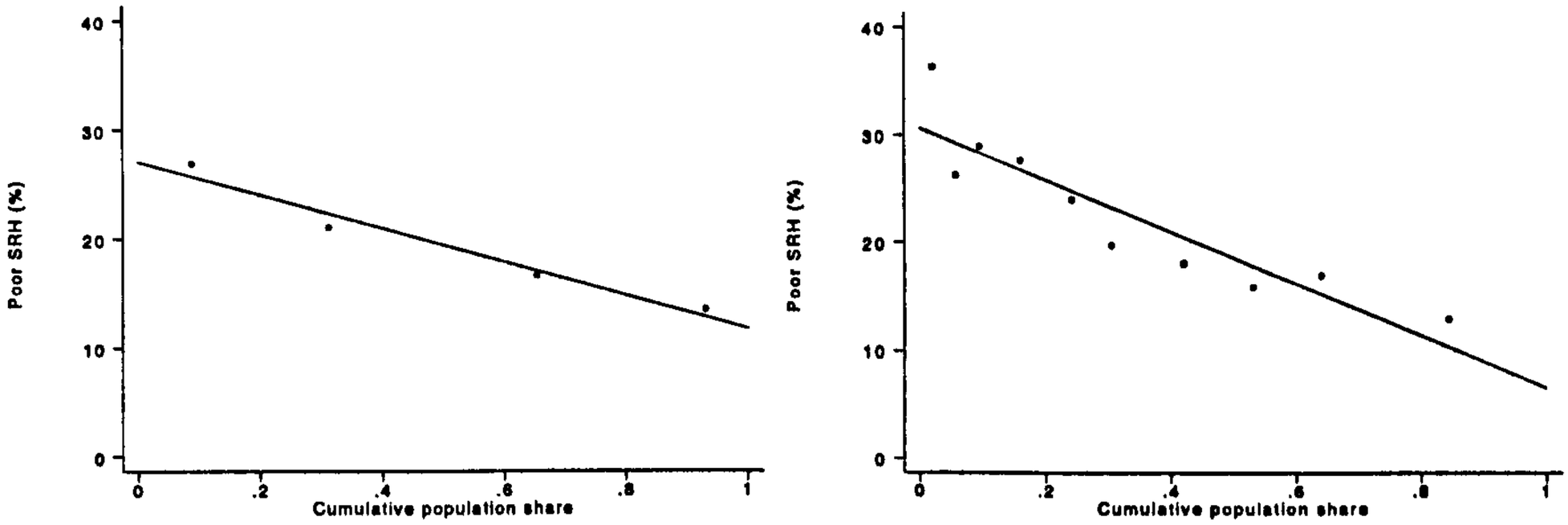


Figure 6.2.2. Relative index and slope index of educational inequality by age-sex standardized prevalence of poor SRH for subjects of age 50 and older

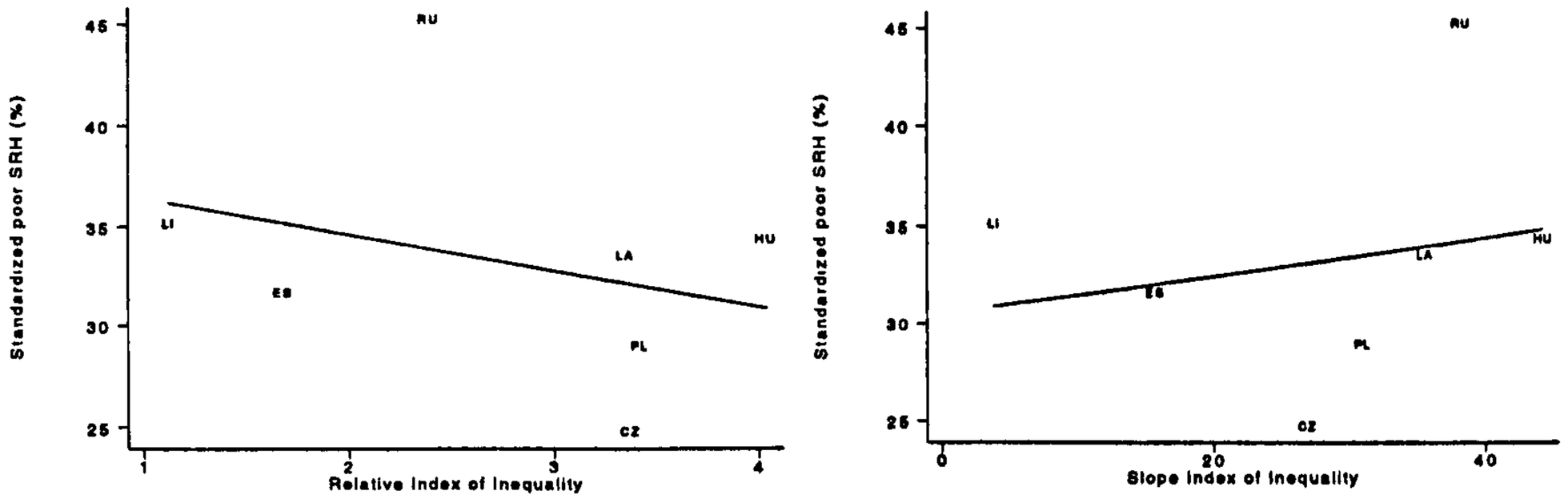
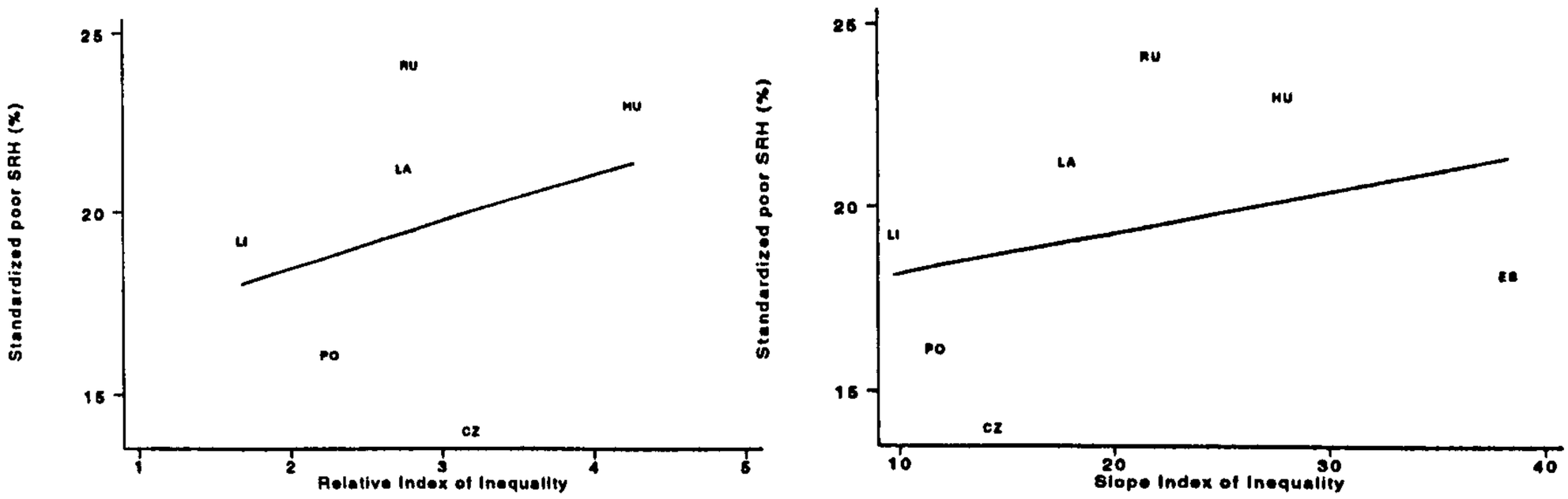


Figure 6.2.3. Relative and slope index of inequality based on material deprivation by poor SRH



6.2.4 Psychosocial factors not related to work

Perceived control

In our study we found a very strong association between perceived control and SRH (and other outcomes used in the last section of chapter 5). This is consistent with international data which were summarized in section 2.4.2. Carlson (1998) found the association between poor self-rated health and low perceived control in each of 23 populations. Lachman and Weaver (1998) found that perceived control was strongly related to self-rated health in three US samples. The association between perceived control and self-rated health was previously found in the Czech population (Hraba et al, 1996).

It could be argued that perceived control and self-rated health are based on similar concepts and that there can be a "cross-contamination" of these two variables. Although this possibility cannot be dismissed, there are several arguments against this. First, in some analyses we divided perceived control into perceived control over own health and perceived control over own life. We found a strong effect of perceived control over own life, a variable which should have less in common with self-rated health. Second, perceived control has been found to predict mortality in a prospective study. Bosma et al (1999) found a strong association between perceived control and mortality (OR (95% CI) 1.61 (1.22-2.13) per 10 units increase on a 45 points scale) in a 6-year follow-up study of Dutch individuals. Moreover, similarly to our study, perceived control explained a major part of the socioeconomic gradient in mortality. The authors used three indicators of socioeconomic status: education, occupational category and income, and found that the average percentage of increased mortality risk explained by perceived control was 51% (range from 37 to 65%).

Social support and social networks

Marital status was the only aspect of social support available in all samples. There was only a small effect of marital status on self-rated health in our data: being married was protective for self-rated health in most of populations. This effect was substantially reduced or removed by adjustment for other risk factors, such as education and perceived control. We found large heterogeneity in the effect of marital status between populations (tables 5.2.1.5 and 5.2.1.6 for national samples, tables 5.2.2.5 and 5.2.2.6 for community samples). The reasons for such heterogeneity are not clear, especially as we found differences between the effects of marital status in the national and community samples within the same country (the Czech Republic, to some extent Lithuania).

Only a binary variable (married/unmarried) could be used in the analyses because such classification was used in the Polish national sample and we wanted the data to be comparable. When the more detailed categories ('married', 'single', 'divorced', and 'widowed') were analysed, there appeared to be an interaction between gender and marital status; divorced men reported poor health more often than other categories (not shown). This is consistent with our previous analyses of Russian data (Bobak et al, 1998).

For some populations, data were available on several other components of social support. Our definitions of 'social relations' and 'trust in institutions' (see Methods) are, to some extent, similar to those variables used in previous research summarized in the Background chapter (eg. Berkman and Syme, 1979; Hanson et al, 1989). Trust has been used by some authors as an indicator of social capital across geographic areas (Kawachi et al, 1997; Kennedy et al, 1998b; Kawachi et al, 1999). We used questions regarding trust in institutions as an individual-level factor. Our results did not show clear associations between 'trust in institutions', 'social relations' and self-rated health. Low trust in institutions was significantly related to poor health in the Baltic countries and (inconsistently) in three central European countries. There was no association between trust in institutions and SRH in Russia. The type of social relations was significantly related to poor SRH in Russia (those relying only on formal institutions reported worse health) but not in the Baltic countries. These inconsistencies may have at least two different explanations. First, there can simply be no association between these measures and health in CCEE. This may be due to the long period of absence of civil society and the relatively short time since the breakdown of the communist system. Second, it may be inappropriate to use these factors at the individual level. Trust (thought of as an important component of social capital) has been previously used at the aggregated level to characterize entire populations, and it has been argued that social capital is an inherently ecological concept (Kawachi and Kennedy, 1997). By implications, its indicators should also be measured and used at the aggregate level.

6.2.5 Inequalities measured at the aggregated level

We did not have data on social trust that could be used on the aggregated level but we had data on inequalities (which are also considered to be an important component of social capital). In fact, this study may be the first study evaluating the effects of social inequalities at both individual and ecological levels in central and eastern Europe.

Ecological measures of income inequality were related to health outcomes in a number of studies (Wilkinson, 1992; LeGrand, 1987; Kennedy et al, 1996). However, there has

been some debate about these observations. Judge et al (1998) suggested that the ecological association is an artefact due to the poor quality of data, and Gravelle (1998) proposed that the associations between unequal income distribution and population health may be a statistical artefact resulting from the use of aggregate rather than individual data.

We used a "multilevel model" with individual level data and the ecological measures of inequality included in the same statistical model. We used the appropriate statistical technique (controlling for clustering) to test whether the effect of relative inequality remains statistically significant when adjusted for the absolute level of material circumstances. In our data, the effect of inequality distribution was substantially reduced after adjustment for individual deprivation (from OR=2.13 to OR=1.27 for Gini and from 2.07 to 1.17 for inequality index) but remained significant (Gini coefficient) or borderline non-significant (inequality index). This is similar to study of self-rated health published previously (Kennedy et al, 1998a); in this study the effect of relative inequality measure remained significant but was reduced after adjustment for individual socioeconomic factors. By contrast, "multilevel" studies of mortality showed weak or no association with ecological measures of socioeconomic status when they were adjusted for individual socioeconomic circumstances. Daly et al (1998) did not find any significant associations between financial inequality at the US state level and mortality after adjustment for family income. Fiscella and Franks (1997) reached the same conclusion in their analysis of mortality data in a nationally representative sample of middle-aged population in the United States.

Perceived control also appeared to account for the effect of income (or material) inequality. This is suggested by the fact that the effects of ecological measures of inequality were almost entirely removed after adjusting for perceived control. Psychosocial factors such as perceived control were not available in the previous studies. Our findings support the view that the combination of the individual socioeconomic data (material deprivation, income) and individual psychosocial data (which refer to the individual's perceptions of his/her place in the social hierarchy) could explain most of the effect of income inequality (or material inequality) in a society.

Inequality distribution or mean country deprivation level?

There is an additional argument against the hypothesis that there are independent effects of ecological indices of income inequalities. When the analyses were repeated using mean deprivation in each country instead of the Gini coefficient or inequality index, the

results were similar (table 6.2.1). The effect of mean deprivation (at country level) was strong when adjusted for age, sex, marital status and education. But this effect was substantially reduced after adjustment for individual-level deprivation and became inverse after further adjustment for perceived control. The mean deprivation level and the inequality variable (Gini or inequality index) could not be included in the same model because they were strongly correlated (R=0.85).

Table 6.2.1. The effect of mean country deprivation level on poor or very poor self-rated health (OR and 95%CI for the worst relative to the best population)

Adjustment	
sex + age	1.68 (1.42-1.99)
sex + age + education + marital status	1.92 (1.61-2.28)
sex + age + education + marital status + deprivation	1.08 (0.89-1.32)
sex + age + education + marital status + deprivation + control	0.74 (0.59-0.91)

Hungary - the outlier

Hungary is a country which does not fit in the usual model, assuming that national levels of ill health can be predicted from socioeconomic indicators. Mortality rates in Hungary are higher than would be expected from the national indicators of social and economic development. The same appeared to be the case in our data. Hungary had high prevalence of poor self-rated health, despite relatively good levels in socioeconomic and psychosocial factors. Figures 5.4.3-6 showed the association between poor SRH and socioeconomic factors and perceived control in a country level. Hungary was an outlier in all of these graphs. One possible explanation may be that there are different understandings of the question about self-rated health. This may be seen from figure 5.4.2 showing the association between standardized death rates in seven countries and prevalence of poor self-rated health in our samples. Prevalence of poor SRH in Hungary was higher than expected according to the level of SDR.

In the analysis of three central European national samples at the end of section 5.3.1, the difference in prevalence of poor SRH between Hungary and Poland and the Czech Republic was not fully explained even in a fully adjusted model (table 5.3.1.7). It may suggest either a different understanding of the concept of self-rated health in Hungary or that some important predictors of poor SRH such as smoking, alcohol consumption or dietary habits were missing in our model.

In an attempt to clarify the Hungarian question, we used a different definition of the outcome, which included "average" SRH. Using this definition, Hungary was not outlier any more. The scatter plots in figures 6.2.4 and 6.2.5 show that Hungary is where we would expect it from its values of mortality, deprivation, perceived control and inequalities. The associations between all cause SDR, socioeconomic factors and perceived control, presented in figure 6.2.6, also do not show Hungary as an outlier among our seven countries. These two sets of graphs support the hypothesis that the question about perceived health might be interpreted differently in Hungarian population: people seem to give more negative rating of their health in situations when they did not feel absolutely healthy.

Figure 6.2.4. Age-sex adjusted poor/average SRH and all cause SDR (per 100000) In seven countries

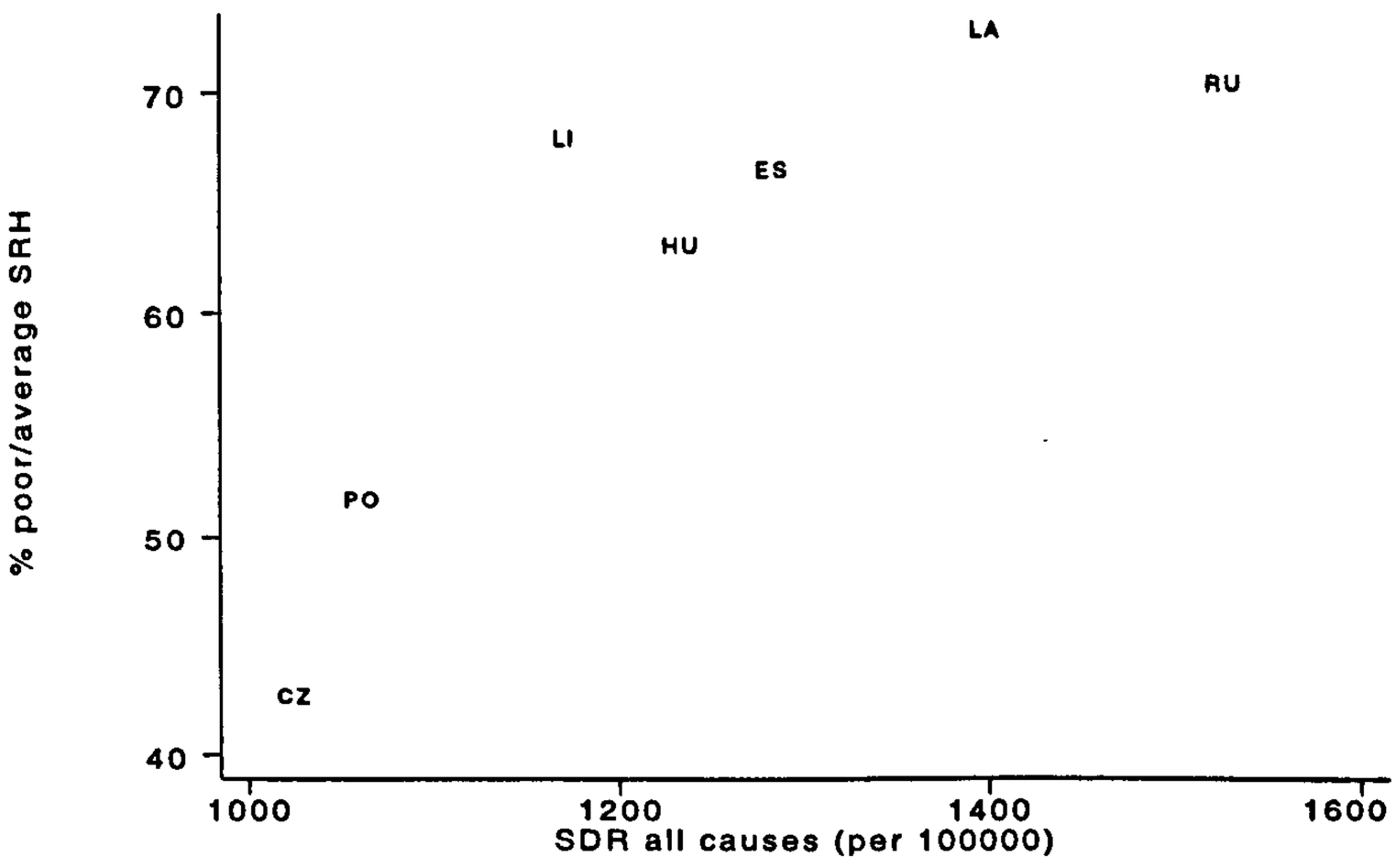
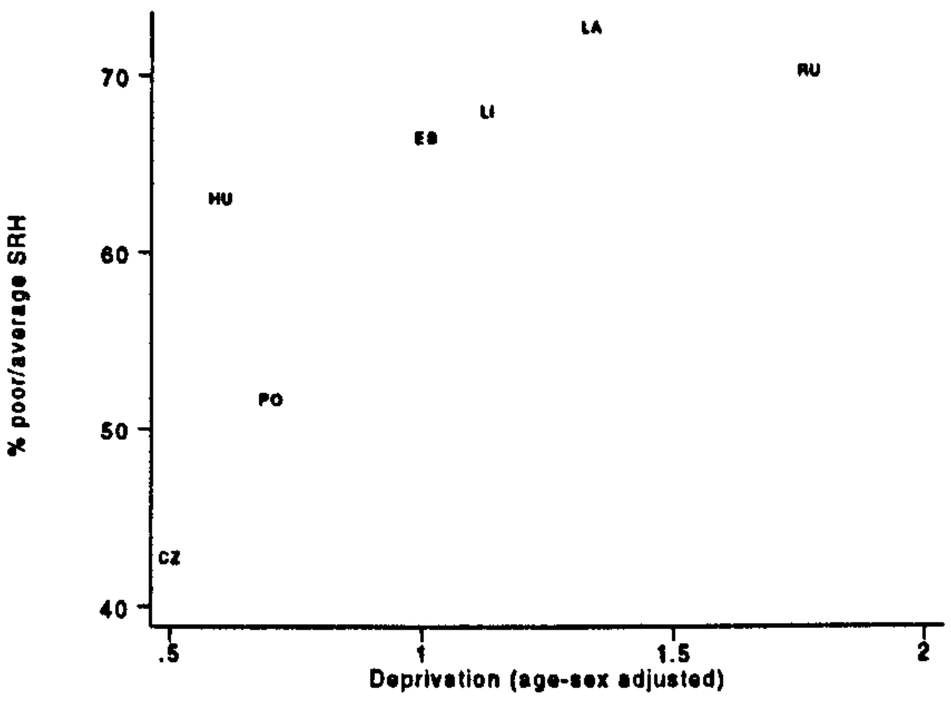
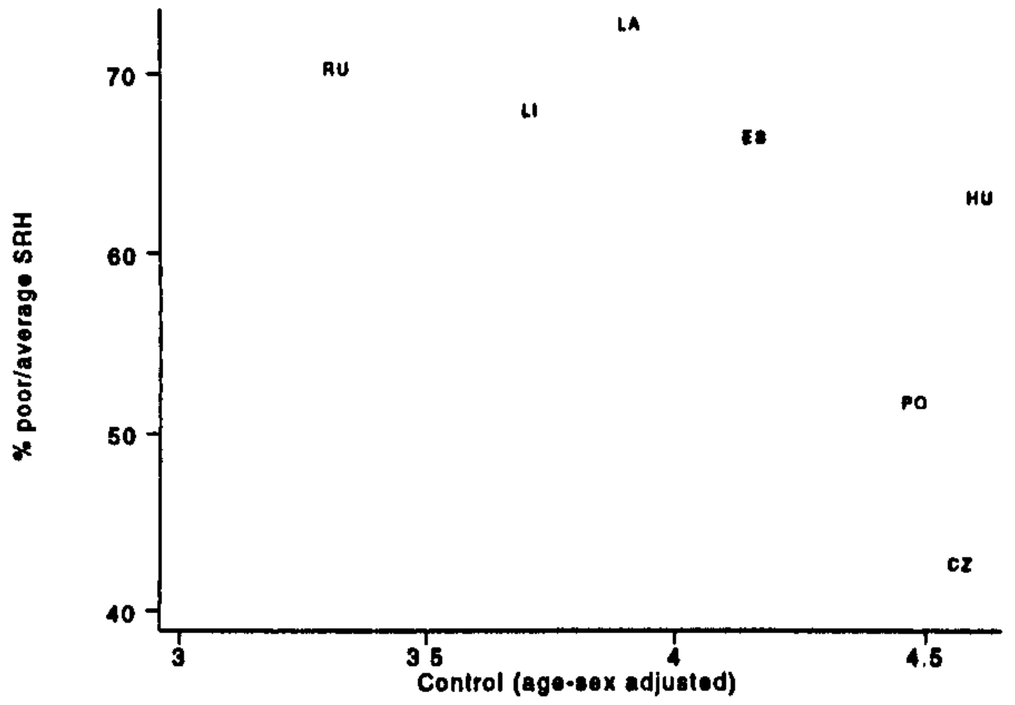


Figure 6.2.5. Relationship between poor/average SRH and socioeconomic variables and perceived control in seven national samples

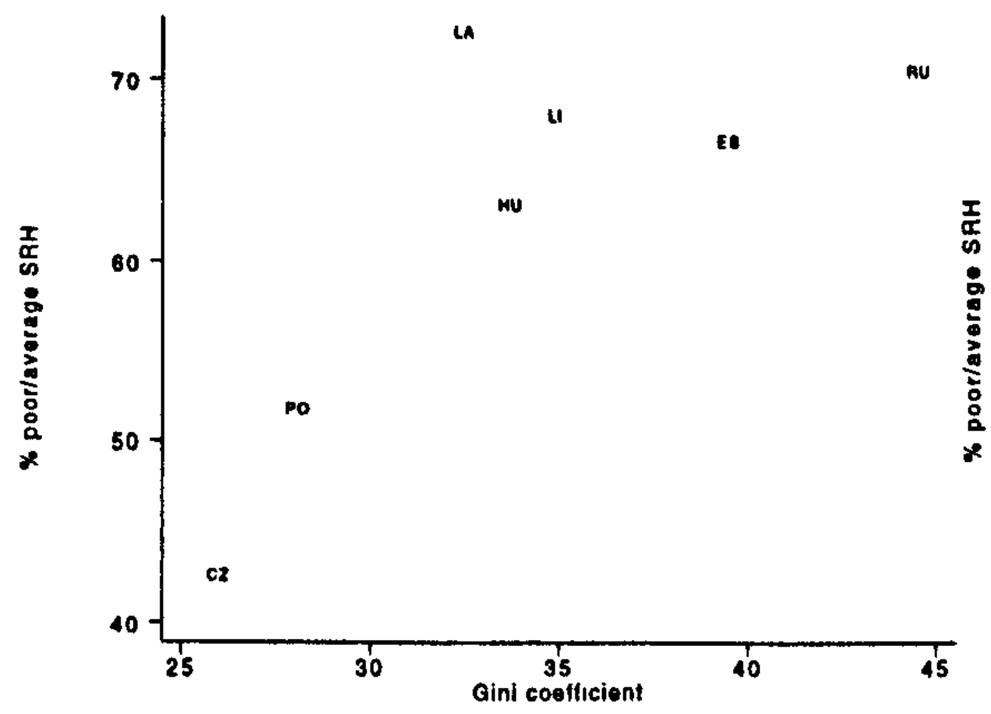
a. material deprivation



b. perceived control



c. Gini coefficient of income inequality



d. Inequality index

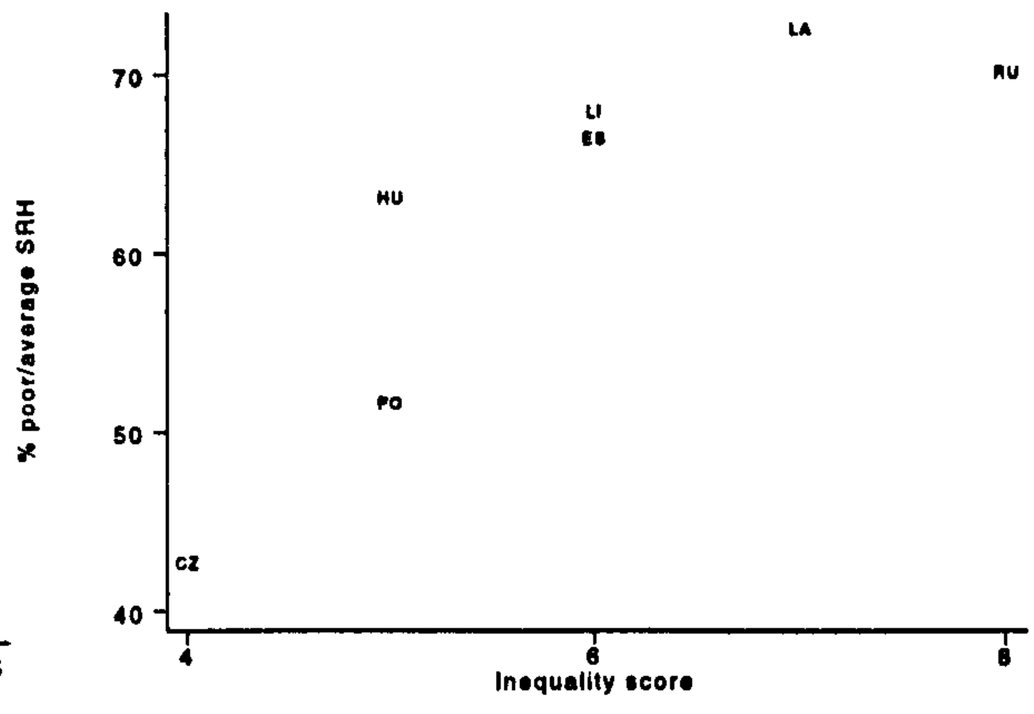
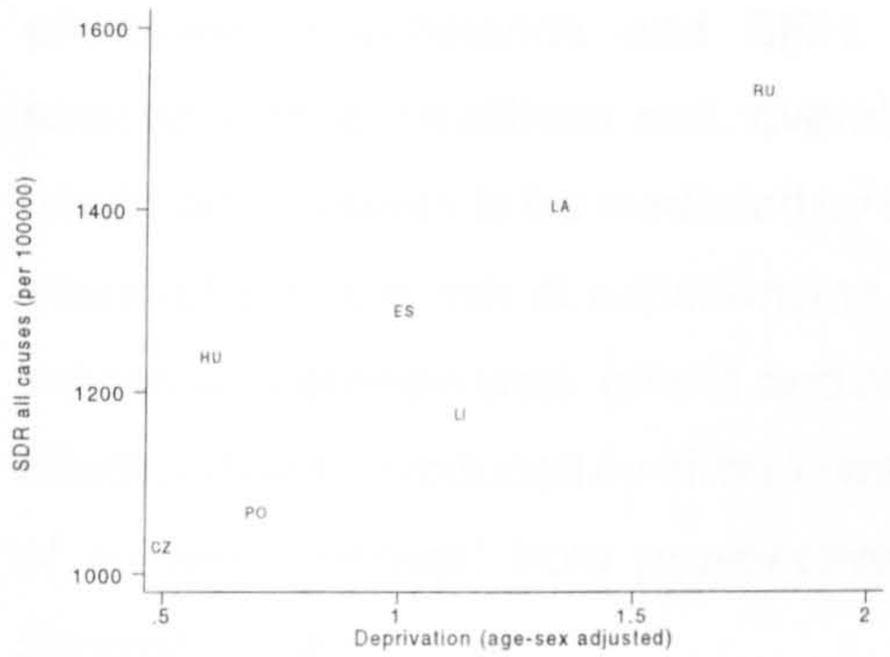
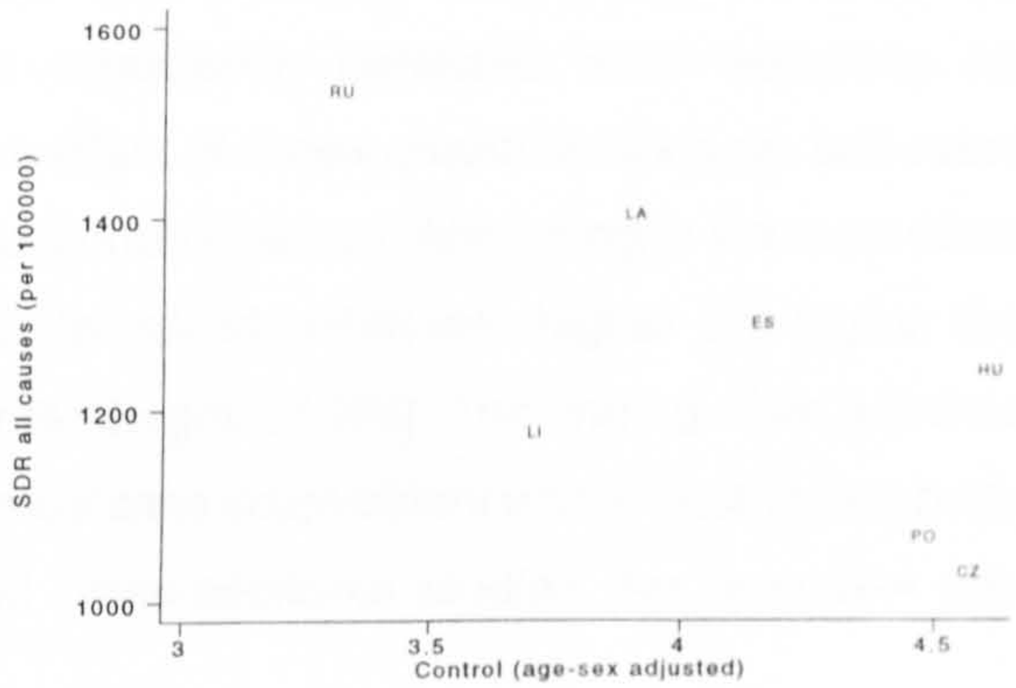


Figure 6.2.6. The associations between all cause SDR and socioeconomic variables and perceived control in seven national samples

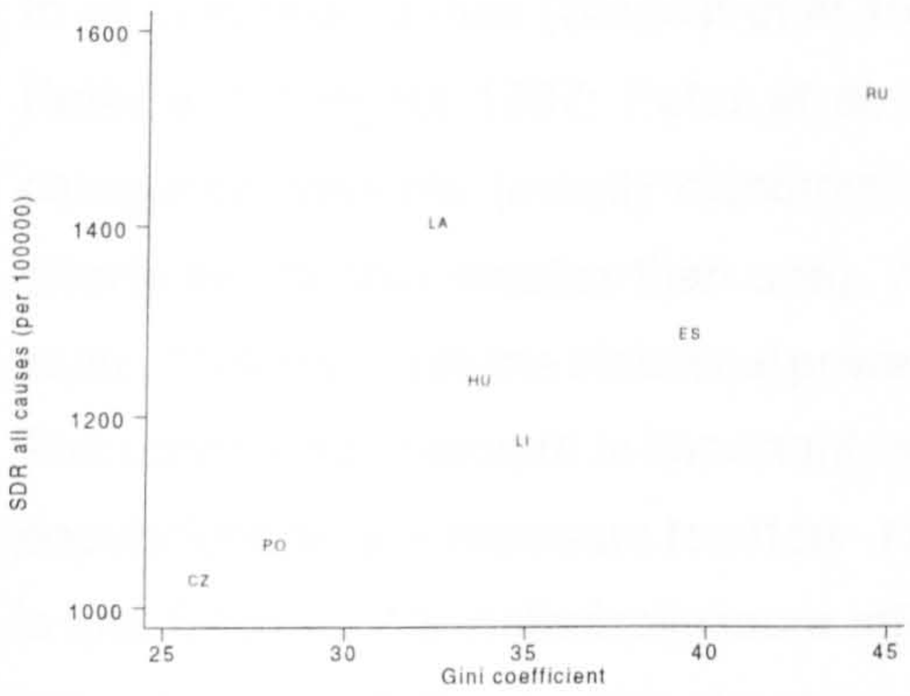
a. material deprivation



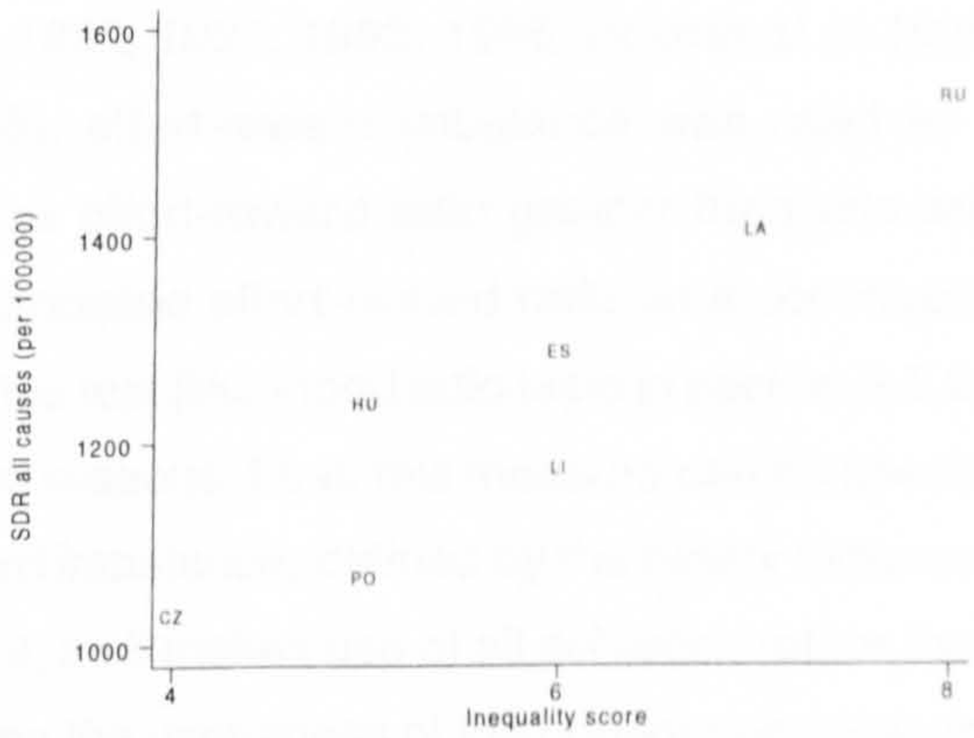
b. perceived control



c. Gini coefficient of income inequality



d. Inequality index



6.2.6 Psychosocial factors related to work

This study found consistent associations of selected psychosocial work characteristics with self-rated health. In particular, there was a strong relationship between the effort/reward imbalance and SRH. The association persisted after adjusting for socioeconomic conditions and, overall, the effect of these characteristics on self-rated health did not seem to be mediated by socioeconomic status. According to the theoretical assumptions, the risk of experiencing poor perceived health was higher the higher the imbalance between work efforts and rewards (Siegrist, 1996). The finding of an adverse effect on health produced by effort-reward imbalance is consistent with an increasing body of evidence derived from prospective and cross-sectional studies (for overview see Siegrist, 1998).

An important methodological finding of this study relates to the effort-reward imbalance. In all previous studies (Siegrist et al 1989, 1990, 1991, 1993, 1995; Bosma et al 1998; Peter and Siegrist 1997; Peter et al, 1998), effort-reward imbalance was used as a categorical variable (mostly dichotomized as effort-reward ratio greater than one and effort-reward ratio smaller than one). We modelled effort-reward ratio on a continuous scale. This improves the statistical power of the test (likelihood ratio tests in section 5.5.2). The continuous measure is important for two reasons. First, this measure can be used in populations where exposure to effort - reward imbalance, defined by the binary indicator, is low. Second, it is statistically more efficient, as it makes use of all subjects, rather than two categories. Other studies should examine the usefulness of the continuous measure in different populations.

Although the effort/reward imbalance model may seem similar to the job-strain model, Bosma and colleagues (1998) have shown that both models predicted incidence of CHD independently. In our data, the ratio of effort-reward remained strong and highly significant when adjusted for job demand, decision latitude, and other work-related psychosocial variables. This suggests that the two models may measure different aspects of work environment.

The job strain model has attracted considerable attention. In this model, it is proposed that the combination of low decision latitude and high job demands carries high risk of CVD and other health outcomes. However, some of the recent studies did not find an interaction between decision latitude and job demands (see a summary of the studies in the section 2.4.1.1). In our project, the job strain model was tested but not confirmed.

There was a small increase of risk of poor self-rated health among subjects with low decision latitude and with high job demand, but there was no interaction between these two factors. OR of poor SRH in the group with high demand-low decision latitude was not significantly higher than in all other groups (table 5.5.2.9). After adjustment for other psychosocial factors at work, the effects of decision latitude and job demand totally disappeared.

One possible reason for the weak effect of job demand is a measurement error. While the original questionnaire combined three questions on job demand, we used only one question. If this reduced the precision, the relative risk would be biased towards unity. However, the effects of job demands were not consistent in other studies, and a recent systematic review concluded that job demand is not a strong predictor of CHD (Hemingway and Marmot, 1999).

Johnson and Hall (1988) proposed an extension of the job-strain model by including social support at work. They suggested that there is an interaction between job strain and low social support at work, which is particularly harmful. In our study, we did not find any effects of social support at work on SRH. After adjustment for other psychosocial variables, and socioeconomic status, we did not find any interaction between social support at work and job strain. One possible reason for the weak association between social support and SRH and for no interaction between social support at work and job demand may be adjustment for effort/reward imbalance because some items of reward at work are similar to those used in social support at work.

Job variety is another dimension of psychosocial work environment which is closely related to the job-strain model. In our data, we found a strong effect of job variety on poor SRH. This effect remained relatively strong (although borderline non-significant; see table 5.5.2.9, bottom panel) after full adjustment for other psychosocial factors at work.

The problem of temporality and reverse causation is also relevant to the interpretation of findings on self-rated health and work-related psychosocial factors. For example, it is possible that individuals with worse health had a worse position on the labour market and were more likely to accept worse jobs or were not promoted to higher positions (health selection). It is also possible that persons in, originally, good occupations had to accept jobs with lower autonomy when their health became worse (reverse causation). If this was true, one would expect that SRH would be associated with all or most work-related characteristics. In fact, SRH in our data was related to only some of the psychosocial factors at work. This does not indicate a presence of a major bias but, as with other independent variables, the cross-sectional design does not allow strong conclusions.

6.3 Does this research help to understand the health crisis in CCEE?

We have conducted a large number of statistical tests to examine which factors were related to SRH in two sets of data in CCEE. The question is whether these results help us to understand the health crisis in CCEE.

The data analysed in this thesis were collected in the middle of 1990's; this was the period when the social crisis in the former Soviet Union peaked but when the situation had already started to improve in central European countries. Health indicators, according to the available data, followed the same trend. The timing of the study may be important for the interpretation of the results.

After 1989, there was a marked disruption of many aspects of the social environment - real income, birth rates and marriage rates were falling while unemployment (previously unknown) and income inequalities rose steeply. The "old" (pre-1989) situation in CCEE can be described, to a varying degree in each country, as an "hour-glass" society (Rose 1995). There was an elite at the top which made all important decisions and controlled the country. The majority of the population was at the bottom of the hour glass; most people relied on informal networks to fulfill their material (and non-material) needs. There was little trust and little communication between the top and the bottom of the society. The disruptions after 1989 probably affected disproportionally people at the bottom of the society; those at the top were at large able to find good positions in the new system (eg in Russia, the new elite is largely composed of the old "nomenclatura" elite (Kennedy et al, 1998b; Carlson, 2000)).

The "macro" characteristics of the society, such as income inequalities or the overall levels of deprivation, probably resulted (at least partly) from the process of the transition. Our data suggest that these factors also contributed to poor health in these countries. Our data suggest, however, that the effects of these societal variables were not direct. Rather, our data suggest that the societal characteristics influenced individual people's health through factors acting at the individual level - such as material deprivation or psychosocial factors (eg control, work environment). As discussed in the previous sections, the strong effects of material deprivation were not expected, and they may indeed reflect the changes after 1989.

Education probably represents a long term indicator of the socioeconomic position, and, most likely, it also measures "non-material" aspects of the socioeconomic status. As most

subjects in our data completed their education before 1989, the effects of education cannot be seen merely as a result of the post-1989 development. In fact, it has been documented that even before 1989, there were pronounced educational gradients in CCEE (Bobak and Marmot, 1996). The effects of education on health thus may represent several mechanisms. Firstly, education has been shown to influence health behaviours in CCEE (CHEWE, 1996; Bobak et al, 2000), and a part of the educational differences in SRH in our data can be attributable to health behaviours (data on which were not available for the majority of the subjects in our national samples). Secondly, education is a social indicator which tends to be transmitted within families across generations. It has been shown that in CCEE this tendency is very strong - children of better educated parents are much more likely to achieve higher education than children of parents with lower education (Vecernik and Mateju, 1998). It seems that in CCEE, groups with higher education were more distant from groups with lower education in terms of social mobility - despite the proclaimed educational policies and despite the income equality. Vecernik and Mateju have shown that higher education was more accessible to students from less educated families in the west than in CCEE (1998).

Given such long term nature of education, it is possible that a life time accumulation of the advantage (or the disadvantage) may underlie some of its effects on health. It has been shown in CCEE, for example, that parental education is an important predictor of children's growth (Bobak et al, 1994) or morbidity (Fischer et al, 1998), and current education is strongly related to adult height (Bobak et al, 2000). Finally, it has been shown that educational differences in income (which have been traditionally small in most CCEE) increased dramatically after 1989 (Vecernik and Mateju, 1998). Therefore, a part of the education gradient may have been due to the material factors associated with education after 1989.

Psychosocial factors seem to act as mediators, both between the societal ("macro") characteristics and health, and between individual socioeconomic factors and health. There is evidence that distribution of different psychosocial factors is much less favourable in CCEE than in western countries (Kristenson, 1998, Carlson, 1998); this suggests that the overall social environment affects the population levels of psychosocial factors. In addition, there is evidence that psychosocial factors show a more favourable pattern in higher socioeconomic groups than in lower socioeconomic groups. Both these patterns were clearly demonstrated in our data. The strong effect of perceived control is consistent with Syme's proposition that the concept of control may integrate different socioeconomic factors acting at different levels (Syme, 1989).

Similarly, psychosocial factors at work seemed to mediate some of the effects of "traditional" socioeconomic factors. Psychosocial factors may operate either directly or via health behaviours. (Our data cannot clarify this issue but this project was not designed to answer this question.)

The results of this research seem to form a pattern. The recent transition (superimposed on already unfavourable long term trends) lead to social disruption and inequalities in CCEE. These macro level factors resulted in higher prevalence of deprivation in these countries, particularly among persons with low qualifications or with low education or, in some countries, without appropriate social networks. Deprivation and low education lead to increased risk of poor health - partly via psychosocial factors. This hypothesis cannot be tested by the current data - one would need hierarchical (multilevel) datasets, and, above all, prospective data with objective endpoints for health. However, this model is consistent with other models (Dahlegren and Whitehead, 1991), and, if the appropriate data are collected, it can be tested empirically.

Chapter 7

Conclusions

We have conducted a series of cross-sectional studies in 7 post-communist countries. Our major interest was whether in these countries there is an association between health and social and psychosocial factors, and whether it is similar to the situation in western countries.

Our results can be summarised as follows.

First, there are strong social gradients in self-rated health in post-communist countries. The gradients were seen in all study populations, and are of the same direction and similar magnitude as in the west.

Second, in contrast to studies of cardiovascular disease and risk factors, the social gradients were seen not only by education, but were also pronounced by material deprivation. This can be explained either by using different health outcome or by having more recent data allowing enough time for the effect of material deprivation to (re-) appear.

Third, the effect of marital status was smaller than in previous studies. Again, this inconsistency may be due to the choice of the health outcome.

Fourth, we found that perceived control was strongly related to self-rated health, and mediated some of the effect of socioeconomic variables (both individual-based and ecological). Although the research on perceived control is fragmented, our results are consistent with recent studies.

Fifth, some aspects of the psychosocial work environment were powerful predictors of self-rated health among employed men and women. In particular, the continuous measure of effort-reward imbalance was strongly and independently associated with the outcome. Apart from this finding, the modification of the effort-reward imbalance indicator will allow a more general use of the effort-reward model. On the other hand, the job strain model

was not found to predict health in our data.

Sixth, we found that ecological measures of income or material inequalities were associated with self-rated health. These associations, however, were eliminated after controlling for individual based deprivation or perceived control. These results contribute to the current debate about whether area based social indicators predict health above individual factors.

These results, although interesting, must be taken with caution because the cross-sectional design does not allow firm conclusions about causal effect. This project helped us to understand better the situation in post-communist countries, and we are now in a better position to formulate hypotheses which should be tested in future studies. This project strongly suggested that the issue of social and psychosocial factors requires more attention, but also indicated that longitudinal studies will be needed to provide more definite answers.

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Appendix 1

CHEWE questionnaire

1a. What is your date of birth?

Day	Month	Year

1b. Sex: Male 1
Female 2

2a. How many years of education did you have?

No. of Years

2b. Now thinking just of your full-time education, at what type of school or college did you finish your education?

Circle one only

Primary/elementary 1
Secondary school 2
Apprenticeship 3
University/Polytechnic 4
Some other type of college 5
Other (please specify) 6

.....

3. What is your marital status? *Circle one only*

Married/living with partner 1
Single (never married) 2
Divorced or separated 3
Widowed 4

The following questions concern your health

4. Over the last 12 months, would you say your health has been?

Very good 1
Good 2
Average 3
Poor 4
Very poor 5

5. In general, would you say your PHYSICAL HEALTH is:

Poor 1
Fair 2
Good 3
Very good 4
Excellent 5

6. In general, would you say your MENTAL OR EMOTIONAL HEALTH is:

Poor	1
Fair	2
Good	3
Very good	4
Excellent	5

7. In general, compared to most people your age, would you say your health is:

Much better	1
Somewhat better	2
About the same	3
Somewhat worse	4
Much worse	5

8a. Have you ever had heart trouble suspected or confirmed by a doctor?

Yes	1
No	2

If NO, go to Question 9a

If YES, what was the diagnosis?

8b.

	Yes	No	Don't know
Heart attack (MI)	1	2	3
Angina	1	2	3
High blood pressure	1	2	3
Valve disease	1	2	3
Congenital heart disease	1	2	3

9a. Do you smoke cigarettes now?

Yes	1
No	2

9b. If no, did you smoke in the past?

Yes	1
No	2

The following questions ask about everyday living concerns

10. a) How often do you have worries or problems with other relatives (eg parents, in-laws or siblings?)

Always 1 Often 2 Sometimes 3 Seldom 4 Never 5

b) How often does it happen that you do not have enough money to afford the kind of food or clothing you/ your family should have?

Always 1 Often 2 Sometimes 3 Seldom 4 Never 5

c) How much difficulty do you have in meeting the payment of bills?

Always 1 Often 2 Sometimes 3 Seldom 4 Never 5

d) To what extent do you have problems with your housing (eg too small, repairs, damp etc)?

Very great 1 Great 2 Some 3 Slight 4 Very little 5 None 6

e) To what extent do you have problems with the neighbourhood in which you live (eg noise, unsafe street, few local facilities)?

Very great 1 Great 2 Some 3 Slight 4 Very little 5 None 6

We would now like you to answer some questions about your current work situation

11a. Are you currently employed?

Yes	1	(If YES, please go to Question 12a)
No	2	

If NO, please indicate the category that best describes your current situation (Select only one. If two or more apply, select the best one)

11b.

Student	1	Unemployed	5
Homemaker	2	Other (please specify)	6
Retired	3		
Medically retired	4	.....	

If not in current employment, please go to Question 37

12a. What is your current occupation? (please specify) .....

12b. What is your position at work?

Manager	1
Supervisor/Foreman	2
Other employee	3
Self-employed	4

12c. Is your current employment in the?

Public sector	1
Private sector	2

13. How many years have you worked in your current employment?	years
14a. Apart from your main employment, do you have any other jobs?	yes 1 no 2
14b. On average, how many hours did you spend working for pay last week?	no. of hours

15. Are you scheduled on shiftwork?

Yes, but without night shift	1
Yes, with night shift	2
No	3

Here are some statements about possible strenuous aspects of your current work situation. Please circle the answer that best describes your job:

16. **There is constant time pressure in my job due to a heavy workload**

Yes 1 No 2

	Very good	Rather good	Rather distressed	Very distressed
If Yes, how do you feel about this?	1	2	3	4

17. **There are many interruptions and disturbances in my job**

Yes 1 No 2

If Yes, how do you feel about this?	1	2	3	4

18. **I have a lot of responsibility in my job**

Yes 1 No 2

If Yes, how do you feel about this?	1	2	3	4

Very good	Rather good	Rather distressed	Very distressed

19. **There is pressure in my job to work overtime**

Yes 1 No 2

If Yes, how do you feel about this? 1 2 3 4

20. **My job is physically demanding**

Yes 1 No 2

If Yes, how do you feel about this? 1 2 3 4

21. **Over the past few years, my job has become more and more demanding**

Yes 1 No 2

If Yes, how do you feel about this? 1 2 3 4

Here are some questions about your current work situation. Please circle the answer that best describes your job.

Not at all distressed	Somewhat distressed	Rather distressed	Very distressed

22. **Do you receive the respect you deserve from your work colleagues?**

Yes 1 No 2

If No, how do you feel about this? 1 2 3 4

23. **Do you experience adequate support in difficult situations?**

Yes 1 No 2

If No, how do you feel about this? 1 2 3 4

24. **Are you treated unfairly at work?**

Yes 1 No 2

If Yes, how do you feel about this? 1 2 3 4

25. **Are the promotion prospects in your job poor?**

Yes 1 No 2

If Yes, how do you feel about this? 1 2 3 4

26. **Have you experienced or do you expect to experience an undesirable change in your work situation**

Yes 1 No 2

If Yes, how do you feel about this? 1 2 3 4

27. **Have job redundancies recently affected your work colleagues?**

Yes 1 No 2

If Yes, how do you feel about this? 1 2 3 4

28. **Is your own job security poor?**

Yes 1 No 2

If Yes, how do you feel about this? 1 2 3 4

Not at all distressed	Somewhat distressed	Rather distressed	Very distressed

29. **Does your current job adequately reflect your knowledge, skills and training?**

Yes 1 No 2

If No, how do you feel about this? 1 2 3 4

30. **Does your salary/income adequately reflect all your past efforts and achievements?**

Yes 1 No 2

If No, how do you feel about this? 1 2 3 4

31. **Considering all your efforts and achievements, do you receive the respect and prestige you deserve at work?**

Yes 1 No 2

If No, how do you feel about this? 1 2 3 4

32. **Considering all your efforts and achievements, are your work prospects poor?**

Yes 1 No 2

If Yes, how do you feel about this? 1 2 3 4

33. **Considering your job as a whole, how often have you felt irritated and angry at work during the past 12 months?**

never 1 sometimes 2 often 3 very often 4

34. **Considering your job as a whole, how often have you felt depressed and hopeless at work during the past 12 months?**

never 1 sometimes 2 often 3 very often 4

35. **At the end of the day do you ever feel exhausted both mentally and physically?**

never 1 sometimes 2 often 3 very often 4

The following questions and statements are about your work. For each, please circle the one answer that best describes your job.

36. Concerning your particular work:	Often	Sometimes	Seldom	Never/ Almost never
a) Do you have to work very intensively?	1	2	3	4
b) Do you have the possibility of learning new things through your work?	1	2	3	4
c) Does your work demand a high level of skill or expertise?	1	2	3	4
d) Does your job require you to take the initiative?	1	2	3	4
e) Do you have a choice in deciding HOW you do your work?	1	2	3	4
f) Do you have a choice in deciding WHAT you do at work?	1	2	3	4
g) Do you have a good deal of say in decisions about work?	1	2	3	4

	Often	Sometimes	Seldom	Never/ Almost never
h) Do you have a great deal of say in planning your work environment?	1	2	3	4
i) Do different groups at work demand things from you that you think are hard to combine?	1	2	3	4
j) Do you get sufficient information from line management? (your superiors)	1	2	3	4
k) Does your job provide you with a variety of interesting things to do?	1	2	3	4
l) How often do you get help and support from your colleagues?	1	2	3	4
m) How often are your colleagues willing to listen to your work related problems?	1	2	3	4
n) How often do you get help and support from your immediate superior?	1	2	3	4
o) How often is your immediate superior willing to listen to your problems?	1	2	3	4
p) Does your home life help you relax and feel ready for the next day's work?	1	2	3	4
q) Do the things you do at work make you a more interesting person at home?	1	2	3	4
r) Does stress at home makes you irritable at work?	1	2	3	4
s) Does stress at work makes you irritable at home?	1	2	3	4

Thinking about the impact of any changes in your work, your life or family circumstances:

37. Have the changes since 1989 been good or bad for your:	Very good	Good	Neither good/poor	Poor	Very poor
a) Occupational position	1	2	3	4	5
b) Income	1	2	3	4	5
c) Material circumstances	1	2	3	4	5
d) General social position	1	2	3	4	5

38 Below is a list of various items, which of the following do you have in your household?

	Yes	No, by preference	No, cannot afford
a) microwave	1	2	3
b) video recorder	1	2	3
c) television (colour)	1	2	3
d) washing machine	1	2	3
e) dish washer	1	2	3
f) car	1	2	3
g) freezer	1	2	3
h) dacza	1	2	3

39. How much do you agree or disagree with the following statements?
Please circle one for each of the following questions:

	DISAGREE			AGREE		
	Strongly	Moderate	Slightly	Strongly	Moderate	Slightly
a) At Home, I feel I have control over what happens in most situations	1	2	3	4	5	6
b) **At Work,** I feel I have control over what happens in most situations (if not working, please go to 39c)	1	2	3	4	5	6
c) Keeping healthy depends on things that I can do	1	2	3	4	5	6
d) There are certain things I can do for myself to reduce the risk of a heart attack	1	2	3	4	5	6
e) There are certain things I can do for myself to reduce the risk of getting cancer	1	2	3	4	5	6
f) I feel that what happens in my life is often determined by factors beyond my control	1	2	3	4	5	6
g) Over the next 5-10 years I expect to have many more positive than negative experiences	1	2	3	4	5	6
h) I often have the feeling that I am being treated unfairly	1	2	3	4	5	6
i) In the past ten years my life has been full of changes without my knowing what will happen next	1	2	3	4	5	6
j) In many ways, I feel disappointed about my achievements in life	1	2	3	4	5	6
k) I very often have the feeling that there's little meaning in the things I do in my daily life	1	2	3	4	5	6
l) I sometimes feel as if I've done all there is to do in life	1	2	3	4	5	6
m) I live my life one day at a time and don't really think about my future	1	2	3	4	5	6
n) I gave up trying to make big improvements or changes in my life a long time ago	1	2	3	4	5	6
o) When I look at the story of my life, I am pleased with how things have turned out so far	1	2	3	4	5	6

40. When you think about your life as a whole up to the present, how would you rate your contribution to the welfare and well-being of other people?

Excellent	1
Very good	2
Good	3
Fair	4
Poor	5

Appendix 2

Physical functioning

Here is a list of activities that you might do during a typical day. Does your health now limit your ability in these activities? If so, how much?

	yes, a lot	*a little*	*not at all*
A) Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports			
B) Moderate activities, such as moving a table, pushing a vacuum cleaner			
C) Lifting or carrying bag of cereal, sugar			
D) Climbing several flights of stairs			
E) Climbing one flight of stairs			
F) Bending, kneeling or stooping			
G) Walking two kilometres			
H) Walking one kilometre			
I) Walking one hundred metres			
J) Bathing and dressing yourself			

Appendix 3

Coding of work characteristics

Effort

	No	Yes			
		Very good	Rather good	Rather distressed	Very distressed
Q1) There is constant time pressure in my job due to a heavy workload	1				
If Yes, how do you feel about this?		1	1	2	2
Q2) There are many interruptions and disturbances in my job	1				
If Yes, how do you feel about this?		1	1	2	2
Q3) I have a lot of responsibility in my job	1				
If Yes, how do you feel about this?		1	1	2	2
Q4) There is pressure in my job to work overtime	1				
If Yes, how do you feel about this?		1	1	2	2
Q5) My job is physically demanding	1				
If Yes, how do you feel about this?		1	1	2	2
Q6) Over the past few years, my job has become more and more demanding	1				
If Yes, how do you feel about this?		1	1	2	2

Score: (Q1 + Q2 + Q3 + Q4 + Q5 + Q6) / 6

if only five questions were answered, average score was calculated from five valid answers

Reward

	No	Yes			
		Not at all distressed	Somewhat distressed	Rather distressed	Very distressed
Q1) Are you treated unfairly at work?	1				
If Yes, how do you feel about this?		1	1	2	2
Q2) Are the promotion prospects in your job poor?	1				
If Yes, how do you feel about this?		1	1	2	2
Q3) Have you experienced or do you expect to experience an undesirable change in your work situation?	1				
If Yes, how do you feel about this?		1	1	2	2
Q4) Have job redundancies recently affected your work colleagues?	1				
If Yes, how do you feel about this?		1	1	2	2
Q5) Is your own job security poor?	1				
If Yes, how do you feel about this?		1	1	2	2
Q6) Considering all your efforts and achievements, are your work prospects poor?	1				
If Yes, how do you feel about this?		1	1	2	2

	Yes	No			
		Not at all distressed	Somewhat distressed	Rather distressed	Very distressed
Q7) Do you receive the respect you deserve from your work colleagues?	1				
If No, how do you feel about this?		1	1	2	2
Q8) Do you experience adequate support in difficult situations?	1				
If No, how do you feel about this?		1	1	2	2
Q9) Does your current job adequately reflect your knowledge, skills and training?	1				
If No, how do you feel about this?		1	1	2	2
Q10) Does your salary/income adequately reflect all your past efforts and achievements?	1				
If No, how do you feel about this?		1	1	2	2
Q11) Considering all your efforts and achievements, do you receive the respect and prestige you deserve at work?	1				
If No, how do you feel about this?		1	1	2	2

Score: (33 - (Q1 + Q2 + Q3 + Q4 + Q5 +Q6 +Q7 + Q8 + Q9 + Q10 + Q11)) / 11

if only nine or ten questions were answered, average score was calculated from valid answers

Job decision latitude (control)

	Often	Some times	Seldom	Never/ almost never
Q1) Do you have a choice in deciding HOW you do your work?	0	1	2	3
Q2) Do you have a choice in deciding WHAT you do at work?	0	1	2	3
Q3) Do you have a good deal of say in decisions about work?	0	1	2	3
Q4) Do you have a great deal of say in planning your work environment?	0	1	2	3

Score: ((3-Q1) + (3-Q2) + (3-Q3) + (3-Q4)) / 4

if only three questions were answered, average score was calculated from three valid answers

Social support

	Often	Some times	Seldom	Never/ Almost never
Q1) How often do you get help and support from your colleagues?	0	1	2	3
Q2) How often are your colleagues willing to listen to your work related problems?	0	1	2	3
Q3) How often do you get help and support from your immediate superior?	0	1	2	3
Q4) How often is your immediate superior willing to listen to your problems?	0	1	2	3

Score: ((3-Q1) + (3-Q2) + (3-Q3) + (3-Q4)) / 4

if only three questions were answered, average score was calculated from three valid answers

Job demand

	Often	Some times	Seldom	Never/ Almost never
Q1) Do you have to work very intensively?	0	1	2	3

Score: (3-Q1)

Job variety

	Often	Some times	Seldom	Never/ Almost never
Q1) Do you have the possibility of learning new things through your work?	0	1	2	3
Q2) Does your work demand a high level of skill or expertise?	0	1	2	3
Q3) Does your job require you to take the initiative?	0	1	2	3
Q4) Does your job provide you with a variety of interesting things to do?	0	1	2	3

Score: ((3-Q1) + (3-Q2) + (3-Q3) + (3-Q4)) / 4

if only three questions were answered, average score was calculated from three valid answers