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**Coronary heart disease from a psychosocial perspective:
socioeconomic and ethnic inequalities among Slovak patients**

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Slovak patients**

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Introduction

This thesis deals with socioeconomic and ethnic inequalities in psychological factors and in health-related quality of life among patients with coronary heart disease, as well as with psychosocial predictors of positive and negative changes in quality of life among patients with coronary heart disease (CHD).

With regard to the psychological factors, the present study is focusing on the following most commonly researched characteristics: psychological well-being, vital exhaustion, Type D personality and hostility. Psychological well-being is characterized by the occurrence and severity of the depression and anxiety symptoms, which are strongly associated with the coronary heart disease. Vital exhaustion, a state characterized by lack of energy, increased irritability and feelings of demoralisation, is also known as one of the risk factors for coronary heart disease, and has been shown to be a substantial predictor of myocardial infarction. Type D personality defines individuals who experience increased negative emotions and who do not express these emotions in social interactions, and is associated with higher numbers of re-infarction and higher mortality rates among coronary patients. Hostility is comprising of cynicism, aggressive responding and hostile attitude toward the social environment, and has been demonstrated as a risk factor contributing to CHD as well.

In the field of CHD research, much attention has been paid in recent years to socioeconomic inequalities of those suffering from coronary heart disease. The role of socioeconomic disadvantage in CHD incidence, morbidity and mortality has been studied quite often, showing the importance of socioeconomic status (SES) in both the etiology and the prognosis of this disease. With regard to the quality of life and the psychological characteristics among patients, less attention has been paid to the possible associations with socioeconomic status. The incidence of the factors influencing coronary heart disease among minority ethnic groups is also becoming a point of the interest. In this regard, the effects of specific ethnic factors (e.g. cultural background, lifestyle differences) and an often low socioeconomic status play a significant role. Within the framework of this thesis, SES is representing by the income level and educational grade as the most commonly used indicators of socioeconomic status.

In this chapter information is provided about the associations between socioeconomic status/ethnicity, psychological factors and the etiology and prognosis of coronary heart disease, with special emphasis

on the possible conceptual pathways and mechanisms between these associations. The aim of the study, research questions and structure of this thesis are provided at the end of this chapter.

1.1. Coronary heart disease and psychosocial factors

Although the mortality caused by coronary heart disease (CHD) in most European countries has decreased in recent years, CHD is still the leading cause of morbidity and disability of the population. In the countries of the Eastern and Central Europe, CHD rates remain rather high compared to the rest of the Europe. Moreover, mortality has shifted to younger categories of the population (1, 2).

Coronary heart disease refers to a set of conditions resulting from the process of atherosclerosis, which is an accumulation of plaque in the coronary arteries. A complex atherosclerotic process occurs over a span of many years as a result of various risk factors related to a series of biochemical, immune-inflammatory and hemodynamic processes. The most common clinical manifestations of coronary heart disease, anginal chest pain and myocardial infarction are among the most widely researched areas not only in the fields of cardiology and public health, but also in health psychology (3, 4).

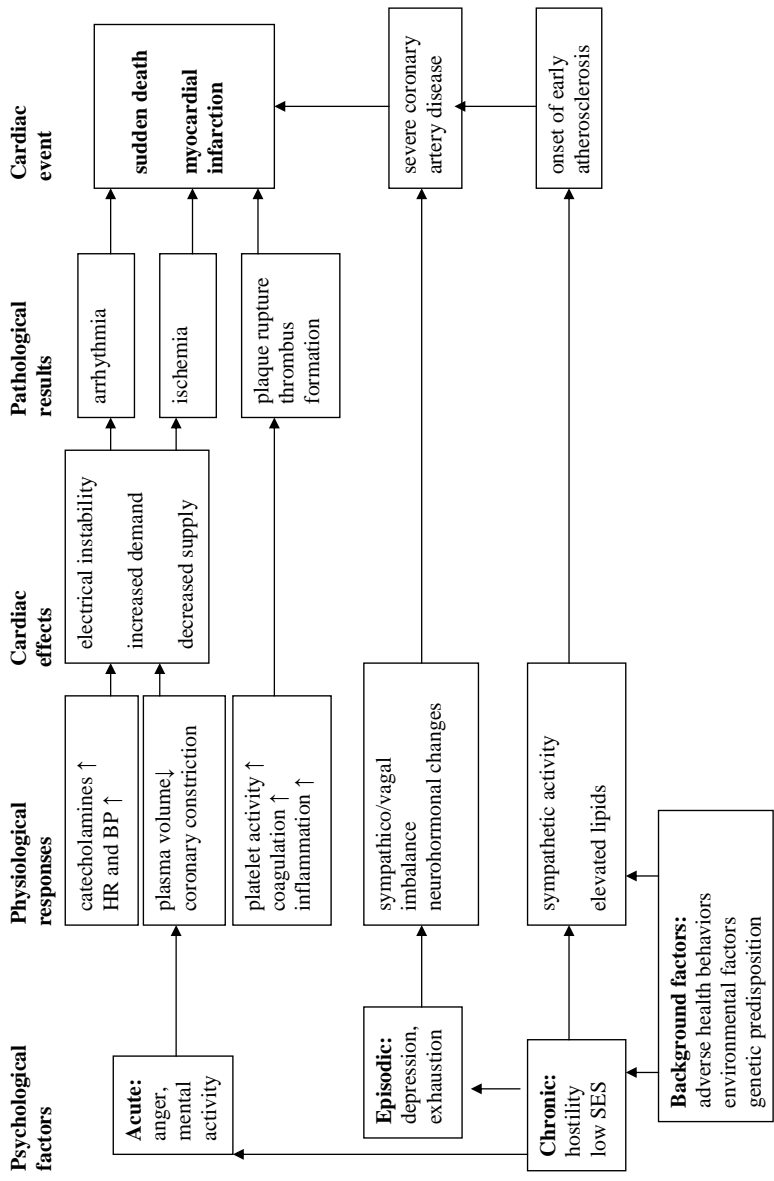
The perception of CHD, its treatment and prevention have changed considerably over the last few decades. Halfway through the last century, health was perceived from a mechanistic biomedical viewpoint, and very small importance was given to psychosocial factors. Since then a large amount of attention has been focused on psychological and social influences, and a more complex model of understanding chronic diseases has been established. Because of the complex pathophysiology of coronary disease, various psychological, social and behavioral variables may be related to different aspects of the disease process (5, 6).

1.1.1 Psychosocial factors and the etiology of CHD

The expression 'psychosocial factors' is frequently used in the literature as an umbrella term for a variety of characteristics describing psychological status, personality traits, or characteristics of the social environment (i.e. anxiety, depression, vital exhaustion, type D personality, social support, psychosocial work characteristics etc.). Some studies also include socioeconomic status (education, income, occupational grade) under this umbrella term. A summarizing and integrating view resulting in a pathophysiological model of the relationships between psychological risk factors and CHD outcomes was proposed by Kop (6). In this model, psychological factors are distinguished as acute, episodic and chronic, and all of them play a specific role in a complex model. Acute psychological factors are assumed to result in physiological responses (i.e.

electrical instability, increased cardiac demand and decreased coronary supply), leading to pathophysiological cardiac effects among vulnerable patients (including arrhythmias, myocardial ischemia, thrombus formation and plaque ruptures). Episodic psychological factors have physiological correlates that are involved in the progression of severe coronary disease to acute coronary syndromes. Chronic psychological factors promote the onset of early atherosclerosis, especially in cases of genetic vulnerability, adverse health behaviors and other environmental risk factors (Kop, 1999, Figure 1.). Kop later extended his model with the psychoneuroimmunological pathways involved in coronary disease progression, accentuating the importance of immune- inflammatory processes (4).

Figure 1. A pathophysiological model of the relationships between chronic, episodic and acute psychological risk factors for CHD (Kop, 1999).



1.1.2. Psychosocial factors and the prognosis of CHD

Psychosocial factors significantly influence not only the etiology of CHD, but also its prognosis. However, the association of psychosocial factors with the prognosis of CHD is more consistently reported for certain characteristics such as depression than for others, such as personality traits. For instance, a systematic review of prospective studies by Kuper et al. (7) provides evidence for an association between depression, social support and psychosocial work characteristics with coronary heart disease etiology and prognosis, and a less consistent effect of anxiety or type A- behavior on coronary heart disease (see the results of this review in table 1).

The association between depression and CHD prognosis is well-established; depressive symptoms have adverse effects on the prognosis among patients, especially after myocardial infarction, as well as other cardiac events. Patients with high levels of depression are more likely to experience various cardiac complications (3, 4, 7). Vital exhaustion has also been shown to be a predictor of increased risk for myocardial infarction, coronary bypass surgery, need of revascularization and cardiac death among coronary patients (8). Personality traits may also influence coronary heart disease prognosis: type-D personality was associated with a higher numbers of re-infarctions and higher mortality rates among coronary patients in a study by Denollet (9), and hostility has been shown to be associated with poorer survival among CHD patients and with a higher risk of restenosis after coronary angioplasty (10).

The rehabilitation process from a major cardiac event is highly individual and is influenced by the severity of underlying disease and the type of medical intervention received, but it also undoubtedly has psychosocial aspects after all of the mentioned types of the intervention. A first myocardial infarction strikes many patients unprepared for it, whereas coronary bypass surgery and angioplasty are more likely to be the result of a more lengthy chain of medical investigation which gives the patient time to prepare (11). Research on the question whether the treatment of psychosocial factors could improve cardiovascular prognosis in patients has not brought consistent results yet, but it has been shown that such interventions significantly improved patients' quality of life (12,13).

Table 1. Summary of the results of a review of prospective studies assessing the effects of psychosocial factors on CHD (Kuper, Marmot, Hemingway, 2005).

	Number of reports of etiologic studies (n = 70)				Number of reports of prognostic studies (n = 92)			
	-	0	+	++	-	0	+	++
Type A behaviour	1	11	5	1	3	10	1	1
Depression	0	8	5	9	0	16	7	11
Anxiety	0	4	1	3	1	9	4	4
Work characteristics	0	3	5	5	0	2	2	0
Social support	0	3	4	2	0	7	4	10

- finding contrary to hypothesis

0 lack of clear association

+ moderate association (relative risk ≥ 1.50 and < 2)

++ strong association (relative risk ≥ 2)

1.2. Socioeconomic status and coronary heart disease

A considerable number of studies have found that socioeconomic disadvantage during the course of life (poor income, low education) is associated with a higher occurrence of CHD lifestyle risk factors (heavier smoking, worse nutrition, higher levels of cholesterol) and with a worse prognosis after disease inception. A higher CHD mortality and morbidity risk has been found in patients from low socioeconomic groups (14, 15, 16, 17).

1.2.1. Socioeconomic status and CHD: possible pathways

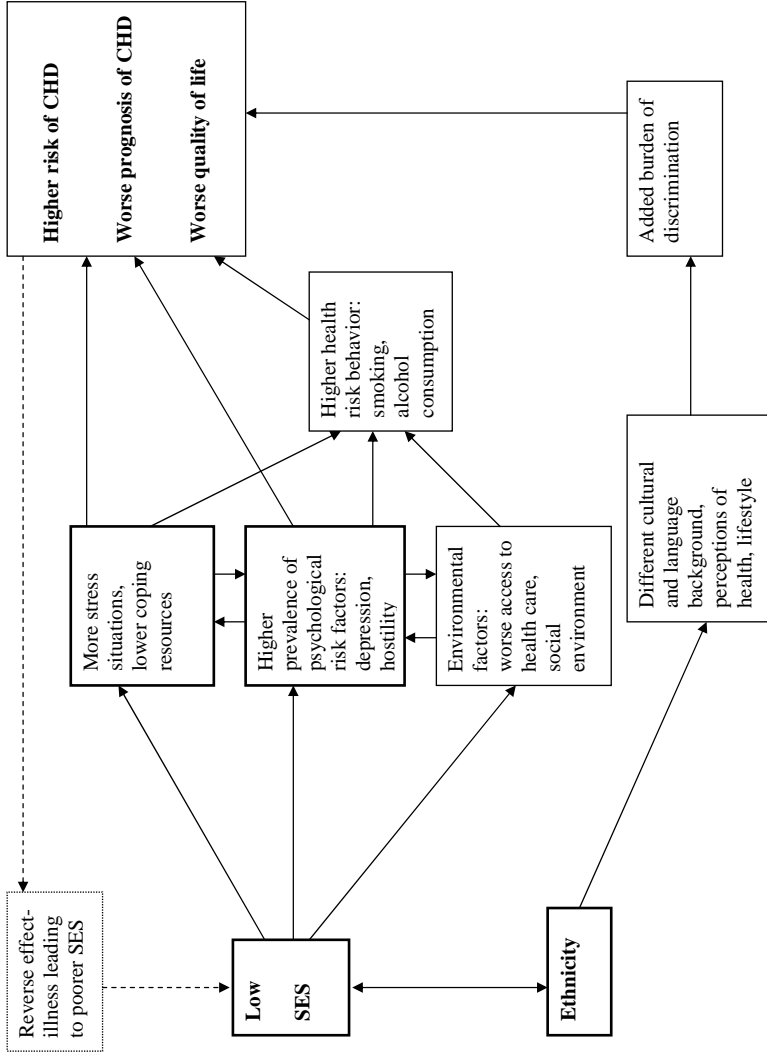
Several pathways have been proposed by which socioeconomic status might influence coronary heart disease, including the effect of inadequate health insurance, a lack of preventive care, poor diet and poor health care, as well as more risky health behavior among low socioeconomic groups (18, 19). It might be hypothesized that socioeconomic status influences coronary heart disease not only directly (e.g. worse access to good quality food, higher incidence of smoking, lower physical activity), but also indirectly, via a psychological pathway. Increased depression, anxiety, exhaustion or hostility were found to be more prevalent in groups with a lower socioeconomic status. This may later produce acute or chronic physiological changes, increasing the risk of coronary heart disease and worsening the prognosis of patients (20, 21, 22). Moreover, socioeconomic inequalities might exist in psychosocial factors among coronary patients

with an already diagnosed disease, thus negatively influencing their overall quality of life.

Cognitive and emotional processes characteristic for experiencing anxiety, hostility or depression are connected with a higher cardiovascular reactivity stress response and imbalance in the autonomic system (increased sympathetic reactivity and decreased parasympathetic reactivity). This in turn might contribute to an increase of appetite, higher smoking and higher alcohol intake or to a decrease in physical activity and consequently the conditions associated with higher risk of coronary heart disease, as well worse prognosis (23). Low socioeconomic resources might also contribute to higher stress exposure, which increases the risk of coronary heart disease, as has been shown, for instance, in the Whitehall study (16). In these socioeconomic settings, stressful events and lower resources for coping occur more often (18, 24). This might be especially harmful for the adjustment to the disease and for coping with negative factors influencing quality of life among people with a diagnosed chronic disease, such as coronary heart disease. With regard to personality traits such as Type D, it is necessary to point out that the pathway mechanisms and their role in association between SES and CHD is probably different that in the case of depression or vital exhaustion. However, not much research has been conducted into the relationship between SES-CHD and personality traits. Therefore, the present study regarding personality traits is more exploratory, which is also the reason why personality is treated at the same level as distress variables.

Thus, the general mediating factors between coronary heart disease (but similarly also in other chronic disease) and SES would comprise of following important factors: lifestyle (risk behavior), access to health care, physical and social environment, psychosocial factors and stress situations, and possible reverse effect (illness might lead to a worse socioeconomic position). This model of possible pathway mechanisms is summarized in Figure 2.

Figure 2. Possible theoretical model of SES, ethnicity and CHD associations (based on the work of Adler, Stewart, 2007). Variables highlighted in bold are central constructs within this thesis.



1.3. Ethnicity: an added burden?

Although it might be expected that ethnicity would have significant influence on CHD, evidence of the occurrence of CHD among ethnic minorities is quite ambiguous. For instance, cardiovascular mortality among immigrants from the Indian subcontinent (including Bangladeshis, Indians and Pakistanis) in the United Kingdom is rather high (25). In contrast, CHD mortality among the major immigrant groups in the Netherlands (Turks and Moroccans) is generally lower than among the native Dutch, probably due to their more healthy lifestyle, such as less smoking and a better diet (26). Significant differences also exist within ethnic subgroups. For instance, UK Indians seem to have less CHD than Bangladeshis and Pakistanis (25), which might be associated, for instance, with different eating habits due to differences in religions. The relative impact of ethnicity and socioeconomic position might also vary depending on the health condition or disease. For example, in the USA ethnicity is very important in infant mortality, but in other health conditions including coronary heart disease, ethnic differences are far less significant when adjusted for income and education (18).

In Slovakia, the Roma make up the second largest ethnic minority. They are characterized by a high proportion of people living in very poor socioeconomic conditions and have a different cultural background than the majority of population. The limited available evidence shows that the health status of Roma population is in general worse than that of the non-Roma population, and also that the prevalence of both medical and non-medical CHD risk factors is higher among the Roma (27). However, research on the Roma is still sparse, especially in the field of chronic diseases and particularly coronary heart disease. Almost no research has been performed with regard to mental health or the quality of life among Roma patients with coronary heart disease. With regard to coronary heart disease (as well as other chronic diseases) among Roma patients, it still remains questionable to what extent ethnic inequalities in the mentioned health conditions might be due to the poor socioeconomic position of the Roma.

Based on the literature, it is probable that SES would account for a large share of ethnic inequalities in health. However, it is likely that apart from socioeconomic disadvantage, also specific ethnic factors also play a role. Discrimination is an additional factor which impacts the distribution of opportunity or resources and creates adverse social climates, thus also taking a toll on health outcomes (18). Moreover, specific cultural and language factors might contribute to the different perceptions of health and lifestyle than in the majority population, which might have both positive (as in the case of the Turks and Moroccans in Netherlands) and negative (as among the Roma in Slovakia) effects on cardiovascular health (24, 25, 26) see Figure 2.

1.4. Impact of CHD on quality of life in psychological, social and physical dimensions

Quality of life is a multidimensional construct influenced by various factors (28), both physical (severity of disease, functional status, type of the intervention received) and psychosocial (such as personal perceptions, coping mechanisms or environmental resources). Table 2 presents potential physical and psychosocial effects of CHD on quality of life among coronary patients, as reported by Shepard and Franklin (29). Increased depression, anxiety and distress are among the most commonly reported negative effects of CHD on quality of life, and other pertinent factors include: physical functions such as mobility and capacity for self-care, the ability to play a meaningful role in the work place and the frequency and severity of symptoms.

Table 2. Physiological, clinical and psychosocial effects of cardiovascular disease on patient’s quality of life (Shephard, Franklin,2001- modified) .

Disease/ condition	Physiological/clinical manifestations	Psychosocial manifestations
Acute myocardial infarction	Decreased: functional capacity, impaired left ventricular function, residual myocardial ischemia, arrhythmias, Increased: likelihood of AMI, CABG or PTCA, use of cardiac medications (e.g. BB, ACE inhibitors, statins)	Increased: anger, depression, emotional stress/ distress, vital exhaustion, and sexual dysfunction, job/ economic strain
Angina pectoris	Decreased: symptom-limited functional capacity (cold exposure, exertion, heavy meal, and emotional triggers) Increased: likelihood of CABG or PTCA, use of cardiac medications (e.g. BB, NTG)	Increased: depression, emotional stress/distress, anxiety, and sexual dysfunction, job strain
Coronary artery bypass graft surgery	Decreased: functional capacity, associated musculoskeletal pain (i.e. sternum, leg), prolonged convalescence, potential for reocclusion (giving angina pectoris and/or AMI), transient/lasting cognitive dysfunction, use of cardiac medications (e.g. cardiac glycosides, BB)	Increased: depression, emotional stress/distress, anxiety, and sexual dysfunction, job strain/economic strain
Percutaneous transluminal coronary angioplasty	Relatively high likelihood restenosis, repeat PTCA, AMI or CABGS, use of cardiac medications (e.g. BB, statins, NTG)	Increased: depression, anxiety, emotional stress/ distress

In the next chapters the SF-36 questionnaire is used as a measure of quality of life. The outcome parameter of the SF-36 is usually defined as perceived health status or health-related quality of life (HRQL) and can be used to evaluate the broad impact of a disease on a patient, as it captures the subjective health status of patient as a reflection of disease, and also for the effectiveness of interventions (30).

As Höfer et al. state in their article (31), although measurement of HRQL in CHD has become more accepted during the last few years and HRQL has been increasingly considered as an important outcome measure among coronary patients, until recently efforts have been made mainly to identify the psychosocial factors that influenced CHD etiology or prognosis, but the influence of these factors on HRQL as an outcome has been rarely examined. However, it seems that HRQL is an independent psychosocial factor, most probably strongly influenced by psychological factors such as depression and anxiety (32, 33).

1.5. Aims and research questions

The general aim of the present study was to explore socioeconomic and ethnic inequalities in psychological factors (psychological well being, vital exhaustion, Type-D personality, hostility) and in health-related quality of life among patients with coronary heart disease. A further aim of the present study was to assess whether psychological factors and socioeconomic status predict a change in quality of life among patients with coronary heart disease during their recovery after invasive coronary procedure (PTCA, CABG).

Based on previous literature and the theoretical model presented in the Figure 4, several research questions have been formulated:

Research question 1.

Is there evidence from the literature supporting the hypothesis of a socioeconomic gradient in the occurrence of psychosocial factors (like anger, depression, hostility, social support) among patients with coronary heart disease? (Chapter 3)

Research question 2.

Are there socioeconomic inequalities in psychosocial factors (psychological well-being, perceived mental health status, perceived quality of life, vital exhaustion) among patients with coronary heart disease? (Chapters 4, 5)

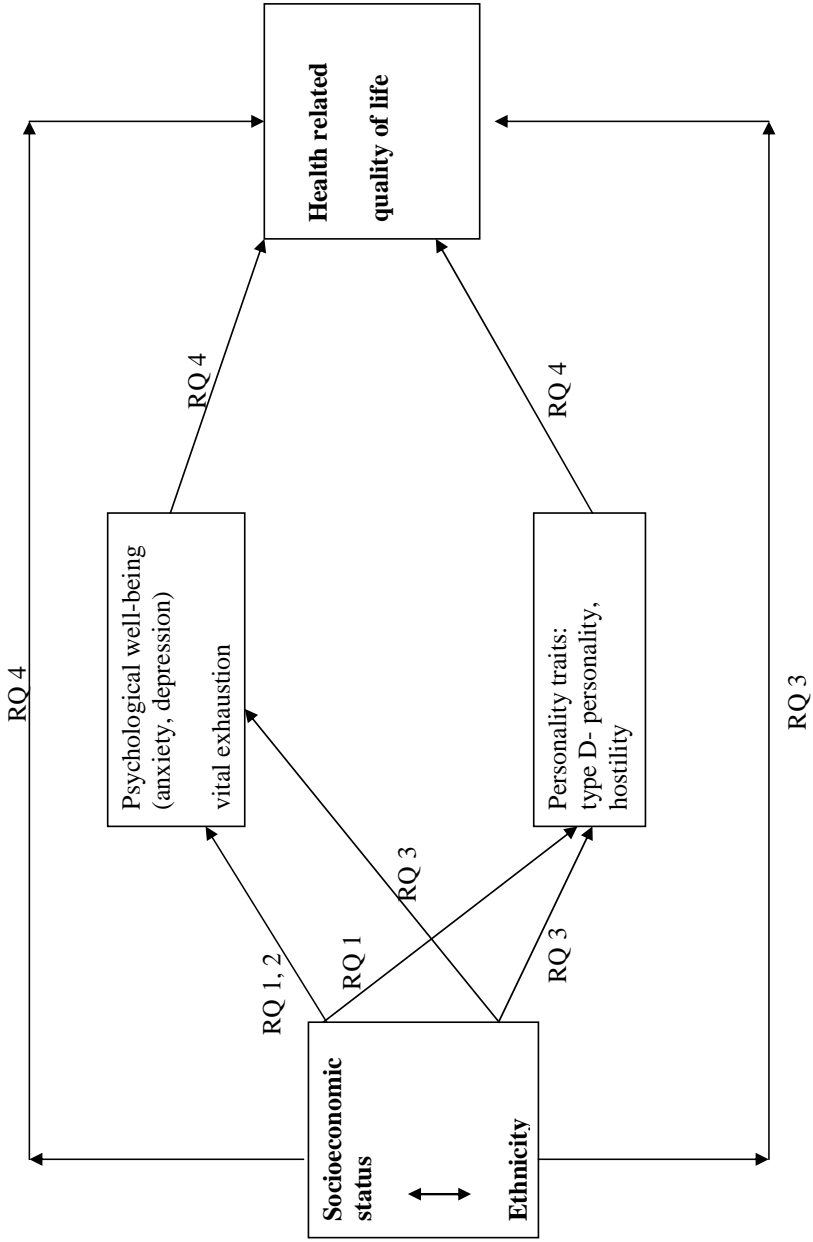
Research question 3.

Are there ethnic inequalities in psychosocial factors and quality of life among patients with coronary heart disease? To what extent are these inequalities influenced by socioeconomic status? (Chapter 6)

Research question 4.

Do psychosocial factors predict a change in health-related quality of life among patients with coronary heart disease? (Chapter 7)

Figure 3. A model of the relationships examined within this thesis, for cardiac patients.



1.6. Outline of the thesis

Chapter 1 provides an overall introduction to the associations between the key theoretical constructs of this thesis: psychosocial factors, coronary heart disease, socioeconomic status and ethnicity. Possible theoretical pathways are proposed in the chapter, as well as the primary aim and research questions of the thesis. Chapter 2 provides information about the design of the study. In Chapter 3, a systematic review is presented on socioeconomic differences in psychosocial factors contributing to coronary heart disease. Chapter 4 deals with inequalities among coronary patients with low and high incomes and education with regard to psychological characteristics (psychological well-being defined by anxiety, depression) and perceived health status, as well as to the perceived overall quality of life. Chapter 5 explores the impact of socioeconomic status on vital exhaustion in patients with coronary heart disease, as vital exhaustion has been shown to be a significant predictor of worse prognosis among coronary patients. Socioeconomic differences in vital exhaustion might be part of the mechanism by which SES influences the quality of life among patients with coronary heart disease. Chapter 6 focuses on the question of whether Roma patients with coronary heart disease perceive their quality of life as worse when compared to non-Roma patients. The incidence of psychological factors (depression, anxiety, vital exhaustion, Type-D personality, hostility) within the two ethnic groups is also explored. Roma and non-Roma coronary patients were matched by socioeconomic status, which enabled to some extent to distinguish the impact of ethnicity and socioeconomic status on the outcome variables. In Chapter 7, we explore the possible psychosocial predictors of a positive and negative change in health quality of life among cardiac patients who underwent CABG or PTCA, focusing on the following variables: psychological well-being, vital exhaustion, type-D personality and hostility. In the last chapter the main findings, strengths and limitations of the research study are discussed.

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Design of the study

The research project 'Social class and its impact on a patient's functional status and recovery process after cardiological or cardiosurgical intervention' is an interdisciplinary study carried out in a cooperation between the University of Groningen, PJ Safarik University in Kosice, and the East Slovakian Institute of Cardiac and Vascular Disease in Kosice. The aim of the project is to explore the impact of socioeconomic status and ethnicity on various psychosocial and medical aspects of the quality of life and the recovery process among patients with coronary heart disease in Slovakia. Previous studies have indicated that both socioeconomic status (1,2,3) and ethnicity (4,5) have significant impact on coronary heart disease. However, such research has been performed rarely in the countries of the Central and Eastern Europe. This chapter provides a general outcome of the design of this study.

2.1. Data collection

2.1.1. Participants and data collection

Data for this study were collected in the East Slovakian Institute of Cardiac and Vascular Disease in Kosice starting in November 2004 and still continuing to the present. The East Slovakian Institute for Cardiac and Vascular Diseases is a highly specialized medical center, where all patients with diagnosed or suspected cardiovascular problems from the entire East Slovakian region (about 1.5 million inhabitants) are referred for diagnosis and treatment.

Inclusion and exclusion criteria for baseline examination were defined as follows:

Inclusion criteria:

1. coronary heart disease in the medical history
2. both males and females
3. age less than 75
4. willing to participate (signed informed consent)

Exclusion criteria:

1. cardiovascular problems other than coronary heart disease (e.g. valve disease)
2. severe cognitive impairments
3. serious comorbidity

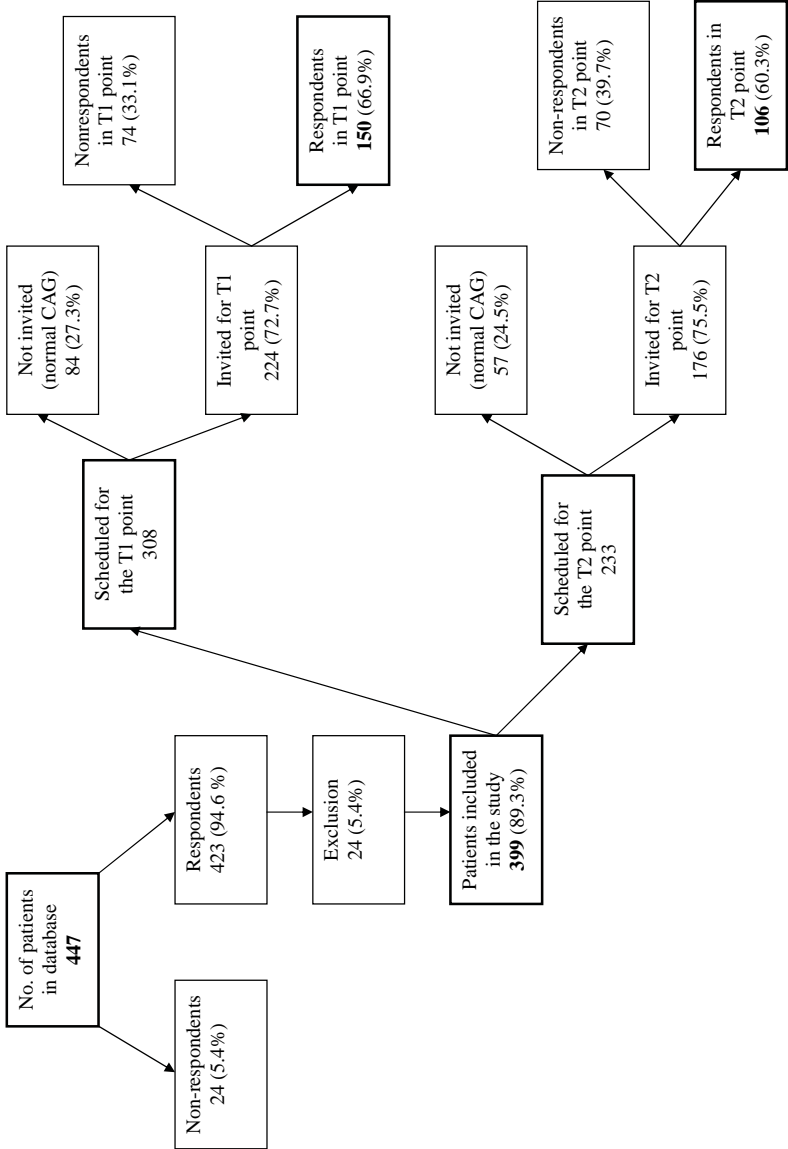
Patients referred for coronary angiography (CAG) by their cardiologist were enrolled in the study. A personal interview was conducted with each participant by a psychologist, and medical data were retrieved from their medical records. Data collection consisted of three waves: cross sectional data collection (T0 time point) and longitudinal data collection (T1 time point and T2 time point). A baseline examination was performed before CAG. The type of therapeutic intervention following the CAG (percutaneous coronary intervention, coronary artery bypass grafting or pharmacology treatment) was determined by a cardiologist based on the results of CAG, independently from participation in this study.

For the follow-up assessment, patients were individually invited via mail. The first follow-up (T1 time point) was performed 3 to 6 month after the CAG and/or subsequent treatment. A second follow-up (T2 time point) was performed 12 to 24 month after the CAG and/or subsequent treatment. For the follow-up examinations only patients who were indicated for the percutaneous transluminal coronary angioplasty (PTCA), coronary-artery bypass grafting (CABG) or for pharmaceutical treatment were invited. This means that participants with a normal coronary angiogram at the baseline were not enrolled in the follow-up. Details on respondents and non-respondents at all three time points (T0, T1, T2) can be found in Table 1.

Table 1. Description of the samples used in this study.

Sample	First sample: cross-sectional	Second sample: Roma/non-Roma	Third sample: longitudinal
Chapter	4, 5	6	7
Data collection	Personal interview with 362 patients invited for CAG	114 patients = 38 Roma + 38 non-Roma with low SES + 38 non-Roma with high SES (selected from 399 interviewed)	106 patients interviewed in baseline and follow-up (12-24 month after baseline)
Time period	November 2004 - March 2007	November 2004- June 2007	November 2004 (start T0)- November 2005 (start T2)- December 2007
Response rate	94.1 %	94.6%	60.3%- at follow-up
Age - mean	55.9	53.4	57.4
SD	7.3	6.9	6.7
Range	27-75	27-72	34-73
Gender - males	245 (67.7%)	93 (81.6%)	90 (84.9%)
females	117 (32.3%)	21 (18.4%)	16 (15.1%)

Figure 1. Data collection - details on respondents and non-respondents.



All participants were provided with information about the study and signed an informed consent letter before their inclusion in the study. Ethical approval for this study was obtained from the Ethics Committee of the East Slovakian Institute for Cardiac and Vascular Diseases in Kosice.

2.1.2. Samples used in this study

This thesis is intended to give an overview of the research work done on the project 'Social class and its impact on a patient's functional status and recovery process after cardiological or cardiosurgical intervention' during the period 2004-2008. The data collection for this research project was carried out continuously during that time and continues still. As the five articles (Chapter 3- Chapter 7) used in this thesis were written at different times during data collection, three different samples are used within this thesis:

First sample (cross-sectional)

- 362 participants
- cross-sectional data collection between November 2004 and March 2007
- sample used in Chapters 4 and 5

Second sample - Roma/non-Roma (cross-sectional)

- 114 patients (selected from 399 participants)
- 38 Roma matched with 38 low SES non-Roma, and 38 high SES non-Roma
- matching criteria: age, gender, education and type of intervention after CAG
- cross-sectional data collection between November 2004 and June 2007
- sample used in Chapter 6

Third sample (longitudinal)

- 106 participants interviewed at two time points
- first wave of data collection between November 2004 and December 2006
- second wave of data collection between November 2005 and December 2007
- follow-up 12 to 24 month after the CAG and/or subsequent treatment
- exclusion criteria for the follow-up: normal coronary angiogram at the baseline
- sample used in Chapter 7

A brief description of the samples and information about their use in separate chapters is provided in Table 2. [you previously inserted table 1]

Table 2. Brief summary of the variables and measurements used in this study.

Construct	Measure	Type of variable (Chapters)	Short description
Psychological well-being	General Health Questionnaire (Goldberg & Hilier, 1979), Self-reported questionnaire	Dependent (ch. 4, 6) Independent (ch. 7)	Measuring psychological well-being (symptoms of depression and anxiety)
Health-related quality of life	SF-36 (Ware, Kosinski & Keller, 1994) Self-reported questionnaire	Dependent (ch. 4, 6) Independent (ch. 7)	Measurement of health-related quality of life comprised of the components: physical and mental
Vital exhaustion	Maastricht Interview for Vital Exhaustion (Meesters & Appels, 1996) Structured interview by psychologist	Dependent (ch. 5, 6) Independent (ch. 7)	Interview assessing the feeling of excessive fatigue, troubles with sleeping, tiredness, demoralization, etc.
Type-D personality	DS 14 (Denollet 2005) Self-reported questionnaire	Dependent (ch. 6) Independent (ch. 7)	Measuring of the tendency to experience negative emotions and not to express emotions in social interactions
Hostility	Cook-Medley hostility scale (Barefoot et al., 1989) Self-reported questionnaire	Dependent (ch. 6)	Indicator of hostility comprising of subscales: cynicism, aggressive responding and hostile affect
Socioeconomic status	Educational level, Income level Structured interview by psychologist	Independent (ch. 4, 5, 6, 7)	Education - basic (elementary), middle, high (university) Income - based on minimum wage income used within social system in Slovakia
Ethnicity	Roma / non-Roma Structured interview by psychologist	Independent (ch. 6)	Based on self-identification and objective assessment
Construct	Measure	Type of variable (Chapters)	Short description
Functional status	Combination of NYHA (Criteria committee of the New York Heart Association, 1994) and CCS (Campeau, 1976), assessed by a cardiologist	Independent /covariate (ch. 4, 5, 6, 7)	NYHA- dyspnea symptoms (problems with breathing) CCS - severity of chest pain

Construct	Measure	Type of variable (Chapters)	Short description
Type of the intervention	Based on the results of the coronary angiography, assessed by cardiologist	Independent/covariate (ch. 5, 7)	Invasive treatment: CABG (Coronary-artery Bypass Grafting) PTCA (percutaneous transluminal coronary angioplasty) Non-invasive treatment: Pharmaceutically (no invasive treatment)
Ejection fraction	Indicated by the results of echocardiography (McGowan & Cleland, 2003), assessed by a cardiologist	Independent/covariate (ch. 6)	Measure of the systolic function of the left ventricle-indicating the disease severity

2.2. Measures

In this section an overview of the variables and measures used in this study is given.

We used the following psychological, sociodemographic and medical variables: psychological well-being, health-related quality of life, vital exhaustion, type-D personality, hostility, socioeconomic status, ethnicity, functional status, type of the intervention and ejection fraction.

The central dependent variables were the indicators of psychological well-being, vital exhaustion and the health related quality of life. Psychological well-being is an individual mood often operationalized by the level of symptoms of anxiety and depression and within the study is assessed by the General Health Questionnaire-GHQ 28 (6). The structured Maastricht Interview for Vital Exhaustion (7) measures feelings of excessive fatigue; questions focus on the symptoms of tiredness, lack of energy, irritability, disrupted sleep, etc. The SF-36 questionnaire was used as measure of quality of life. This questionnaire intends to capture the subjective (self-perceived) health status of a patient as a reflection of his/her disease. The outcome parameter of the SF-36 is usually defined as health-related quality of life (HRQL). This variable can be used to evaluate the broad impact of a chronic disease on all dimensions of patient's life and the effectiveness of intervention strategies (8).

The main independent variable used in all the chapters was socioeconomic status indicated by the level of education and income. In Chapter 6, ethnicity was employed as an independent variable as well. Medical characteristics (functional status, type of the intervention and ejection fraction) were put in the regression models as possible

covariates. The origin of the measurements, a short description of them and information about in which chapter the variables were used, are presented in the Table 2.

2.3. Statistical analysis

Several statistical methods were used across this study to analyze data. All analyses were performed using the statistical software package SPSS, versions 10.1., 12.0. and 14.0. More details on the analyses can be found in the 'statistical analysis' sections following each chapter. Descriptive statistics were used for analyzing the basic demographic, medical and psychological characteristics of participants. T-tests for repeated measures were used in Chapter 7 to assess the statistical significance of the change in the outcome variable between the baseline and the follow-up. Analysis of variance (ANOVA) and Scheffe post hoc tests were employed in Chapter 6 in order to explore the differences in dependent variables between ethnic groups. Logistic regression models for exploring the relative effects of different levels of socioeconomic status on outcome variables were used in Chapters 4 and 5. Use of linear regression models in Chapter 6 (the enter method) enabled the examination of the effect of ethnicity, and in Chapter 7 the identification of predictors of change in the health related quality of life. In this chapter we also assessed the clinical relevance of the change in the quality of life using a distribution-based model: effect sizes and SEM-based criterion (SEM- standard error of measurement).

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Socioeconomic differences in psychosocial factors contributing to coronary heart disease: A review¹

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Abstract

Psychosocial factors have been shown to play an important role in the aetiology of coronary heart disease. A strong association between coronary heart disease and socioeconomic status (lower-level education, poor financial situation) has also been well established. Socioeconomic differences may thus also have an effect on psychosocial risk factors associated with coronary heart disease, and socioeconomic disadvantage may negatively affect the later prognosis and quality of life of cardiac patients. The aim of this study was to review the available evidence on socioeconomic differences in psychosocial factors which specifically contribute to coronary heart disease. A computer-aided search of the Medline and PsycINFO databases resulted in 301 articles in English published between 1994 and 2007. A comprehensive screening process identified 12 empirical studies which described the socioeconomic differences in coronary heart disease risk factors. A review of these studies showed that socioeconomic status (educational grade, occupation or income) was adversely associated with psychosocial factors linked to coronary heart disease. This association was evident in the case of hostility and depression. Available studies also showed a similar trend with respect to social support, perception of health and lack of optimism. Less consistent were the results related to anger and perceived stress levels. Socioeconomic disadvantage seems to be an important element influencing the psychosocial factors related to coronary heart disease, thus, a more comprehensive clarification of associations between these factors might be useful. More studies are needed, focused not only on well-known risk factors such as depression and hostility, but also on some lesser known psychosocial factors such as Type D and vital exhaustion and their role in coronary heart disease.

Introduction

A more systematic and interdisciplinary attitude to coronary heart disease (CHD) has gained ground recently. Attention has also focused on the role of psychosocial factors and increasing socioeconomic differences in the aetiology and prognosis of CHD (1, 2, 3, 4). Evidence suggests that in addition to the traditional biomedical risk factors (cholesterol, hypertension, blood pressure) there are other important determinants of coronary heart disease (5, 6, 7, 8).

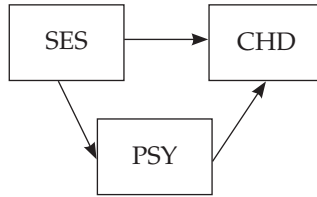
Various psychosocial factors have been shown to be related to different aspects of the cardiovascular disease process. Depression is associated with increased cardiovascular morbidity and mortality, both aetiologically and in terms of prognosis, being a known risk factor for the development of cardiovascular disease, as well as an independent predictor of poor prognosis following a cardiac event (9, 10, 11, 12).

Hostility and anger are assumed to increase the risk of CHD through stress-induced cardiovascular and neuroendocrine hyperreactivity and health risk behaviors (7, 13, 14). Lack of social support has been related to health-risk behavior, psychological distress, cardiac symptoms, an increased risk of recurrent cardiac events and mortality (15, 16). Lack of optimism (17, 18) and perceived stress (19, 20) are also connected with increased cardiovascular mortality and morbidity. A greater negative self-perception of health has been found to be an important predictor of general and cardiovascular mortality and morbidity even after adjustment for the influence of other risk factors (21), vital exhaustion is a substantial predictor of myocardial infarction within an 18-month period before the cardiac event (20, 22), and Type D personality has been associated with higher numbers of reinfarction and higher mortality rates among cardiac patients (23, 24).

A strong association between CHD and socioeconomic status (SES, e.g. low education, low income level) has also been well established. Enduring socioeconomic disadvantage is linked to the higher risk of cardiovascular mortality and morbidity, as well as increased behavioral and medical risk factors – smoking, excessive weight, sedentary lifestyle, heavy alcohol use, higher blood pressure and higher levels of cholesterol (25, 26, 27, 28, 29).

In summary, it has been found that both psychosocial factors and socioeconomic position are significantly related to CHD. However, less is known about the character of the association between psychosocial factors and socioeconomic position and the possible causal pathways with respect to CHD. Usually the effect of both psychosocial factors and socioeconomic position are perceived as independently related to the clinical outcome: CHD. However, it is more probable that an interplay exists and a strong interaction between psychosocial factors and SES might partly explain the complexity of associations in the aetiology of CHD. For example, evidence suggests that the impact of low SES may be linked to an increased risk of CHD via a psychosocial mechanism (8, 30, 31) such as hostility or depression. Also low SES in childhood and adulthood has been associated with high levels of cynical hostility and increased cardiovascular risk (32, 33). Depression and anxiety seem to be more prevalent in groups with a lower SES and may later produce acute or chronic physiological changes, increasing the risk of CHD (4, 20, 30, 34). A possible theoretical model can be proposed as follows: if SES is related to CHD and also to the psychosocial factors associated with the latter, then socioeconomic position might thus influence CHD via a psychosocial mechanism (see Figure 1).

Figure 1. Possible relationships between socioeconomic status (SES), coronary heart disease (CHD) and psychological factors (PSY).



The relationship between SES, psychosocial factors and CHD is complex as it is likely that SES contributes to the development of CHD through areas not related or indirectly related to psychosocial pathways. Lower SES is often associated with such factors as inadequate health insurance, less preventive care, poor diet and poor health care which may result in high stress and gives rise to symptoms such as depression, anxiety and hostility. It is also very probable, to the extent that SES and psychosocial factors are related, that both psychosocial factors and CHD are partially influenced by SES factors (for example, the stress of living in poverty and poor health care). Chronic negative psychosocial factors might also affect socioeconomic position. For example, long-term depression may result in loss of employment, and thus depression can lead to both a CHD endpoint and a lower SES.

Recognizing the importance of these complexities, we limited our focus to one part of these complex relationships as the importance of psychosocial factors and socioeconomic position in the aetiology and prognosis of CHD has already been well established. Thus, in our review we focused on the less-explored aspect of the relationship, i.e. the association between SES and psychosocial factors in CHD.

The review focuses on socioeconomic differences related to the following factors affecting CHD: hostility, depression and anxiety, social support, anger, perceived stress, self-rated health and lack of optimism. The selected articles reported study results from different European countries and the US and among both males and females (five articles study both genders, two study men only, and two include women only). Most of the studies were carried out as extensive population-based prospective surveys with baseline examination and follow-up assessments, and participants were randomly selected from the population, or a representative sample of the population was used (See Table 1).

Methods

Search strategy

A computer-assisted literature search of the Medline and PsycINFO databases was conducted to identify the publications relevant to this study.

The following search limitations were set: English language abstracts of articles from the years 1994 to 2007. Three query terms or phrases were used when searching for relevant publications: cardiovascular or coronary heart disease and risk factors, psychological factors or psychosocial factors, and socioeconomic or social class or sociodemographic factors. The search based on these queries combined by 'and' resulted in 346 hits, with 88 hits in the Medline database and 258 in the PsycINFO database.

The second step focused on the exclusion of articles which treated SES and psychosocial factors as independent factors as these publications did not explore the associations between these variables of interest. Such articles were of course carefully assessed in order to find any (even sporadic and brief) mentions of reported associations between SES and psychosocial factors before exclusion. In fact, in most of the articles that were included in our review, sociodemographic variables were treated as possible confounders or covariates in the statistical model, thus it was necessary in our search strategy to look not for the 'basic' or 'main' findings of the studies, but for the results which were reported as 'additive', or confounding. A single research psychologist assessed all the abstracts. This step resulted in thirteen publications. Despite only including search queries for psychosocial or psychological risk factors, our search strategy also identified a number of articles focusing on sociodemographic differences in behavioral risk factors (such as lack of physical activity, diet or smoking). As this topic falls outside the aim of our review, these studies were also omitted.

In two cases our search strategy identified more than one article referring to the results of the same prospective study – we found two articles referring to 'Whitehall II' and two articles referring to the 'Kuopio' study. We decided to choose only one article concerned with each of these studies, that with the most comprehensive treatment of socioeconomic differences. In order to extend the scope of an article, additional screening based on author's name and a manual search of the bibliography of retrieved papers was undertaken by a trained librarian. This process identified two more publications. The completed screening process resulted in 12 relevant articles consisting of empirical studies.

Participants and design of studies

The number of participants in the selected studies varied from 308 to 13,104. In most studies, data were obtained by having participants complete a battery of self-reported questionnaires, as well as by performing a clinical examination of their health status. Eight articles referred to results of studies carried out as extensive population-based prospective surveys, with baseline examinations and one or more follow-up assessments (17, 28, 33, 35, 36, 37, 38). Four studies used a cross-sectional design (19, 32, 38, 39). In most studies selected for review, participants were chosen as

a representative selection from the population. In two cases, participants were patients already diagnosed with CHD (40, 42).

Indicators of socioeconomic status and the psychosocial measures used in studies

The most frequently used indicators of **SES** in the studies were occupational status (19, 32, 35, 38, 41), level of income (17, 32, 36, 40) and education (32, 33, 37, 39, 40, 41). Perceived job insecurity and financial insecurity were also measured (28), as was social mobility during life, classified into four categories: stable high, upwardly mobile, downwardly mobile and stable low (33) (see Table 1).

The following questionnaires were used to measure **anger**: Spielberger's Trait Anger Scale (Spielberger et al., 1988, in 32; 37) and the Anger Expression Scale (Spielberger et al., 1985, in 41). **Hostility** was assessed with the Cook-Medley Hostility scale (Cook & Medley, 1954, in 17, 35; 37, 41) and the Cynical Distrust Scale (Greenglas & Julkunnen, 1989, In 32; 36). The Cynical Hostility Scale derived from the Minnesota Multiphasic Personality Inventory was also used (Hathaway & McKinley, 1940, in 33).

Cohen's Social Network Scale was employed to measure **social support** (Cohen et al., 1997, in 41), as was the Interpersonal Support Evaluation List (Cohen et al., 1985, in 37).

In order to evaluate **depression and anxiety**, the following measures were used: Beck Depression Inventory (BDI) (Beck et al., 1978, in 37, 41), General Health Questionnaire (GHQ) (Goldberg, 1972, in 28), Psychological General Well-being Inventory (Dupuy, 1984, in 38) and Spielberger's Anxiety Scale (Spielberger et al., 1966, in 37). A self-reported 12-item scale based on the DSM-III-R diagnostic symptom criteria for a depressive episode was used in the Alameda County study (17). A computerized Diagnostic Interview Schedule for measuring depression was used in the study by Gehl and colleagues (40).

The Reeder Stress Inventory (Reeder et al., 1968, in 19) and Cohen's Perceived Stress Scale (Cohen et al., 1983, in 37) were employed for measuring perceived **stress**.

For the evaluation of **health perception**, the SF-36 questionnaire was used (Ware, Kosinski & Keller, 1994, in 28). Self-reported difficulties with cognitive functioning were assessed by four Likert-type questions in the study by Lynch and colleagues (17).

The Life Orientation Test (Scheier et al., 1994, in 17) was used for measuring lack of **optimism** about the future.

Table 1 provides information on the study size, design, indicators of socioeconomic status and the psychosocial measures used in the studies.

Table 1 Description of study size, design and measures.

Authors & country	Participants	Study design	Psychosocial measures	Indicators of socioeconomic status
Ferrie et al., 2003, UK	-10,308 London-based civil servants (the Whitehall II study)	-longitudinal	-SF-36 (self-reported health perception) -GHQ (General Health Questionnaire)	-perceived job insecurity -financial insecurity
Carroll et al., 1997, UK	-1,091 men from the Whitehall II study (every fourth male)	-longitudinal	-Cook-Medley Hostility Scale	-6 employment grade categories (3 manual, 3 non-manual)
Everson et al., 1997, FINLAND	-2,125 men from Kuopio region in Eastern Finland (KUOPIO study)	-longitudinal	-Cynical distrust scale	-income level
Gallo et al., 2001, USA	-308 randomly selected women (University of Pittsburgh Healthy women study)	-longitudinal	-Cook-Medley Hostility Scale -BDI -Spielberger scales -Cohen Perceived Stress Scale	-education
Haukka et al., 2002, FINLAND	-3,403 adults from Helsinki (stratified random sample)	-cross-sectional	-Interpersonal Support Evaluation List -Cynical distrust scale -Spielberger's trait anger scale	-education -household income -occupation
Heslop et al., 2001, UK	-6,832 cohort of Scottish adults from different work fields	-cross-sectional	-Reeder Stress Inventory	-6 employment grade categories
Lynch et al., 1997, USA	-representative sample of 1,124 adults (Alameda County study)	-longitudinal	-Cook-Medley hostility Scale -depression scale (based on DSM III) -scales on functional status -Life Orientation Test	-economic hardship (total household income lower than 200% of the federal poverty level)

Table 1 Description of study size, design and measures.

Authors & country	Participants	Study design	Psychosocial measures	Indicators of socioeconomic status
Pulkki et al., 2003, FINLAND	-1,219 randomly selected young people (Cardiovascular risk in young Finns study)	-longitudinal	-Cynical hostility scale (derived from MMPI)	-education -4 categories of social mobility
Rutledge et al., 2003, UK	-743 women with chest pain referred for coronary angiography (WISE study)	-longitudinal	-BDI -Cook-Medley Hostility Scale -Spielberger's Anger Expression Scale -Cohen's Social Network Scale	-household income -occupation -education
Rose et al., 2006, SWEDEN	-954 automotive workers	-longitudinal	-Psychological General Well-being Inventory	-occupational status (blue collar vs. white collar)
Emmelin et al., 2006, SWEDEN, USA	-5,461 adults in SWEDEN, 7,643 adults in USA	-cross-sectional	-General question on self-rated health	-education
Gehi et al., 2005, USA	-940 participants with CHD	-cross-sectional	-Computerized Diagnostic Interview Schedule-I -Patients Health Question	-education -income

Results

Hostility was the most often monitored psychosocial trait in the articles selected for this review. Seven articles found significant differences in relation to SES. All studies confirmed that participants from the lowest socioeconomic group had higher hostility scores than participants from the highest socioeconomic group. This association was reported for different indicators of socioeconomic position: occupational grade (35), education (32, 37, 41) and level of income (32, 36, 41). In the study by Haukkalla (32), the association was only found in male participants.

Furthermore, two studies observed an effect of long-term disadvantaged SES on hostility. Lynch et al. (17) found that people with three episodes of economic hardship (between 1965 and 1983) had five times greater probability of being cynically hostile in 1994, compared to participants with no history of economic hardship. In the article by Pulkki et al. (33), participants with 'stable low' SES (that is, low status in childhood and adulthood) had significantly higher mean scores of cynical hostility in comparison to 'stable high' participants, while the mean scores of participants with 'upwardly and downwardly mobile' SES lay in between.

Socioeconomic variations regarding **depression and anxiety** were reported in six articles. The direction of the association was the same as in the case of hostility: lower SES was connected with higher depression and anxiety. This adverse association was found using various indicators of SES: level of income (40, 41), occupational grade (28) and education (37, 40, 41). The effect of long-term disadvantaged SES on depression was reported by Lynch et al. (17). Compared to participants with no history of economic hardship, people with three episodes of hardship (between 1965 and 1983) had three times greater probability of meeting the DSM-III-R criteria for depression in 1994. The only exception was Rose et al. (38), who found no relationship between education and depression, as well as higher anxiety levels among higher educated participants in their study.

Results for **social support, perception of health and lack of optimism** confirmed the previous trend – the lower the SES of the participants, the worse were their scores on psychosocial factors, as reported by the articles. Differences based on SES in social support were mentioned in two studies (37, 41). Participants with a low SES (education or income) reported significantly fewer social contacts and a worse social network compared to participants with a higher level education or income.

Results from the study by Ferrie et al. (28) show significant socioeconomic differences between the lowest versus the highest employment grade with respect to the self-rated health of women. Perception of health was also associated with a long-term disadvantaged SES (17): people with three episodes of economic hardship between 1965

and 1983 had greater self-reported difficulties with cognitive functioning in 1994 compared to people with no history of economic hardship. In the study by Emmelin et al. (39), low education was associated with poor self-rated health, but only among US participants. No significant relationship was found among Swedish adults.

An association between lack of optimism and history of economic hardship was also found. Participants who experienced three episodes of economic hardship between 1965 and 1983 had worse scores on the optimism test in 1994 compared to people with no history of economic hardship (17).

Socioeconomic differences in **anger** and **perceived stress** were less consistent than those of other psychosocial factors. In the study by Haukkalla (32), participants with a basic education or lower income had significantly lower scores on the Anger Expression Scale (which means lower anger expression) compared to participants with a university degree or higher income. An association was found only in male participants. In contrast, Rutledge et al. (41) and Gallo et al. (37) reported that various SES groups did not differ significantly with respect to anger expression scores.

Heslop et al. (19) reported that a greater proportion of men in lower social-class categories scored lower in their perceived stress scores, and conversely, a greater proportion of men in higher social class categories had higher perceived stress scores. However, in the article by Gallo et al. (37), no differences related to education were found in the perceived stress scores. Table 2 lists results with respect to socioeconomic differences for all articles.

Table 2 Main findings of studies selected for review.

Authors & country	Findings: differences between the highest vs. the lowest socioeconomic groups in terms of psychosocial factors
Carroll et al., 1997, UK	↓ hostility F / 1.1088 / = 52.14***
Everson et al., 1997, FINLAND	↓ hostility ***
Ferrie et al., 2003, UK	↓ anxiety Diff = 1.26**
	↓ depression Diff 0.54**
	↑ perception of health OR = 3.74***
Gallo et al., 2001, USA	↓ hostility F(1.259) = 9.00***
	↓ depression F(1.298)=3.25*
	↓ anxiety F(1.284)=4.16**
	↑ social support F(1.298) = 7.79***
	0 anger 0 stress
Haukkala et al., 2002, FINLAND	↓ hostility in men ***
	↓ anger in men ***
Heslop et al., 2001, UK	↑ stress in men ***
Lynch et al., 1997, USA	↓ hostility OR = 5.09***
	↓ depression OR = 4.56***
	↑ perception of health OR = 3.74***
	↓ lack of optimism OR = 5.68***
Pulkki et al., 2003, FINLAND	↓ hostility ***
Rutledge et al., 2003, UK	↓ hostility ***
	↓ depression ***
	↑ social support ***
	0 anger
Rose et al., 2006, SWEDEN	↑ anxiety **
	0 depression
	0 positive well-being
	self control **
	↓ general health **
	0 vitality
Emmelin et al., 2006, SWEDEN, USA	↓ perception of health ***
Gehi et al., 2005, USA	↓ depression ***

Note:

*p < .05, **p < .01, ***p < .001

F = F test results, OR = odds ratio, Diff = difference

↓ = negative association (higher socioeconomic group had lower scores in given factor)

↑ = positive association (higher socioeconomic group had higher scores in given factor)

0 = no association between given factor and socioeconomic status

Table 3 presents the mediating effects linking the psychosocial factors, SES and risk of CHD as observed in the 12 studies reviewed in this article.

Table 3 Findings: association of socioeconomic status (SES) and psychosocial factors with risk of heart disease (CHD).

Authors & country	Findings: association of socioeconomic status (SES) and psychosocial factors with risk of heart disease (CHD)
Carroll et al., 1997, UK	hostility is to a limited extent a mediator in the SES-CHD association
Everson et al., 1997, FINLAND	SES is a significant mediator in the hostility-CHD association
Ferrie et al., 2003, UK	Interrelationships between SES, CHD and psychosocial factors were not explored
Gallo et al., 2001, USA	psychosocial factors (hostility, depression, anxiety, social support) contribute to, but do not fully explain the SES-CHD relationship
Haukkala et al., 2002, FINLAND	Interrelationships between SES, CHD and psychosocial factors were not explored
Heslop et al., 2001, UK	SES attenuates the stress-CHD relationship
Lynch et al., 1997, USA	Interrelationships between SES, CHD and psychosocial factors were not explored
Pulkki et al., 2003, FINLAND	no support for the mediating effect of hostility in the SES-CHD relationship
Rutledge et al., 2003, UK	psychosocial factors (hostility, depression, social support) contribute to, but do not fully explain the SES-CHD relationship
Rose et al., 2006, SWEDEN	Interrelationships between SES, CHD and psychosocial factors were not explored
Emmelin et al., 2006, SWEDEN, USA	SES predicted poor self-rated health independently of CHD risk factors (among US participants)
Gehi et al., 2005, USA	Interrelationships between SES, CHD and psychosocial factors were not explored

Discussion

This review focuses on socioeconomic differences in the following factors related to CHD: hostility, depression and anxiety, social support, anger, perceived stress, self-rated health and lack of optimism. Results showed that SES (educational grade, occupation or income) was adversely associated with psychosocial factors related to CHD. This association was evident in the case of hostility and depression. The studies available also showed a similar trend with respect to social support, perception of health

and lack of optimism. Less consistent were the results related to anger and perceived stress.

It is possible that SES is one of the predictors of psychosocial risk in CHD. As we proposed in our introduction, if socioeconomic position is related to CHD and also to psychosocial factors, socioeconomic position might thus influence CHD via a psychosocial mechanism. Based on this review of the literature, it seems that socioeconomic disadvantage has a significant adverse effect on psychosocial factors linked to CHD. However, another important question is whether the predictive value of the psychosocial risk factors in relation to cardiac outcomes is reduced or eliminated when socioeconomic factors are included in the risk models. We were not able to address this question in our review as the studies in this field do not explore the relationship between sociodemographic variables and psychosocial risk factors in this way. In only two articles (19, 36) was SES reported to be a significant covariant in the relationship between psychosocial characteristics (hostility and perceived stress), attenuating the relationship between psychosocial factors and the risk of CHD. However, studies did explore whether psychological factors contributed to the relationship between SES and CHD risk. This assumption was only partially confirmed, with most authors concluding that psychosocial factors contribute to, but do not fully explain, the relationship between SES and CHD risk. However, the pervasive and consistent trend of an adverse association between SES and psychosocial risk factors for CHD shows that more research exploring the possible causal relationships between SES, CHD and psychosocial factors is needed, and the assumption that SES might influence CHD via a psychosocial mechanism might also have some validity.

No articles were found which examined socioeconomic differences with respect to other factors linked to CHD, such as vital exhaustion or Type D. The influence of these factors is probably less known, leading to a smaller number of studies about their role in CHD being published, even though they appear to have a strong association with the aetiology and prognosis of CHD (22, 23, 24).

One of the factors which might also influence the heterogeneity of studies in this review is a publication bias in epidemiological studies – there is greater likelihood of a positive study being published rather than a negative one, and thus a greater impact of these positive studies after publication. We are also aware of the fact that different scales for measuring the psychological concepts were used in the studies included in this review, which made the comparison of studies difficult. However, even when these effects are presented, the validity of the associations found was supported by the consistency of results found in studies selected for review. The prospective design and representative selection of participants contributed to high-quality methodology in most of the

articles used in the review. That different studies of different populations found the same associations supports the consistency of results and strength of the reported associations. For instance, higher levels of hostility were found in the UK (35, 41), Finland (32, 33, 36) and the US (17, 37) among both males and females. Similarly, socioeconomic variations in depression and anxiety were reported in different countries and among both males and females (17, 28, 37, 41). Moreover, the effect of long-term disadvantaged SES on these psychosocial factors was observed (17, 33), which also supported the validity of the associations found.

However, our review also reveals some inconsistencies in the results. These may have arisen due to weaknesses in study design and the measurement of psychosocial factors. The study by Haukkala (32) on hostility and anger, and the article by Heslop et al. (19) concerning perceived stress, used cross-sectional designs and thereby do not allow the possibility of a causal interpretation of associations between the variables. This might contribute to findings that were less clear regarding socioeconomic differences in perceived stress and anger. Some contrasting results with respect to these factors could also be caused by disparities in the assessment and measurement of perceived stress and anger, as these concepts are hard to define consistently. The study by Heslop et al. (19) surprisingly reported a positive association between SES and stress (higher SES group reported higher stress exposure). As the authors concluded, this probably reflects the variations in discourse patterns concerning stress (stress is more common in the vocabulary of higher social-class groups), rather than variations in stress exposure. Some evidence for this appeared in the stress scores for younger men – they did not show positive relationship with social class as did the whole sample. The characteristics of participants might have affected the results in the studies by Rutledge et al. (41) and Gallo et al. (37), which reported no significant differences in anger scales related to educational grade or income level. The groups of participants in these studies consisted of middle-aged women only, and it is probable that the expression of anger might be gender determined (possibly in compliance with social standards) and may differ in particular age categories.

One of the weaknesses of the present study is the fact that we did not provide a quantitative review of the articles selected as there was too much heterogeneity in the way SES and psychosocial factors were measured to consider combining the results of these studies in a meta-analysis. Another limitation that needs to be mentioned is quite broad definition of psychosocial factors in our paper, which allowed us to review a wide range of studies, but also leaves a lot of possible interpretations of found associations.

Conclusions and implications

This literature review suggests that SES (as defined by educational grade, occupation or income) is adversely associated with psychosocial risk factors linked to CHD. This association was evident in the case of hostility and depression. The studies also showed similar trends in social support, perception of health and lack of optimism. Less consistent results were demonstrated with respect to anger and perceived stress.

Our results suggest some challenges for future research in the field of psychosocial aspects of CHD. First, a more comprehensive clarification of the associations between sociodemographic variables and psychosocial factors would be useful to determine to what extent the predictive value of the psychosocial risk factors in relation to cardiac outcomes is reduced when socioeconomic factors are included in the risk models. Second, more studies, focused not only on well-known risk factors such as depression and hostility but also on some less discussed psychosocial factors such as Type D and vital exhaustion and their role in CHD, are needed, as is an examination of the possible interrelationships between these factors and sociodemographic variables.

The importance of the socioeconomic perspective for research into cardiovascular disease is becoming more evident, and interventions in this field should also be guided by an integrative approach which includes not only conventional biomedical factors but also psychological and socioeconomic characteristics. For instance, the international findings of the Interheart study and consistent evidence across countries for an association between socioeconomic disadvantage and psychosocial risk factors in CHD provide evidence of the universal pervasiveness of psychosocial and socioeconomic risk factors. While the impact of treating psychosocial factors or reducing socioeconomic burden on improving cardiovascular prognosis in patients is unclear, it has been shown that such interventions significantly improve the patients' quality of life. Thus, clinically oriented intervention strategies focused on reducing cardiovascular mortality and morbidity and improving the quality of life by addressing psychosocial factors at all levels – from primary to tertiary prevention – should be targeted with respect to socioeconomic conditions.

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Socioeconomic inequalities in quality of life and psychological outcomes among cardiac patients²

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Abstract

Objectives:

The aim of this article is to explore socioeconomic inequalities in the psychological characteristics (psychological well-being, perceived mental health status) and perceived quality of life among cardiac patients.

Methods:

A structured interview was conducted with 362 patients (32% women, mean age 56 ± 7.3 years) referred for coronary angiography. The GHQ-28 was used to measure psychological well-being, the SF-36 for perceived mental health status. Income and education indicated socioeconomic position. Logistic regressions were employed, adjusted for gender, functional status and severity of disease.

Results:

Patients with low income or education had a higher probability of having poor psychological well-being compared to participants with high income or education (OR 5.5, CI 2.32-12.80; OR 3.1, CI 1.52-6.37 resp.), and were also more likely to have worse mental health status (OR 2.9, CI 1.02-8.51; OR 4.8, CI 1.36-16.99 resp.), and low quality of life (OR 2.9, CI 1.02-8.51; OR 4.8, CI 1.36-16.99 resp.).

Conclusions:

Socioeconomic status was found to be negatively associated with the psychological outcomes and quality of life among cardiac patients. Socioeconomic inequalities should be taken into account when designing suitably-adapted interventions focusing on psychosocial factors among cardiac patients.

Introduction

It is predicted that by the year 2020 coronary heart disease (CHD) will overtake infectious disease as the world's leading cause of death and disability, while depression will take second place (1). Research directions in the field of coronary heart disease have changed considerably over the last few decades. Besides the traditional biomedical factors, more attention is being focused on the role of psychosocial factors and socioeconomic position in the etiology and prognosis of CHD. Both psychosocial and socioeconomic factors have been shown to have significant influence on the quality of life, not only among the general population but also among people who already suffer from cardiovascular disease (2, 3, 4).

In the last decade one of the most important observations in the field of public health is that relative socioeconomic disadvantage in society constitutes an independent health risk. When morbidity and mortality

data are connected with the traditional risk factors, then relative social disadvantage has a far greater effect than the other factors (5). As Marmot & Elliot (6) conclude, socioeconomic differences in CHD have increased throughout Europe in the last few decades. The trends in mortality from CHD have been uneven in the European countries. Heart disease has declined in frequency in the west, but increased in the east, opening up an east-west gap. Also within the particular countries the decline in CHD rates has been steeper in subgroups of the population in more favoured socioeconomic positions. In a considerable number of studies it has been shown that socioeconomic disadvantage during the course of life (poor income, low education) is associated with higher presence of CHD life-style risk factors (heavier smoking, worse nutrition, higher levels of cholesterol) and with worse prognosis among patients (7, 8, 9, 10). Higher CHD mortality and morbidity risk has been found in patients from low socioeconomic groups (11, 12, 13, 14).

The relationship between psychosocial factors and cardiovascular disease has also been well established, mostly using behavioural and psycho-physiological conceptual pathways (15). Poor mental health (depression, anxiety) has been shown to be associated with higher incidence of life-style risk factors (smoking, lack of physical activity) and negative physiological changes (e.g. sympatho-adrenal hyperactivity, neuroendocrine regulation disbalance, affecting blood lipids and blood pressure), which increase cardiac risk (16, 17, 18). Depressive symptoms not only increase the likelihood of CHD, but also have adverse effects on later prognosis (19,20). The presence of depression after myocardial infarction (MI) is associated with increased mortality and morbidity risk, meaning that patients with high levels of post-MI depression are more likely to die of cardiac causes, and have higher probability of cardiac complications (21, 22, 23).

Although significant progress has been made in research on the influence of social position and mental health on cardiovascular disease, there is much we still do not know about the relationship between these factors with respect to the general quality of life among patients who suffer from coronary heart disease. No evidence is available about the nature of associations between socioeconomic status and the psychological outcomes (psychological well-being, anxiety, depression, perceived mental health status), and quality of life among patients with coronary heart disease. It is probable that if such differences occur, socioeconomic disadvantage may have a negative effect not only on general quality of life among CHD patients, but also on later prognosis of their disease.

The aim of this article is to explore socioeconomic inequalities in the psychological outcomes (psychological well-being, perceived mental health status), and perceived overall quality of life among patients with coronary heart disease. Quality of life, according to the World Health

Organization (WHO) definition, is a multidimensional construct with numerous physical, psychological, social and economic components which predict good or bad quality of life (24).

Despite the uncertainty in definitions, health-related quality of life or perceived health status (the self-evaluated mental status of patients as a reflection of their disease) is a construct of high clinical relevance, as recent research has shown that it is an important predictor of other health outcomes among patients with chronic disease (4, 25, 26). The study by Lenzen et al (27) showed that impaired health status is associated with a 2 to 3-fold increased risk of all-cause mortality in patients with CAD, independent of other conventional risk factors. Psychological well-being (individual mood often operationalized by anxiety and depression) is considered as another important psychological aspect of quality of life, also significantly connected with the health outcomes among patients with CHD, and specifically with the risk and prognosis of CHD (28, 29). The importance of paying attention to the socio-economic differences in quality of life among patients with coronary heart disease is not only due to equity concerns, but also to efficiency concerns with respect to policy implications for new treatments or interventions.

Methods

Participants and procedure

The group of participants consisted of 362 patients referred by their cardiologists to the East Slovakian Institute for Cardiac and Vascular Diseases in Kosice. Patients from the whole East Slovakian region with cardiovascular disease are referred to this medical centre for diagnosis and treatment. Patients were invited to participate in this research during their hospitalization for coronary angiography. All participants were provided with information about the study and signed an informed consent statement. Ethical approval was obtained from the medical ethical committee of the East Slovakian Institute for Cardiac and Vascular Diseases. Response rate was 93.9%. There were no significant differences between responders and non-responders either in age or gender. Participants included in the study were those meeting the following criteria: coronary heart disease in the anamnesis, age less than 75, without severe cognitive impairments, and no history of severe psychiatric disorders in the anamnesis. Patients with cardiovascular problems other than CHD (e.g. valve disease) and with serious comorbidity were excluded. A structured interview was conducted with each patient by a trained interviewer, with questions concerning medical history, socioeconomic position (education, income), and functional status. Patients also completed self-reported questionnaires.

Measures

Psychological well-being

To assess psychological well being, the GHQ 28 - General Health Questionnaire was used (30). The GHQ 28 is designed to measure mental health status, and consists of 28 items divided into 4 subscales: physical symptoms, anxiety and insomnia, impairment of social functioning, and depression. The score for each subscale ranges from 0 to 21, so the total GHQ 28 score is between 0 and 84, with higher scores indicating worse mental health status. Patients are asked to compare their recent psychological state with their usual state. Scores can be interpreted as indicating the severity of psychological disturbance. The cut-off point identifying a probable risk case is 5 positive answers (31). A validation study of the GHQ 28 among people with chronic diseases has reported acceptable data on the internal consistency and validity of the scale (30). The psychometric properties of the Slovak version of the GHQ 28 are discussed in a study by Nagyova et al. (29). In the present study the Cronbach alpha was 0.916.

Perceived mental health status

The mental component of the SF-36 questionnaire was used to measure perceived mental health status (32). The SF-36 questionnaire provides a subjective measure of health status across eight scales. Four of them (vitality, emotional role limitations, mental health and social functioning) can be summarized into a mental functioning component summary indicating the perceived mental health status. The summary score ranges from 0 to 100, with lower scores indicating worse perceived health status. We used a cut-off score of 42, as this cut-off point had a sensitivity of 74% and a specificity of 81% in detecting patients with depressive disorder (32). A validation study of the SF-36 among cardiac patients showed good psychometric properties of the scale (25). In the present study the Cronbach alpha was 0.73.

Perceived quality of life

Each patient's perception of overall quality of life was assessed using Cantrill's ladder (33) ranging from 0 (at the bottom, indicating worst quality of life imaginable) to 10 (at the top, indicating the highest quality of life imaginable). Andrews (34) reported acceptable data on the reliability and validity of this scale.

Socioeconomic status

Income level and education were used as the indicators of socioeconomic status. Participants' income was divided into three levels: 1) low income: income equal to and lower than the 'minimum wage', 2) middle income: higher than the 'minimum wage' but lower than twice the 'minimum wage', 3) high income: twice the 'minimum wage' and higher. The 'minimum wage' is a standardized indicator of the financial situation which is frequently used in Slovakia. People with an income lower than the minimum wage are considered to live below the 'poverty level' and

can claim welfare support. This indicator also takes into account the household income. Participants' education level was assessed by the type of school completed, divided into basic, middle and higher education.

Functional status

Functional status was assessed by a cardiologist as a combination of two factors: NYHA - four classes according to the New York Heart Association classification of dyspnoea symptoms (35) and CCS - four classes identifying the severity of chest pain according to criteria of the Canadian Cardiovascular Society (36).

Analysis

We examined the relative effects of low and middle income and education on the occurrence of low psychological well-being, poor perceived mental health status and low perceived overall quality of life, using logistic regression. First, the crude effects of income and education on psychological well-being, mental health status and quality of life were computed. Next, the effect of income was adjusted for education and vice versa, and afterwards the effect of income and education on all psychological factors was adjusted for functional status. All models were adjusted for age and gender. Analyses were performed using SPSS 10.1 for Windows.

Results

The demographic characteristics of the participants are presented in Table 1. The mean age was 55.9 years, with standard deviation 7.3, range 27-75 years. Thirty percent of the participants were women. Low income was reported by 13.6 %, middle income by 65.4 % and a high income by the 20.0% of the participants. The educational level was low in 30.6 % of the participants, middle in 55.1 %, and 14.3 % of patients had higher education.

Table 1. Descriptive statistics for study variables

Variable		n	% or mean
Gender	Male	245	67.7 %
	Female	117	32.3 %
Age			55.9 (SD 7.3, range 27-75)
Education		118	32.6 %
		191	52.8 %
		53	14.6 %
Income	Low	50	14.7 %
	Middle	218	64.1 %
	High	72	21.2 %

The mean scores in all subscales of GHQ-28 (psychological well-being, anxiety, depression) and in perceived mental health status among patients in all income and educational groups are presented in Table 2.

Table 2. Mean scores for psychological well-being, depression, anxiety, and perceived mental health status in different income and educational groups

	Mean scores							
	Income				Education			
	low	middle	high	F	basic	middle	high	F
Well-being	33.00	26.50	24.18	8.457***	29.34	26.53	23.63	4.46**
Anxiety	8.74	6.68	6.23	4.56***	7.66	6.88	5.62	3.50*
Depression	4.10	2.33	1.68	9.65***	3.27	2.09	2.04	5.84**
Mental health	50.73	58.31	63.90	9.13***	55.86	58.13	64.41	5.07**

Statistically significant effects are in **bold** ($p \leq 0.05$)

The higher the GHQ 28 score, the lower the psychological well-being, and the higher the anxiety and depression

The higher the mental component of SF36, the better the perceived health status

Low income was associated with greater probability of having low psychological well-being (OR=5.5, 95% CI 2.32-12.80) compared to the group of patients with high income. Participants with middle level of income also had higher probability of having low psychological well-being compared to the high income group (OR= 2.2, 95% CI 1.22-3.89). These associations remained significant also after controlling for the effect of education, and after adjustment for functional status (see Table 3, adjusted effects).

Patients with basic education were more likely to have poor psychological well-being (OR=3.1, 95% CI 1.52-6.37) compared to the participants with higher education. This relationship remained significant after adjustment for functional status, but the significance disappeared after controlling for the effect of income. Middle-level education was not associated with greater likelihood of having low psychological well-being compared to the higher education group (see Table 3, adjusted effects).

Low income was associated with greater probability of having poor perceived mental health status (OR=2.95, 95% CI 1.10-8.52), compared to the group of patients with high income. This association did not remain significant after controlling for the effect of education, and after controlling for functional status. Middle income was not associated with greater likelihood of having poor perceived mental health status compared to the

high income group. (see Table 3, adjusted effects).

Patients with basic education were more likely to have poor perceived mental health status (OR=4.8, 95% CI 1.36-16.99), compared to the participants with higher education. After controlling for the effect of income, and functional status, the odds ratios remained significant. Middle-level education was not associated with greater likelihood of having poor perceived mental health status compared to the higher education group (Table 3, adjusted effects).

Table 3. Logistic regression analyses - risk of having poor psychological well-being and poor perceived mental health status in different socioeconomic groups, crude and adjusted effects. All analyses are age- and gender-adjusted.

Psychological well-being		Crude effect OR (95% CI)	Adjusted effect OR (95% CI)	Effect adjusted for functional status OR (95% CI)
income	high	1.00	1.00	1.00
	middle	2.18 (1.22-3.89)	1.86 (1.10- 3.4)	0.99 (0.45-2.21)
	low	5.46 (2.32-12.80)	4.23 (1.67- 10.48)	7.26 (1.85-28.41)
education	high	1.00	1.00	1.00
	middle	1.98 (1.00-3.80)	1.63 (0.80-3.29)	1.40 (0.54-3.57)
	low	3.11 (1.52-6.37)	1.89 (0.84-4.27)	3.15 (1.07-9.04)
Perceived mental health status		Crude effect OR (95% CI)	Adjusted effect OR (95% CI)	Effect adjusted for functional status OR (95% CI)
income	high	1.00	1.00	1.00
	middle	2.04 (0.86-4.84)	1.53 (0.61-3.84)	1.70 (0.60-4.83)
	low	2.95 (1.10-8.52)	1.82 (0.56- 5.88)	2.23 (0.64- 7.80)
education	high	1.00	1.00	1.00
	middle	3.34 (0.97-11.46)	2.82 (0.80-9.89)	2.66 (0.55-12.78)
	low	4.80 (1.36-16.99)	3.84 (1.10-14.68)	5.13 (1.36-25.52)

Low income was associated with greater probability of having low perceived quality of life (OR=8.01, 95% CI 3.10-21.16), compared to the group of patients with high income. Participants with middle income also had higher probability of having low perceived quality compared to the high income group (OR= 2.47, 95% CI 1.43-4.26). This relationship remained significant after controlling for the effect of education, and after controlling for functional status (Table 4, adjusted effects).

Patients with basic education were more likely to have low perceived quality of life (OR=4.01, 95% CI 1.98-8.12), compared to the participants with higher education. Middle-level education was also associated with greater likelihood of having low perceived quality of life compared to the higher education group (OR=2.16, 95% CI 1.16-4.03). After controlling for the effect of income, and functional status, the odds ratios remained significant. (Table 4, adjusted effects).

Table 4. Logistic regression analyses - risk of having low perceived quality of life in different socioeconomic groups, crude and adjusted effects. All analyses are age- and gender-adjusted.

Perceived quality of life		Crude effect OR (95% CI)	Adjusted effect OR (95% CI)	Effect adjusted for functional status OR (95% CI)
income	high	1.00	1.00	1.00
	middle	2.47 (1.43- 4.26)	1.94 (1.08- 3.47)	2.78 (1.23- 6.29)
	low	8.01 (3.10-21.16)	5.17 (1.83- 14.62)	7.12 (2.04-24.86)
education	high	1.00	1.00	1.00
	middle	2.16 (1.16-4.03)	1.77 (0.92-5.62)	4.95 (1.87-13.12)
	low	4.01 (1.98-8.12)	2.53 (1.14-5.62)	5.59 (1.93-16.18)

Discussion

The results of our study show significant socioeconomic differences in psychological well-being, perceived mental health status and perceived quality of life among patients with CHD. When comparing different income and education groups, we found that especially patients with income under the minimum wage, and participants with low education are at risk of having poor psychological well-being and mental health status. This threshold effect demonstrates that the association between psychosocial factors and income/ education is not as simple as ‘the more money, the better the well-being’. Very low income and the consequent financial stress might be particularly important factors negatively influencing psychological well-being and mental health. An insufficient level of income and the resulting financial strain are not only associated with the general standard of living, but could also be seen as one dimension of social exclusion - lack of money prevents individuals from participating fully in society (37). Moreover, among patients with a chronic disease, all factors (medical, dietary or psychosocial) are strongly influenced by social conditions such as education or income levels (3,10).

Based on the results of analysis of variance and regression models, income seemed to be a ‘more significant’ predictor of poor mental health status, psychological well-being and perceived quality of life than education in our study (the education ceases to be significant in the logistic model after adjustment for income). However, it is necessary to take into account possible mediated effects between these two indicators of socioeconomic position. Education is the most commonly used indicator of socioeconomic status in studies focusing on social inequalities in health (38, 39, 40). This is partly due to the fact that educational grade is (to some extent) a predictor of income, which in turn might be associated with mental health outcomes and quality of life (41, 42) In this case, education

might be a similar or even more important determinant of the income-mental health relationship in our study as well.

Another possible explanation for inconsistency in the results regarding education/income may be the different distribution of income and educational levels among our patients. Every participant in our study had completed the compulsory basic education, but not all of our patients earned at least the minimum wage level of income - there was a group of patients with income lower than the minimum wage.

However, the basic trend was the same in both indicators of socioeconomic status; both low income and low education were associated with worse psychological well-being, and poor perceived mental health status and perceived quality of life. The question arises as to what linking mechanism exists between socioeconomic status, coronary heart disease and mental health? Some studies suggest that the impact of low socioeconomic status may be linked to increased risk of coronary heart disease via a psychosocial mechanism - depression and anxiety are more prevalent in lower socioeconomic groups and may later produce acute or chronic physiological changes increasing the risk of coronary heart disease (10, 15, 43, 44). But other possibilities are also worth considering. For instance, stress might play some role in these relationships. Stress is not only a predictor of both coronary heart disease and depression; it is also related to social position. Chronic stress is often proposed as an integrating theory that can result in adverse health outcomes through biological, psychosocial and behavioural pathways. Uncontrollable stress is experienced particularly by individuals who have failed to develop a broad spectrum of behavioural strategies for controlling psychosocial conflicts. This might be part of the explanation, given that depressive symptoms show a strong socioeconomic gradient, especially in the rapidly-changing societies in Central and Eastern Europe in the last two decades (5).

Clearly, there is a complexity of association between socioeconomic status, coronary heart disease and mental health, which was hard to capture in our study due to some limitations, which need mentioning. The analyses are based on cross-sectional data, so they do not provide the possibility of causal interpretations of associations between the variables. Further research with a longitudinal design would be useful in order to explore also the causal associations between socioeconomic status, mental health and coronary heart disease. However, the significant socioeconomic differences which were found in psychological well-being, perceived mental health status and perceived quality of life in our study support the hypothesis about the negative impact of lower socioeconomic status on the general quality of life among patients with coronary heart disease, and imply a possible adverse effect on prognosis of the disease.

Conclusion

Both psychological well-being and perceived mental health status have been shown to be associated with worse prognosis and lower quality of life among patients with coronary heart disease. It might be doubtful whether the treatment of these factors could improve cardiovascular prognosis in patients, but it has been shown that such interventions significantly improve patients' quality of life (45, 46, 47). Socioeconomic inequalities in psychological well-being and perceived mental health should be taken into account when designing suitably-adapted interventions focusing on quality of life among patients with coronary heart disease. The importance of socio-economic and psychosocial factors in coronary heart disease should be included and more highlighted in clinical practice, the evaluation of strategies and management of interventions in the treatment of CHD.

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Vital exhaustion in coronary heart disease: the impact of socioeconomic status³

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Abstract

Background:

Vital exhaustion has been shown to be a significant risk factor contributing to coronary heart disease, as well as a predictor of a worse prognosis among coronary patients. Socioeconomic differences in vital exhaustion may be part of the causal mechanism in the health and mortality inequalities connected with socioeconomic disadvantage. Our aim was to explore socioeconomic inequalities in vital exhaustion among coronary patients.

Methods:

We included 362 patients (32% women, mean age 56 ± 7.3 years) who were referred for coronary-angiography. The Maastricht interview for Vital Exhaustion was conducted with each patient. Level of income and education were used as indicators of socioeconomic status. Functional status was assessed with the NYHA (dyspnoe symptoms) and CCS (chest pain) scales.

Results:

Logistic regression showed significant socioeconomic inequalities in vital exhaustion among patients. Participants with low and middle income and education had a higher probability of being exhausted in comparison to patients with high income and education (odds ratio (95% confidence interval): 13.31 (4.67 – 37.94), and 2.10 (1.19 – 3.64), respectively). Associations remained statistically significant after controlling for the effect of functional status and seriousness of disease. Socioeconomic differences were more salient among men than among women.

Conclusion:

Low education and income seem to be strongly associated with higher vital exhaustion among patients; a significant factor contributing to worse prognosis and lower quality of life among patients with coronary heart disease.

Introduction

Many patients with coronary heart disease (CHD) experience vital exhaustion, which is characterized by unusual fatigue, a lack of energy, increased irritability and feelings of demoralization (1, 2). Vital exhaustion has some features similar to depression; however, depressed mood, a key symptom of depression, is almost absent in vital exhaustion (3, 4). Vital exhaustion was found to be a risk factor for CHD, especially for myocardial infarction. This relationship has been described in various prospective studies with representative population samples (2, 6, 7).

Vital exhaustion not only increases the risk of coronary heart disease, but also contributes to a worse prognosis. Mendes de Leon et al. (8) and Kop et al. (9) observed in an 18-month follow-up of patients after successful percutaneous transluminal coronary angioplasty (PTCA) that the presence of vital exhaustion independently increased the risk of myocardial infarction, coronary bypass surgery, PCI and cardiac death. In a case-control study of women after the first MI it was found that the risk of MI associated with vital exhaustion was 2.75 times higher, even after adjustment for several confounding variables (10). Interventions focusing on reducing vital exhaustion had a beneficial effect on levels of depression, exhaustion and anginal complaints among coronary patients. However, the available evidence shows only a limited preventive effect regarding the risk of a new cardiac event (11, 12, 13).

Because of its connection to cardiac events, it has been hypothesized that vital exhaustion results from the underlying cardiac insufficiency. However, the degree of exhaustion seems to be unrelated to exercise-induced ischaemia, electrocardiography abnormalities, cardiac pump function, and severity of coronary heart disease measured by angiography (14, 15). It has been shown that psychologically stressful life events, and possibly also inflammatory processes, may significantly contribute to the development of vital exhaustion prior to myocardial infarction (16).

Some evidence shows that lower socioeconomic status may also be a possible predictor of vital exhaustion. Low income or education has been found to be associated with elevated vital exhaustion scores in a few studies (2, 5, 17). So what are the possible pathways in the relationship between socioeconomic status, vital exhaustion and coronary heart disease? It is well known that lower socioeconomic status is associated with higher incidence of lifestyle risk factors and medical risk factors (18, 19, 20, 21), higher cardiac risk in the population (22, 23) and with a worse prognosis among patients (24, 25). It has been hypothesized that low socioeconomic status may be linked to increased cardiac risk via psychosocial mechanisms. Davey Smith & Lynch (26) proposed that early life socioeconomic disadvantage contributes to increased levels of psychosocial risk factors later in life. Several studies which found a higher prevalence of psychosocial risk factors in lower socioeconomic groups support this hypothesis (17, 27, 28, 29). Negative psychosocial characteristics may consequently contribute to the increased risk and worse prognosis of coronary heart disease (30).

However, most research concentrates on exploring the role of socioeconomic status among the general population. Little is known about the association of socioeconomic status and vital exhaustion among patients who already have coronary heart disease. Socioeconomic differences in patients showing vital exhaustion may be a part of the causal mechanism in health and mortality inequalities connected with

socioeconomic disadvantage among patients with coronary heart disease.

The aim of this study was to explore the association between socioeconomic status and vital exhaustion among coronary patients. As the clinical state of patients can influence this association, we decided to control for the effect of functional status and the seriousness of disease in our statistical analyses. Vital exhaustion in the general population has been shown to be significantly influenced by gender; we therefore also explored the differences in vital exhaustion levels among male and female coronary patients.

Methods

Study design

We analyzed cross-sectional data obtained from 362 patients with already diagnosed stable angina pectoris or suspected of the angina pectoris by the symptoms. Patients were referred by their cardiologists according to ESC guidelines (31) to the East Slovakian Institute for Cardiac and Vascular Diseases in Kosice for coronary angiography (CAG). Patients from the whole East Slovakian region (about 1.5 million inhabitants) are referred to this medical centre for diagnosis and treatment. Data collection in the study was carried out from November 2004 to March 2007.

We included patients meeting the following criteria: coronary heart disease (CHD) in their medical history, age < 75, without severe cognitive impairments or psychiatric disorders, and without serious co-morbidity. Participants were provided with information about the study and they signed an informed consent letter. Ethical approval for this procedure was obtained from the medical ethics committee. Response rate was 94.1%, with no differences between responders and non-responders in age or gender. A structured interview was conducted with each patient by a trained interviewer prior to CAG. The type of therapeutic intervention (percutaneous coronary intervention, coronary artery bypass grafting, pharmacology treatment) was chosen depending on the results of CAG, independently from participation in this study.

Measures

Vital exhaustion

The structured Maastricht interview for Vital Exhaustion was conducted with each patient. This instrument was designed to measure feelings of exhaustion by asking a patient a set of 23 questions which concern for instance: tiredness, lack of energy, irritability, disrupted sleep, or difficulty concentrating. The answer categories are: Yes (2 points), Question mark (1 point), or No (0 points). A score ranges from 0-46. The cut-off point of 17 or higher identifies participants as 'exhausted' (32). The scale was found

to have good validity and reliability (33). In our study we used a Slovak translation of this measure, the Cronbach's alpha in the present study was 0.84.

Socioeconomic status

Income level and educational level were used as the indicators of socioeconomic status. Participants' income were divided into three levels: 1) low income: income lower than the 'minimum wage', 2) middle income: higher than the 'minimum wage', and 3) high income: twice the 'minimum wage' and higher. The 'minimum wage' is a standardized indicator of the financial situation used in Slovakia, and it takes into account the income of all members of the household. Participants' education levels were assessed by the type of school completed: basic, middle (secondary with or without school-leaving examination) and high (university) education. There were no differences in the income measures between the two gender groups in our study.

Functional status and seriousness of disease

Functional status was assessed based on two scales, both consisting of 4 classes: the NYHA classification of dyspnea symptoms (34) and the CCS - severity of chest pain (35). The seriousness of the disease was assessed by the type of intervention indicated after the CAG: 'pharmaceutically', or (PTCA: Percutaneous Transluminal Coronary Angioplasty), or 'CABG' (Coronary Artery Bypass Grafting).

Analysis

We used logistic regression models to examine the effect of gender and the effect of low and middle income and education on the occurrence of high vital exhaustion. In the first step, the crude effects of income, education and gender on vital exhaustion were computed using the highest levels as a reference category. Next, the model was adjusted for functional status and the seriousness of the disease. Crude and adjusted effects of income and education on vital exhaustion were also computed separately for males and females. Among women, the high and middle income groups were merged into one category, as were the high and middle education groups, since the number of females in the high education and income groups was very low. Analyses were performed using SPSS 12.0.1 for Windows.

Results

The sociodemographic characteristics of the participants in different socioeconomic groups are presented in Table 1.

Table 1. Descriptive statistics of the study variables

	1. Low income	2. Middle income	3. High income	1. Low education	2. Middle education	3. High education	Total sample
Age							
mean	51.4	57.1	55.4	56.7	55.5	56.1	55.9
range (SD)	27-71	32-75	38-72	27-71	32-75	38-72	27-75 (7.3)
Gender							
Male	31	142	57	70	131	44	245
Female	19	76	15	48	60	9	117
Vital exhaustion							
Exhausted	45	126	27	90	100	16	206
Non-exhausted	5	89	43	25	85	34	144
Functional status							
Class I., II.	26	102	41	56	91	28	175
Class III., IV.	20	101	25	55	84	21	160
Seriousness of disease							
CABG	12	63	25	31	51	25	107
PTCA/stent	10	57	17	30	46	14	90
Pharmacotherapy	25	96	29	55	89	13	157

As expected, participants with low income were more likely to feel exhausted in comparison to patients with high income. Participants with middle income had higher likelihood of being exhausted compared to the high-income group of participants. This association remained significant even after controlling for functional status and seriousness of disease (Table2).

Patients with low and middle education had higher chance of being exhausted compared to participants with high education. All associations remained significant after controlling for the seriousness of disease. However, when functional status was added into the regression model, no significant association between education and vital exhaustion was found (Table2).

Gender was also found to be a significant factor influencing the level of vital exhaustion: female participants were more likely to be exhausted in comparison to male participants. This association remained statistically significant even after controlling for functional status and seriousness of disease (Table2).

Table2. Logistic regression analysis- risk of having higher vital exhaustion in different income, educational and gender groups.

Vital Exhaustion	Crude effect OR(95% CI)	Effect adjusted for functional status OR(95% CI)	Effect adjusted for seriousness of disease OR(95% CI)
Income ¹			
high	1.00	1.00	1.00
middle	2.10 (1.19-3.64)	2.33 (1.10-4.93)	2.03 (1.16-3.57)
low	13.31 (4.67-37.94)	5.18 (1.67-16.16)	11.81 (4.12-33.85)
Education ¹			
high	1.00	1.00	1.00
middle	2.33 (1.20-4.54)	1.03 (0.42-2.53)	2.15 (1.10-4.24)
low	6.93 (3.28-14.64)	2.47 (0.89-6.83)	6.31 (2.96-13.46)
Gender ²			
male	1.00	1.00	1.00
female	2.10 (1.24-3.25)	2.20 (1.10-4.60)	1.83 (1.12-3.10)

Statistically significant effect is in bold ($p < 0.05$)

¹ Model was adjusted for the effect of age and gender.

² Model was adjusted for the effect of age.

The risk of being exhausted was also computed separately among male and female patients. Among men, logistic regression showed that male patients with low income and middle income were more likely to feel exhausted compared to the high-income group. All associations remained significant after controlling for functional status and the seriousness of disease. Similar results were found with regard to education. (Table3).

In the group of female patients, income had no significant effect on vital exhaustion. Education influenced exhaustion scores among women, but this association disappeared after controlling for functional status and seriousness of disease (Table3).

Table 3. Logistic regression analysis- risk of having higher vital exhaustion in different income and educational groups by gender.

Vital Exhaustion		Crude effect OR (95% CI)	Effect adjusted for functional status OR (95% CI)	Effect adjusted for seriousness of disease OR (95% CI)
Males				
Income	high	1.00	1.00	1.00
	middle	2.54 (1.32-4.87)	1.96 (0.86-4.46)	2.48 (1.29-4.77)
	low	14.25 (4.33-46.86)	4.84 (1.34-17.49)	12.23 (3.68-40.59)
Education	high	1.00	1.00	1.00
	middle	2.23 (1.10-4.68)	1.19 (0.46-3.10)	2.15 (1.10-4.60)
	low	6.44 (2.77-15.10)	2.71 (1.1-8.1)	5.98 (2.51- 14.24)
Females				
Income	high + middle*	1.00	1.00	1.00
	low	9.31 (1.19-73.15)	2.82 (0.32-26.20)	3.26 (0.35-31.25)
Education	high + middle*	1.00	1.00	1.00
	low	3.62 (1.40-9.32)	2.87 (0.64-12.80)	3.87 (0.77-19.55)

Statistically significant effect is in bold ($p < 0.05$)

* Categories have been merged to prevent empty cells.

Discussion

The results of our study show that low level of income and low educational grade, were inversely associated with vital exhaustion scores among male patients with coronary heart disease. This association remained significant after controlling for the effects of patient’s functional status and the seriousness of disease. Higher levels of vital exhaustion among low educated groups were reported in previous studies focusing on cardiac risk among representative population samples (5, 6, 7, 17). The results of our study show that this association remains significant among people who already suffer from coronary heart disease.

Vital exhaustion is a significant factor contributing to a worse prognosis among coronary patients, and reducing vital exhaustion has a beneficial effect on levels of depression, exhaustion and anginal complaints among patients (8, 11). Higher vital exhaustion in the low socioeconomic group of coronary patients thus indicates that socioeconomic disadvantage may consequently have a negative effect on the general quality of life among coronary patients and on later prognosis of disease. As we proposed in the introduction, one possible pathway by which socioeconomic disadvantage negatively affects cardiac risk is through psychological factors such as depression or vital exhaustion. It is possible that a similar mechanism exists in the process by which socioeconomic disadvantage influences

patients' quality of life or prognosis. The cross-sectional design of our study did not allow us to explore the subsequent impact of socioeconomic status and vital exhaustion on patients' prognosis. However, the striking socioeconomic inequalities found in vital exhaustion among our patients, support the above hypothesis.

The association between socioeconomic status and vital exhaustion in our study was significantly more salient among men than among women. These findings are in line with previous studies showing women reporting higher vital exhaustion compared to men (5, 15). Appels et al. (12) presented the results of analyses of the origins of increased exhaustion in females, which has shown that of all biographical characteristics, holding a job and simultaneously taking care of the household was most strongly associated with elevated exhaustion. Moreover, the pathway mechanisms between socioeconomic status, gender and the development of disease might be different among males and females. Available evidence shows that men are probably more susceptible to the health deteriorating effects of income inequality, economic deprivation and loss of status than women. The effects of socioeconomic status on health could be also explained by differences in psychosocial distress perception and coping strategies (19, 37). It is also possible that income and education are not as powerful predictors for women as they are for men, and that the less commonly used predictors (such as marital status, or being a single parent) might be stronger predictors for females.

The limitations of our study concern its cross-sectional design and the fact, that relative to the male participants, the female sample is smaller in particular (the number of women with high income or high educational level is very small). However, the latter distribution is quite characteristic for the population of women in this age group in the whole population of Slovakia.

Conclusion

Despite its limitations, our study makes a contribution to an important but somehow neglected area of research. Low education and income of patients had strong adverse effects on their vital exhaustion, which is a significant risk factor contributing to a worse prognosis and a lower quality of life in CHD. These results need confirmation however, preferably in a longitudinal study, which would provide better insight into the effects of socioeconomic status the outcomes, and also enable the exploration of the causal relationships between the variables. Future research might also be focused on possible explanations of gender differences. High vital exhaustion scores among patients with low education and income indicate that more focus on managing this problem is needed in particular socioeconomic groups, which should be taken into account when designing interventions focusing on quality of life among coronary patients.

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Psychosocial factors of coronary heart disease and quality of life among Roma coronary patients: a study matched by socioeconomic position⁴

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⁴ Submitted

Abstract

Objective:

Roma have been shown to have an adverse socioeconomic position and unfavorable health. The high occurrence of coronary heart disease (CHD) is an important aspect of this adverse health, but very little is known about more specific issues, such as quality of life and psychosocial factors among Roma. The aim of this study was to assess whether psychosocial factors and health-related quality of life (HRQL) differ between Roma and non-Roma coronary patients and to what degree socioeconomic position explains these differences.

Design:

We interviewed 399 patients from the Eastern Slovakia, 38 of whom were Roma, who had been referred for coronary angiography. We included 114 participants in the study: 38 Roma patients, all with low socioeconomic status (SES), 38 non-Roma with low SES, and 38 non-Roma with high SES. Groups were selected randomly after matching for age, gender and education. The GHQ-28 was used for measuring psychological well-being (anxiety, depression), the Maastricht interview for vital exhaustion, the type-D questionnaire for personality, the Cook-Medley scale for hostility and the SF-36 for HRQL. SES was measured by education and income and disease severity by functional status and ejection fraction. ANOVA and linear regression were used to analyze the data.

Results:

Differences were found between Roma and non-Roma in psychological well-being and vital exhaustion, where Roma scored worse compared to non-Roma ($p \leq 0.001$, $p \leq 0.001$), but with regard to personality characteristics, ethnicity played a less significant role. Roma also scored worse than non-Roma in HRQL ($p \leq 0.001$). The differences between Roma and non-Roma could be partially explained by SES.

Conclusion:

The adverse HRQL, psychological well being and vital exhaustion of Roma coronary patients may warrant additional care. This care should target their low SES but also other factors related to their ethnic background, such as culture and living conditions.

Introduction

Roma are an ethnic group which originated in India and which entered Europe in the 14th – 15th century. Most of the Roma in the European Union live in Central and Eastern Europe (Kosa *et al.* 2007, Crowe 1995). The history of Roma in this region is characterized by several periods of

repression and discrimination, the most pronounced occurring during World War II when a large part of the Roma population was exterminated in Nazi concentration camps (Vivian & Dundes 2004, Barondess 1998). During the Communist era, state policy was focused on re-educating and assimilating Roma into the majority population. Roma received many social benefits but were also forced to abandon their traditional itinerant style of life and were discouraged from identifying with their original cultural background and their language. This state policy failed to achieve its aims and instead led to increased social passivity and cultural distrust of outsiders among the Roma population, both of which persisted also after the fall of Communism. Societal transformation in the 1990s brought with it many socioeconomic changes, most of which had a negative impact on Roma: i.e. an increase in racist sentiment against Roma, the loss of social welfare from the government (Zeman *et al.* 2003, Koupilova *et al.* 2001). In Slovakia, Roma are the second most numerous ethnic minority (after Hungarians). In the 2001 census, 1.7% of the total population declared themselves to be Roma. This figure depends, however, on self-identification, and the actual number of Roma according to the estimates of the Demographic Research Centre is substantially larger, at around 380,000 (7.2%), with the largest numbers of Roma living in the Eastern regions of Slovakia (Vaňo 2001).

In their review, Hajioff and McKee (2002) concluded that research on Roma health issues is scarce and is largely focused on communicable diseases. Little is known about the epidemiology of chronic diseases among this group. The limited evidence suggests increased morbidity from non-communicable disease, poorer access to health services, lower uptake of preventative care, worse overall health status and a higher prevalence of various risk factors among the Roma compared to the non-Roma population (Kosa *et al.* 2007, 2002, Nesvadbova *et al.* 2000). A significantly lower life expectancy has also been reported (Koupilova *et al.* 2001, Filadelfiova *et al.* 2007).

There are few reports on Coronary Heart Disease (CHD) among Roma. Nozdrovicky (in Koupilova *et al.* 2001) reported cardiovascular diseases as the most common cause of death in the Roma community of Rakusy in Slovakia. Lifestyle risk factors had a high prevalence (high consumption of animal fat and low consumption of fruit and vegetables, obesity, very high prevalence of smoking and alcohol consumption as well as lack of physical activity). Another study (Dejmek *et al.* 2002) indicated an unfavorable diet and smoking habits among Roma pregnant women, with about 78% of Roma mothers reporting smoking as compared with 31% of non-Roma mothers. Other studies confirm the higher prevalence rate of risk factors and of coronary heart disease, metabolic syndrome and Type 2 diabetes among the Roma compared to non-Roma (Vojarova de Courten *et al.* 2003, Krajcovicova-Kudlackova *et al.* 2002).

In research on Roma health issues, it often remains unclear to what extent worse health among Roma is influenced by their very low socioeconomic status, or whether other ethnicity-related factors such as different attitudes towards health and different lifestyle are more important. Studies comparing Roma with the majority population have shown that Roma often do not perceive the connection between lifestyle and health as strongly causal, and that health and disease are in the hands of destiny anyway and are rather stoically and fatalistically accepted (vanCleemput *et al.* 2007, Petek *et al.* 2004). Data on CHD among Roma are sparse, and even less is known about psychosocial factors and quality of life among Roma coronary patients. The role of these factors in CHD has been widely studied and has showed their importance in both the etiology and prognosis of CHD (Bobak & Marmot 2005, Kop 2003). Depression, anxiety and vital exhaustion are among the most commonly reported variables connected to increased CHD morbidity and mortality risk, (Appels *et al.* 2006, Brummet *et al.* 2005, Williams & Schneiderman 2002), together with a Type-D personality (Denollet 2005) and hostility (Kuper *et al.* 2005, Boyle *et al.* 2004). Health-related quality of life (HRQL) comprises physical, mental, social and economic components and evaluates mainly the physical and mental status of patients as a reflection of their disease. HRQL is a factor of high clinical relevance, and in several studies it has been found to be an important predictor of general and cardiovascular mortality and morbidity even after adjustment for other conventional risk factors (Lenzen *et al.* 2007).

The aim of this study was to assess whether psychosocial factors and health-related quality of life differ between Roma and non-Roma CHD patients, and to what extent socioeconomic position explains these differences. Based on the previous studies on Roma health, and bearing in mind the specific cultural and social background of this group, significant differences were expected between Roma and non-Roma coronary patients regarding these factors.

Methods

Study participants and procedure

We interviewed patients who had been referred to the East Slovakian Institute for Cardiac and Vascular Diseases in Kosice for coronary angiography (CAG). Patients with cardiovascular disease from the all of Eastern Slovakia (about 1.5 million inhabitants) are referred to this medical centre for diagnosis and treatment. From 399 patients interviewed (a response rate of 94.8%), 38 patients had Roma ethnicity. We included 114 participants in this study and divided them into three groups: 1st group - 38 Roma patients, almost all with low socioeconomic status (SES); 2nd Group - 38 non-Roma patients with low SES (randomly matched with

Roma in terms of education, age, gender and type of intervention after CAG); 3rd group - 38 non-Roma patients with high SES randomly matched with the first group in terms of age, gender and type of intervention after CAG. The type of intervention after coronary angiography, which is a general indicator of the seriousness of the disease, was divided into three categories: 'pharmaceutically', or 'PTCA (Percutaneous Transluminal Coronary Angioplasty)', or 'CABG' (Coronary Artery Bypass Grafting). General inclusion criteria in the study were as follows: coronary heart disease (CHD) in the medical history, age < 75, no psychiatric disorders in the medical history and no serious co-morbidity. Participants were provided with information about the study, and they signed an informed consent letter. Ethical approval for this study was obtained from the Ethics Committee. The response rate was 94.1%, and there were no significant differences between respondents and non-respondents in age or gender. A structured interview was conducted with each patient by a trained interviewer, and medical data were obtained from the medical records of patients.

Measures

Psychological well-being

To assess psychological well being, the 28 item version of the General Health Questionnaire (GHQ-28) was used (Goldberg & Hillier 1979). The GHQ 28 consists of 4 subscales: physical symptoms, anxiety and insomnia, impairment of social functioning, and depression. The score for each subscale ranges from 0 to 21, and the total GHQ 28 score is between 0 and 84, with a higher score indicating worse mental health status. The questionnaire has been shown to have acceptable consistency and validity (Goldberg & Williams 1988). The good psychometric properties of the Slovak version of the GHQ 28 have also been reported (Nagyova et al. 2000). In the present study the Cronbach's alpha was 0.92.

Vital exhaustion

The structured Maastricht Interview for Vital Exhaustion measures feelings of exhaustion and consists of 23 questions concerning experiences such as tiredness, lack of energy, irritability, or disrupted sleep (Meesters & Appels 1996a). The score ranges from 0-46. The cut-off point at 17 or higher identifies a participant as 'exhausted'. The scale has been found to have good psychometric properties of validity and reliability (Meesters & Appels 1996b). In the present study the Cronbach's alpha was 0.87.

Type-D personality

Type-D personality was measured with the 14-item Type-D Personality Scale (DS14). Type-D personality is characterized by the tendency to experience negative emotions and not express these emotions in social interactions. It consists of 2 subscales: negative affectivity (NA) and social inhibition (SI). A score of 10 or more on both subscales denotes those

with a Type-D personality. The DS14 has adequate reliability and validity (Denolet 2005). In the present study Cronbach's alpha was 0.76.

Hostility

Hostility was assessed using the 27-item version of the Cook Medley Hostility Scale, comprising three subscales – cynicism, aggressive responding and hostile affect – which are thought to reflect the cognitive, behavioral and mood components of hostility. This scale has been demonstrated as a good predictor of CHD and has acceptable validity and reliability (Barefoot *et al.* 1989). In the present study Cronbach's alpha was 0.71.

Health-related quality of life (HRQL)

SF 36 was used to measure health-related quality of life. The four subscales of the SF-36 (vitality, emotional role limitations, mental health and social functioning) can be summarized into a mental functioning component summary, physical functioning, role limitations due to physical health problems and bodily pain, and general health perceptions can be summarized into a physical functioning component summary. The summary score ranges from 0 to 100, with lower scores indicating worse quality of life (Ware *et al.* 1994). A validation study of the SF-36 among coronary patients has confirmed good psychometric properties (Failde & Ramos 2000).

Socioeconomic status

Income level and education were used as the indicators of socioeconomic status (SES). Participants' education was assessed as basic (including also unfinished basic education), middle (lower secondary without school-leaving exams and secondary with the graduation exams) and high (university education). Participants' income was divided into three levels: 1. low income (lower than the 'minimum wage'), 2. middle income (higher than the 'minimum wage'), and 3. high income (twice the 'minimum wage' and higher). 'Minimum wage' is an indicator of financial situation which is adjusted for the income of all family members. An official scheme for assessing minimum wage (prepared by the Slovak Ministry of Social Affairs) was employed. People with an income lower than the minimum wage are considered to live under the 'poverty level' and are entitled to receive social benefits.

Disease severity

Disease severity was measured by functional status and ejection fraction. Functional status was assessed by a cardiologist based on two scales: NYHA - four classes according to the New York Heart Association classification of dyspnea symptoms (Criteria Committee of the NYHA 1994) and the Canadian Cardiovascular Society (CCS) checklist that assesses the severity of chest pain in four classes (Campeau 1976). In both scales, a higher classification represents a worse functional status. In this study functional status is calculated using the worst level from these two scales.

Ejection fraction (EF) as the measure of the systolic function of the left ventricle was indicated by echocardiography. EF may be reported as normal (>50%), borderline normal (40%-50%), or systolic dysfunction: mild (30%-39%), moderate (20%-29%), and severe (<20%) (McGowan & Cleland 2003).

Analysis

We first described the demographic and basic medical characteristics of each group. Second, we used a one-way analysis of variance (ANOVA) and Scheffe post hoc tests in order to explore the differences in psychological variables and HRQL between groups (Roma, non-Roma with low SES and non-Roma with high SES). Next, hierarchical linear regression models (enter method) were employed to examine the effect of ethnicity on the psychological variables (psychological well-being, vital exhaustion, type-D personality, hostility) and HRQL. Age and gender were included in the regression models as potential confounding variables. In the next step, this regression model was adjusted for the effect of income and education. In the final model, functional status and ejection fraction were included to control for the potential effect of disease severity. Analyses were performed using SPSS 12.0.1 for Windows.

Results

The mean age of participants in our study was 53.4 years, and 18% were women. These characteristics were similar in all 3 SES groups. Other sociodemographic characteristics of the research groups are presented in Table 1.

Table 1. Descriptive statistics

	Roma	non-Roma low SeS	non-Roma high SeS	Total study sample
Total number	38	38	38	114
Age				
Mean	53.1	53.4	53.8	53.4
SD	7.4	6.6	6.9	6.9
Range	27-71	39-64	38-72	27-72
Gender				
Males	31 (81.6%)	31 (81.6%)	31 (81.6%)	93 (81.6%)
Females	7 (18.4%)	7 (18.4%)	7 (18.4%)	21 (18.4%)
Education				
Unfinished basic	3 (7.9%)	-	-	3 (2.6%)
Basic	25 (65.8%)	27 (71.1%)	-	52 (45.6%)
Lower secondary	8 (21.1%)	8 (21.1%)	-	16 (14%)
Secondary (graduate)	1 (2.6%)	2 (5.3%)	-	3 (2.6%)
High (university)	1 (2.6%)	1 (2.6%)	38 (100%)	40 (35.1%)
Income				
Low	25 (67.6%)	3 (9.4%)	-	28 (27.2%)
Middle	9 (24.3%)	25 (78.1%)	14 (41.2%)	48 (46.6%)
High	3 (8.1%)	4 (12.5%)	20 (58.8%)	27 (26.2%)
Ejection fraction				
EF= 20- 29%	1 (3.1%)	2 (5.6%)	-	3 (2.9%)
EF= 30- 39%	7 (21.9%)	6 (16.7%)	2 (5.3%)	15 (14.6%)
EF= 40- 49%	7 (21.9%)	8 (22.2%)	9 (25.7%)	24 (23.3%)
EF= >50%	17 (53.1%)	20 (55.6%)	24 (68.6%)	61 (59.2%)
Functional status				
Class I.-II.	14 (38.9%)	19 (50.0%)	24 (63.2%)	57 (50.9%)
Class III.-IV.	22 (61.1%)	19 (50.0%)	14 (36.8%)	55 (49.1%)
Seriousness of disease				
Pharmacotherapy	13 (35.1%)	14 (36.8%)	13 (34.2%)	40 (35.4%)
PCI/ stent	8 (21.6%)	8 (21.1%)	11 (28.9%)	27 (23.9%)
CABG	16 (43.2%)	16 (42.1%)	14 (36.8%)	46 (40.7%)

Analysis of variance and Scheffe Post Hoc tests (Table 2) revealed differences between Roma patients, low-SES non-Roma patients and high-SES non-Roma patients. In *psychological well-being* Roma patients differed significantly from both non-Roma with low SES and non-Roma with high

SES. In *vital exhaustion* there were differences between all three groups, with Roma scoring higher than non-Roma with low SES and non-Roma with high SES, but differences were also found between non-Roma with low SES and non-Roma with high SES. In the *hostility* and *NA subscale of the Type D* questionnaire, only Roma patients and high-SES non-Roma differed significantly. In the *SI subscale of the Type D* questionnaire, as well as in the total score for type D, no statistically significant results were found. In both mental and physical components of *HRQL*, Roma patients scored significantly worse than non-Roma with low SES and non-Roma with high SES.

Table 2. Differences between research groups in psychological factors and HRQL tested with one-way analysis of variance (ANOVA) and Sheffe post-hoc tests.

	Group 1. mean	Group 2. mean	Group 3. mean	F value	p-value	Sheffe test- differences between groups
GHQ - total score	35.2	25.8	23.0	11.13	0.001	1-2, 1-3
Vital exhaustion	27.4	21.4	13.6	20.19	0.001	1-2, 2-3, 1-3
Hostility	17.8	15.6	14.2	7.60	0.05	1-3
Type D - NA	13.8	11.4	10.3	3.33	0.05	1-3
Type D - SI	13.2	12.6	11.2	1.48	0.23	-
Type D	-	-	-	1.72	0.18	-
SF 36 - mental component	49.2	61.6	65.1	7.54	0.001	1-2, 1-3
SF 36 - physical component	37.7	52.2	58.9	9.75	0.001	1-2, 1-3

- Group 1: Roma

Group 2: non-Roma with low socioeconomic status

Group 3: non-Roma with high socioeconomic status

- the higher the GHQ score, the lower the psychological well-being (anxiety, depression)

- a higher score in Hostility, Vital exhaustion and Type D indicate a higher level of the psychological trait

- the higher the SF36 score, the better the health-related quality of life

In the multivariate linear regression models containing age, gender and ethnicity, ethnicity was a significant predictor in almost all variables: psychological well being, vital exhaustion, hostility, and the physical and mental components of the HRQL. After the inclusion of income and education into the regression model, the effect of ethnicity disappeared in all the variables with the exception of the physical component of the HRQL and hostility. SES was significantly related to the following variables: psychological well-being, vital exhaustion and health-related quality of life. After the inclusion of functional status and ejection fraction, the influence of SES and ethnicity did not change significantly (Table 3).

Table 3. Effects of ethnicity on psychological variables and HRQL: results of a linear regression model.

	Equation 1 ethnicity β (95% CI)	Equation 2 ethnicity adjusted for age, gender β (95% CI)	Equation 3 ethnicity adjusted for age, gender SES β (95% CI)	Equation 4 ethnicity adjusted for age, gender SES, FS, EF% β (95% CI)
GHO-28	-0.42 (-15.47; -6.13)***	-0.43 (-15.63; -6.31)***	-0.20 (-10.80; 0.62)	-0.14 (-9.78; 3.76)
Vital Exhaustion	-0.43 (-13.59; -5.82)***	-0.43 (-13.42; -5.80)***	-0.11 (-6.75; 2.09)	-0.13 (-7.50; 1.53)
Hostility	-0.35 (-4.55; -1.26)**	-0.36 (-4.58; -1.25)**	-0.31 (-4.60; -0.40)*	-0.312 (-4.87; -0.30)*
Type D	-0.09 (-0.29; 0.11)	-0.08 (-0.29; 0.11)	-0.03 (-0.23; 0.29)	0.11 (-0.16; 0.39)
SF-36 PHS	0.39 (9.32; 26.45)***	0.40 (9.89; 26.74)***	0.27 (1.85; 22.30)*	0.24 (+0.05; 2.110)*
SF-36 MHS	0.36 (6.79; 21.74)***	0.36 (6.72; 21.84)***	0.17 (-2.77; 16.18)	0.13 (-4.71; 15.67)

Abbreviations:

SES = socioeconomic status (income, education)

FS = functional status

EF% = ejection fraction

GHO-28 = General Health Questionnaire-28

SF36 PHS = physical health status, SF36 MHS = mental health status

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Discussion

Main findings

Our study showed that Roma coronary patients had poorer scores than non-Roma patients on psychological factors that are relevant for the prognosis of coronary heart disease: psychological well-being (anxiety, depression) and vital exhaustion. Similarly, Roma scored worse in both the mental and physical components of health-related quality of life. However, these differences could be partially explained by the socioeconomic status of the Roma.

The design of our study enabled a proper assessment of the impact of SES and of other aspects of ethnicity on the outcome variables. For most variables (psychological well-being, vital exhaustion and HRQL) the impact of ethnicity in linear regression disappeared after the inclusion of socioeconomic status in the model (while SES was a significant predictor). Our results thus support the assumption that a significant part of ethnic inequalities in quality of life and psychological factors may be explained by the poor socioeconomic position of Roma. Socioeconomic disadvantage has been shown in numerous studies to be consistently associated not only with a higher presence of CHD lifestyle risk factors (heavier smoking, worse nutrition, higher levels of cholesterol), but also with a worse prognosis among coronary patients (Yarnel *et al.* 2005, Petrelli *et al.* 2006). However, it is necessary to take into account that the socioeconomic status of a considerably part of the Roma (especially those in separated settlements) is much lower than that of the majority population, with a much higher incidence of unemployment, criminality and dependency on government social welfare and very poor standard of living (Filadelfiova *et al.* 2007). In our sample, this was shown, for instance, by the fact that even in the low SES non-Roma group, income levels were higher than in the low SES Roma group. Furthermore, only among the Roma were there patients with an unfinished basic education. Because of this, SES as measured may not fully adjust for 'real' differences in SES.

One of the interesting findings in the study was that functional status in the three groups is quite different (table 1): the Roma have a higher prevalence rate of Class III and IV symptoms than both the low-SES non-Roma and the high-SES non-Roma, suggesting that the Roma might be more symptomatic from their disease than the non-Roma at referral to the cardiologist. With regard to personality traits, hostility seemed to be influenced by ethnic origin (higher scores among Roma), which is in line with some other studies where higher scores of hostility were found among ethnic minorities (Smart-Richman *et al.* 2007, Iribarren *et al.* 2000), most probably associated with the experiences of discrimination.

Strengths, limitations, directions for future research

Major strengths of the present study are that it adds evidence to a rarely investigated topic – ethnic differences at the entrance of specialist care – and that we could distinguish between the impacts of SES and ethnicity on the outcome variables. However, due to our study's cross-sectional design, we could not further explore the mechanisms which might explain *how* SES is related to the psychological outcomes and HRQL among specific Roma population. Based on the literature, it might be hypothesized that chronic stress plays an important role, which can result in adverse health outcomes through biological, psychosocial and behavioral pathways. Higher stress events connected with enduring financial stress and a lower capacity to develop adaptive behavioral strategies for controlling psychosocial conflicts might be connected with poor SES (Kopp, Rethelyi 2004). Also other factors (social participation, social exclusion, feelings of discrimination) might be important in influencing the quality of life and psychological outcomes among Roma. Another limitation of the study was the relatively small number of Roma patients (38 from 399 interviewed patients, or 9.5%, which is quite characteristic for the population in Slovakia). The estimated proportion of Roma in the Slovak population is 7%, thus the slightly higher ratio of Roma in our sample may reflect the higher prevalence of CHD among the Roma. Results of the present study would benefit from confirmation in a longitudinal study with a bigger sample, which would also provide better insight into the causal relationships between the variables.

Conclusion and implications

This study showed differences between Roma and non-Roma patients with coronary heart disease in psychological factors that are relevant for the prognosis (psychological well-being, vital exhaustion, HRQL). However, these differences were, to a significant extent, explained by SES, which supports the hypothesis of a significant impact of poor SES on ethnic inequalities in health among the Roma vs. non-Roma populations. These results may also apply to other ethnic minority groups with a backward societal position.

Roma patients may warrant a personalized intervention (respecting their cultural background and specific attitudes toward health issues) when enhancing quality of life, of which socioeconomic status appears to be a critical factor that needs to be taken into account.

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Psychosocial predictors of change in quality of life among patients with coronary heart disease⁵

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⁵ Submitted

Abstract

Purpose:

Health-related quality of life (HRQL) after coronary interventions (CABG, PTCA) usually improves among patients, but not among all patients. Some actually show a significant decline in HRQL. Our aim was to explore the potential of psychological well-being (anxiety, depression), vital exhaustion, Type-D personality and socioeconomic position as predictors of improvement in HRQL, and separately of lack of improvement in HRQL (i.e. stable or worse).

Methods:

106 patients scheduled for coronary angiography (CAG) were interviewed before CAG (baseline) and 12-24 months after. Socioeconomic status was evaluated by education. GHQ-28 was used for measuring psychological well-being (anxiety, depression), the Maastricht interview for vital exhaustion and the Type-D questionnaire for personality. HRQL was assessed using the SF-36 (physical and mental component) questionnaire. Functional status was assessed with a combination of NYHA and CCS. Linear regressions were used to analyze data.

Results:

A change in physical HRQL was predicted by baseline psychological well-being ($\beta=-0.39$;95%CI:-1.00,-0.16) and baseline HRQL ($\beta=-0.61$;95%CI:-0.83,-0.34). A change in the mental HRQL was predicted by (baseline) psychological well-being($\beta=-0.37$;95%CI:-0.99,-0.09), vital exhaustion($\beta=-0.21$;95%CI:-0.69,-0.03) and baseline HRQL($\beta=-0.76$;95%CI:-1.03,-0.44). However, these factors were significant only among patients who improve in their HRQL.

Conclusion:

Psychological well-being and vital exhaustion are significant predictors of positive change in HRQL among coronary patients.

Introduction

Although the mortality caused by coronary heart disease in the most European countries decreased in the recent years, still CHD is the leading cause of morbidity and disability of the population. In the countries of the Eastern and Central Europe, CHD rates remain rather high among general population compared to west European countries (1, 2). However, when evaluated statistical decrease in mortality, it is needed to take into account also other possible influences on this trend, for instance epidemiological trends of incidence of myocardial infarction should be evaluated also from the aspect of statistical increase of small infarctions caused by introduction

of troponin- based criterion into diagnostics, which might contribute to the false statistical decrease in mortality trends (3).

The focus of research on coronary heart disease is currently shifting toward quality of life among patients, and psychosocial factors are also becoming more important. This is partly due to the fact that medically oriented treatment strategies have strongly developed over the past decades, and survival rates among coronary patients has significantly improved. This has enabled many patients to live longer and better despite their disease. Quality of life has thus been increasingly considered as an important outcome measure in research focused on patients with coronary heart disease (4, 5).

A patient's quality of life is a complex, multidimensional construct comprising physical, mental, social and economic components and can be influenced by various factors, including both medical and psychosocial parameters (6). Due to the inconsistency in definition, it is often operationalised as perceived health status, self-rated health or health-related quality of life. In the present study we used as a measure of quality of life the SF-36 questionnaire, which attempts to capture the subjective (self-perceived) health status of patient as a reflection of his/her disease. The outcome parameter of the SF-36 is usually defined as health-related quality of life (HRQL) and can be used to evaluate the broad impact of a disease on a patient and the effectiveness of interventions aimed at mental and physical health (7, 8).

Recent research has shown HRQL to be a construct of high clinical relevance, with HRQL significantly predicting long-term mortality among patients with coronary heart disease (9) as well as short-term mortality after cardiac surgery, especially among older patients (10). Long-term mortality, re-admissions and cardiovascular events after invasive coronary procedures (CABG or PTCA) among patients with coronary heart disease and among patients with the heart failure have all been predicted by HRQL (11, 12, 13).

Invasive coronary procedures (coronary-artery bypass grafting – CABG, or percutaneous transluminal coronary angioplasty – PTCA) usually lead to an improvement in both the physical and mental dimensions of HRQL, but there is still a significant proportion of patients who do not improve, or who even show a decline in HRQL (14, 15, 16). Hawkes & Mortensen have concluded that predicting in advance which patients will benefit from therapy or intervention and which will not by investigating clinically significant intra-individual change standards in HRQL may therefore be a relevant step. Evidence regarding deterioration in HRQL is scarce, however, and most studies focused on predicting HRQL after invasive coronary procedure look at medical factors; thus, data on psychosocial factors as predictors of HRQL after surgery are lacking. From psychosocial factors, it might be expected that mood

disturbances (depression, anxiety) in particular play an important role, as a strong association between depression and coronary heart disease is well established based on numerous studies. Symptoms of depression not only increase the likelihood of CHD but also have independent adverse effects on later prognosis among patients who have already experienced a cardiac event (17, 18). Myocardial infarction (MI) is often followed by symptoms of depression and anxiety, and the presence of post-MI depression is associated with increased risk of mortality and morbidity. Patients with high levels of post-MI depression are more likely to die of cardiac causes over the subsequent years and have a higher probability of nonfatal re-infarction and other cardiac complications (19, 20, 21).

Our aim was to identify psychosocial predictors of change in the health-related quality of life among patients with coronary heart disease. The predictors of change in HRQL were also assessed separately for any lack of improvement in HRQL (i.e. patients with a stable or worse HRQL). We focused not only on the well-known characteristics traditionally associated with coronary heart disease, such as depression and anxiety (in our study represented by the term psychological well-being), but also on the less commonly explored factors of vital exhaustion, Type-D personality and socioeconomic status (education).

Methods

Study participants and procedure

The study sample consisted of patients who had been referred for coronary angiography (CAG) by their cardiologist. Both the baseline and the subsequent measurements were performed in the East Slovakian Institute for Cardiac and Vascular Diseases in Kosice, where patients from the whole East Slovakian region (about 1.5 million inhabitants) are referred to for diagnosis and treatment. A total of 233 patients underwent a personal interview with a trained psychologist at baseline, and medical data were retrieved from their medical records. This part of the data collection was performed before the coronary angiography. A follow-up examination was performed 12 to 24 month after the CAG and/or subsequent treatment, since it might be expected that significant positive or negative changes in HRQL will be pronounced in a period of at least one year after the intervention. For the follow-up examination we invited only those patients who were indicated for the percutaneous transluminal coronary angioplasty (PTCA), coronary-artery bypass grafting (CABG) or for pharmaceutical treatment. This means that 57 participants with the normal coronary angiogram at the baseline were not enrolled in the follow-up. Thus, a total of 106 patients took a part in a follow-up examination (response rate 60.3%).

General inclusion criteria at baseline were as follows: coronary heart disease (CHD) in the medical history, age less than 75, no severe cognitive impairments and no history of severe psychiatric disorder. Patients with cardiovascular problems other than coronary heart disease (e.g. valve disease) and with serious co-morbidity were excluded. All participants were provided with information about the study and signed an informed consent letter. Ethical approval for this study was obtained from the Ethics Committee of the East Slovakian Institute for Cardiac and Vascular Diseases in Kosice.

Measures

Psychological well-being

To assess psychological well being, the GHQ 28 - General Health Questionnaire was used. It consists of 28 items divided into 4 subscales: physical symptoms, anxiety and insomnia, social dysfunction and depression (22). A total GHQ 28 score is between 0 and 84, with a higher score indicating worse mental health status (23). The psychometric properties of the Slovak version of this questionnaire have been shown to be acceptable (24). In the present study the Cronbach's alpha was 0.92.

Health-related quality of life (HRQL)

The SF-36 questionnaire (7,25) provides a subjective measure of eight dimensions of HRQL: bodily pain, physical functioning, physical role limitations, general health perceptions, vitality, emotional role limitations, mental health and social functioning. The first four subscales can be summarized into a physical functioning component summary and the last four into a mental functioning component summary. These latter two components were used as the outcome measures in this study. The summary score ranges from 0 to 100, with lower scores indicating worse HRQL. Cronbach's alpha for the physical component of SF-36 in our study was 0.88, and for the mental component of SF-36 it was 0.90.

Vital exhaustion

The structured Maastricht Interview for Vital Exhaustion, which consists of 23 questions, measures feelings of exhaustion, such as tiredness, lack of energy, irritability or disrupted sleep. Scores range from 0-46, with a cutoff point of 17 or higher identifying a participant as 'exhausted' (26). The scale has been found to have good psychometric properties (27). In the present study the Cronbach's alpha was 0.87.

Type-D personality

Type-D personality was measured with the 14-item Type-D Personality Scale (DS14) which consists of 2 subscales: negative affectivity, or NA (a tendency to experience negative emotions) and social inhibition, or SI (not expressing emotions in social interactions). A score of 10 or more on both subscales denotes a person with a Type-D personality (28). In the present study the Cronbach's alpha was 0.82.

Functional status

Functional status was assessed by a cardiologist based on 2 scales: NYHA – 4 classifications according to the New York Heart Association classification of dyspnea symptoms (29), and CCS – 4 classifications identifying the severity of chest pain according to the Canadian Cardiovascular Society (30). In both scales, a higher classification represents worse functional status. In this study we used the worst level from these two scales as the indicator of functional status.

Socioeconomic position

The socioeconomic position of participants was measured according to their level of education: basic education, middle education (lower secondary without school-leaving exams and secondary with the graduation exams) and high (university) education.

Analysis

We first analyzed the basic demographic, medical and psychological characteristics of patients according to the type of intervention indicated after the coronary angiography (CABG, PTCA/stent and pharmacotherapy), as well as the SF-36 scores at the baseline and the follow-up. Second, we used t-tests for repeated measurements to assess the statistical significance of changes in the physical and mental component of SF-36 between the baseline and the follow-up. The clinical relevance of the change in both components of the SF-36 was assessed using a distribution-based model [31]. We employed effect sizes and an SEM-based criterion (SEM – standard error of measurement). Effect sizes from 0 to 0.2 are considered trivial; those from 0.2 to 0.5 to be small; those from 0.5 to 0.8 to be moderate; and effect sizes of 0.8 or higher to be large [31]. Regarding the definition of the SEM-based criterion of the clinically relevant change, we employed 1.96 SEM as a reflection of the 95% confidence interval. We defined patients as improved in HRQL when their increase in SF-36 score was >1.96 SEM, patients who declined as having a decrease of >1.96 SEM, and those remaining stable as having a change in score of ≤ 1.96 SEM.

To determinate predictors for change in the physical and mental aspect of HRQL, multiple linear regression analyses were performed. Age, gender, functional status and the type of intervention were included in the regression models as possible confounding variables, and education, psychological well-being, vital exhaustion, Type-D personality and baseline HRQL as expected predictors. Linear regressions were performed first for the total sample. In the next step we also computed linear regression separately in the two groups: The 1st group consisted of patients who improved in HRQL, and the 2nd group was made up of patients who did not improve in HRQL, i.e. those who deteriorated or remained stable. Statistical analyses were performed using SPSS, version 14.0.

Results

The mean age of participants in our study was 57.4 years (SD= ±6.7), and 15.1% were women. Most of the patients had middle education (54.7%), while 25.5% of the participants had a basic education and 19.8% had a higher education. These characteristics were similar in all sub-groups according to the type of intervention. Basic psychological and medical characteristics within the research groups are presented in Table 1.

Table 1. Baseline characteristics of patients in study

Type of the intervention after CAG*		CABG*	PTCA/stent*	Pharmacotherapy	Total study sample
Total number	N (%)	41 (38.7%)	37 (34.9%)	28 (26.4%)	106 (100%)
Age	Mean (SD)	59.4 (±5.4)	55.8 (±7.6)	56.8 (±6.4)	57.4 (±6.7)
	Range	49-73	34-69	46-69	34-73
Gender	Males	35 (85.4%)	30 (81.1%)	25 (89.3%)	90 (84.9%)
	Females	6 (14.6%)	7 (18.9%)	3 (10.7%)	16 (15.1%)
Education	Basic	8 (19.5%)	7 (18.9%)	12 (42.9%)	27 (25.5%)
	Secondary	21 (51.2%)	23 (62.2%)	14 (50.0%)	58 (54.7%)
	High	12 (29.3%)	7 (18.9%)	2 (7.1%)	21 (19.8%)
Functional status	Class I	2 (4.8%)	5 (13.9%)	5 (17.9%)	12 (11.6%)
	Class II	15 (36.6%)	13 (36.1%)	11 (39.3%)	39 (37.9%)
	Class III	21 (51.2%)	16 (44.4%)	9 (32.1%)	46 (44.7%)
	Class IV	3 (7.3%)	12 (5.6%)	1 (3.6%)	6 (5.8%)
Psych. well being	Mean (SD)	27.7 (±9.9)	29.1 (±12.5)	25.4 (±13.2)	27.7 (±11.7)
Vital exhaustion	Mean (SD)	18.4 (±8.8)	20.7 (±9.6)	21.6 (±12.4)	20.1 (±10.1)
Type D	Type D	27 (34.1%)	20 (54.1%)	16 (57.1%)	63 (59.4%)
	Non-Type D	14 (65.9%)	17 (45.9%)	12 (42.9%)	43 (40.6%)

* CAG- coronary angiography, CABG- coronary-artery bypass grafting, PTCA/stent- percutaneous transluminal coronary angioplasty with or without stent

Table 2 shows the SF-36 summary scores (physical and mental component) at baseline and at the follow-up for the total sample and for each sub-group according to the type of the intervention after coronary angiography. For the physical component of the SF-36, statistically significant improvements were found among all groups of patients, except for patients indicated for pharmacotherapy, and in the mental component, significant improvements were found among all groups of patients (as indicated by p-values and effect sizes in the Table 2).

Testing for a clinically relevant change in HRQL by using the SEM-based criterion revealed that approximately 40% of patients improved in the physical component of the SF-36, one half of the participants (51%) remained stable, and almost 9% declined in this component of HRQL. Results in the mental component of the SF-36 were similar, with 36% of patients improved, more than half (56%) remaining stable, and 8% of participants showing a decline.

Table 2. Health related quality of life (SF-36 scores) at the baseline and follow up

Physical component of the health related quality of life									
Type of intervention	Baseline Mean (SD)	Follow-up Mean (SD)	**Change Mean (SD)	p-value	***Effect size	Patients improved (%)	Patients stable (%)	Patients declined (%)	
All (106)	48.3 (±18.5)	57.2 (±17.8)	9.1 (±18.4)	0.001	-0.68	40.6%	51.0%	8.3%	
CABG* (41)	46.6 (±14.7)	59.1 (±16.2)	11.4 (±17.3)	0.001	-0.94	42.1%	55.3%	2.6%	
PTCA/stent** (37)	45.8 (±20.6)	57.7 (±23.4)	10.1 (±19.8)	0.008	-0.72	38.7%	51.6%	9.7%	
Pharmacotherapy (28)	50.6 (±21.2)	54.1 (±22.1)	4.5 (±17.9)	0.207	-0.35	40.7%	44.4%	14.8%	

Mental component of the health related quality of life									
Type of intervention	Baseline Mean (SD)	Follow-up Mean (SD)	**Change Mean (SD)	p-value	***Effect size	Patients improved (%)	Patients stable (%)	Patients declined (%)	
All (106)	58.5 (±17.8)	65.2 (±18.2)	7.7 (±16.5)	0.001	-0.55	35.8%	52.6%	11.6%	
CABG* (41)	58.9 (±17.3)	65.9 (±16.9)	8.1 (±17.1)	0.007	-0.67	35.1%	54.1%	10.8%	
PTCA/stent** (37)	56.6 (±18.5)	62.1 (±19.4)	6.6 (±17.1)	0.035	-0.55	36.4%	48.5%	15.2%	
Pharmacotherapy (28)	60.6 (±17.9)	68.1 (±18.6)	8.6 (±15.2)	0.009	-0.79	36.0%	56.0%	8.0%	

* CABG- coronary-artery bypass grafting, PTCA/stent- percutaneous transluminal coronary angioplasty with or without stent

** change between baseline and follow-up

*** negative values for effect size between baseline and follow-up represents improvement in HRQL, positive values represents declining

The linear regression model showed that significant baseline predictors for a change in the physical HRQL were psychological well-being and the baseline physical component of SF-36. Significant predictors of change in the mental HRQL were psychological well-being, vital exhaustion and the baseline mental component of SF-36 (Table 3). Socioeconomic status and personality traits were not significant in predicting a change in HRQL among our patients.

Table 3. Baseline predictors for change in the health related quality of life (HRQL) among participants

	Physical component of HRQL		Mental component of HRQL	
	β -value	95% CI	β -value	95% CI
Age	-0.01	(-0.55 ; 0.50)	-0.01	(-0.49 ; 0.47)
Gender	0.14	(-2.57 ; 18.61)	0.13	(-3.29 ; 15.58)
Functional status	0.05	(-3.49 ; 5.53)	0.05	(-3.20 ; 4.85)
Intervention	0.04	(-3.79 ; 5.36)	-0.07	(-5.74 ; 2.80)
Education	0.13	(-2.58 ; 9.51)	0.05	(-4.07 ; 6.69)
Psychol. well-being	-0.34**	(-1.01 ; -0.16)**	-0.36*	(-0.98 ; -0.077)*
Vital exhaustion	-0.13	(-0.63 ; 0.17)	-0.22*	(-0.71 ; 0.016)*
Type D	0.13	(-2.47 ; 12.08)	0.03	(-5.89 ; 7.87)
Baseline HRQL	-0.60***	(-0.83 ; -0.33)***	-0.76**	(-1.03 ; -0.44)**
Total R ² (adjusted)	0.24		0.21	

* p<0.05, ** p<0.01, *** p<0.001, Statistical significant results are in bold

When linear regression was performed separately within the groups of patients who improved and those who did not improve in HRQL, the results showed that psychological well-being was a significant predictor only among those who improved (in both the mental and physical components of HRQL). Within the group of participants who did not improve in HRQL, only baseline HRQL was significantly associated with the physical component of the SF-36 (Table 4)

Table 4. Baseline predictors for change in the health related quality of life (HRQL) among patients who improved, and who did not improve.

		Physical component of HRQL		Mental component of HRQL	
		β - value	95% CI	β - value	95% CI
Improved in HRQL	Age	-0.28	(-1.21 ; 0.16)	0.14	(-0.39 ; 0.74)
	Gender	0.10	(-6.09 ; 14.15)	0.08	(-8.54 ; 11.90)
	Functional status	0.37*	(-0.17 ; 10.01*)	-0.16	(-5.98 ; 3.19)
	Intervention	0.01	(-5.31 ; 5.35)	0.17	(-3.64 ; 7.54)
	Education	0.07	(-5.71 ; 8.18)	-0.17	(-8.36 ; 3.36)
	Psychol. well-being	-0.44*	(-1.05 ; 0.03*)	-0.66*	(-1.16 ; -0.11*)
	Vital exhaustion	0.01	(-0.51 ; 0.52)	-0.01	(-0.45 ; 0.43)
	Type D	0.18	(-4.40 ; 12.79)	-0.11	(-9.59 ; 5.36)
	Baseline HRQL	-0.34	(-0.60 ; 0.08)	-0.91**	(-0.87 ; -0.17**)
	Total R ² (adjusted)		0.17		0.15
Not improved in HRQL	Age	0.07	(-0.38 ; 0.60)	0.61	(-0.20 ; 0.68)
	Gender	-0.09	(-19.90 ; 10.42)	-0.05	(-13.35 ; 9.16)
	Functional status	-0.08	(-5.45 ; 3.43)	0.04	(-3.38 ; 4.36)
	Intervention	0.10	(-3.05 ; 5.80)	-0.12	(-5.21 ; 2.18)
	Education	0.24	(-1.81 ; 10.49)	0.06	(-4.10 ; 5.96)
	Psychol. well-being	-0.21	(-0.64 ; 0.25)	0.11	(-0.35 ; 0.54)
	Vital exhaustion	-0.20	(-0.59 ; 0.15)	-0.17	(-0.47 ; 0.15)
	Type D	0.21	(-2.48 ; 12.28)	0.07	(-4.85 ; 7.77)
	Baseline HRQL	-0.48*	(-0.58 ; -0.02*)	-0.27	(-0.49 ; 0.16)
Total R ² (adjusted)		0.02		-0.03	

Discussion

Major findings

Psychological well-being (depression and anxiety), vital exhaustion (only for the mental component) and the baseline HRQL were identified as significant baseline predictors for a change in HRQL. Only a few previous studies exploring predictors of HRQL have focused on psychosocial variables as potential predictors. Symptoms of depression and anxiety have been found to predict short-term HRQL (3 months after treatment) in a study by Höfer et al. (5) and to be associated with the HRQL among coronary patients in one cross-sectional study (32). Our results showed that psychological well-being (depression and anxiety) significantly predicts both the mental and physical components of HRQL also over a long-term period (12-24 month after treatment), and that not only are depression and anxiety of importance in predicting HRQL, but that vital exhaustion is too.

However, it is necessary to take into account that the psychosocial factors mentioned were predicting HRQL only among patients who improved in their quality of life. Approximately one half of patients remained stable with regard to both mental and physical component of HRQL (they neither improved nor deteriorated) in the follow-up examination after coronary angiography and/or subsequent treatment. It would be of use to focus on exploring other possible predictors of HRQL in this group of patients, as it seems that different pathway mechanisms apply among patients who improved and those who deteriorated in their HRQL.

Our study showed that psychological characteristics were even more significant than functional status or type of treatment after CAG (indicating the seriousness of the disease) in predicting HRQL among patients with coronary heart disease. It has also been shown, that psychosocial characteristics expressing mental health (anxiety, depression, vital exhaustion) were more important in predicting HRQL than more stable personality traits (hostility, Type-D personality), which might be of importance in planning psychologically oriented intervention strategies focusing on improving quality of life among coronary patients.

Socioeconomic differences in the prognosis of coronary heart disease have been found in numerous studies showing that socioeconomic disadvantage is associated with higher mortality and higher incidence of cardiac complications (33, 34, 35); thus it could be expected that similar effect would be present in HRQL. However, results of the present study suggest that a change in the health-related quality of life was not significantly predicted by socioeconomic status (as measured by education). It might be probable that socioeconomic status influences quality of life indirectly, via psychological factors. Thus, SES have an effect on depression and anxiety which consequently influences quality of life. It is also possible that current socioeconomic status has an impact only on current HRQL, but that it does not predict HRQL in the future (after treatment, respectively).

Strengths and limitations

The longitudinal design of the present study and the focus on the psychosocial predictors of the HRQL allowed us to contribute to this important but less explored field in coronary heart disease research. However, the relatively small number of participants is one limitation of the present study which should be mentioned. As a result, we did not identify a sufficient number of patients who declined in their HRQL, and it was therefore not possible to explore psychosocial predictors specifically in patients who deteriorated in HRQL separately, but only among the group which did not improve, meaning those who remained stable or declined.

Conclusions and implications for research and practice

It would be useful to direct future research efforts on indentifying predictors of HRQL also separately among patients who declined in HRQL, as different predictors may occur as significant in this group.

In the present study, psychosocial factors, especially psychological well-being and vital exhaustion, were shown to be predictors of a positive change in health-related quality of life among coronary patients.

Improving the psychological well-being of patients would have a significant beneficial effect on their quality of life. More focus on managing problems with depression in particular is needed among patients with coronary heart patients, as psychosocial factors significantly influence the quality of life among coronary patients.

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General discussion, implications for future research and practice and conclusions

This thesis deals with socioeconomic and ethnic inequalities in psychological factors and in health-related quality of life among patients with coronary heart disease, as well as with psychosocial predictors of positive and negative changes in quality of life among patients with coronary heart disease (CHD). [I here copied in the first sentence of your introduction, to eliminate all possible discrepancies] The relationship between socioeconomic status (SES), ethnicity, psychosocial factors and coronary heart disease is a complex one and includes several direct and indirect pathways and a number of mediating factors: lifestyle, access to health care, physical and social environment, psychosocial factors and stress situations. Recognizing the complexity of proposed associations, we limited our focus in this study to one part of these relationships: on the association between socioeconomic position/ethnicity and psychosocial factors in coronary heart disease (CHD). In this final chapter, the main findings of the study are discussed within the context of what is already known in the field, and the implications for clinical practice are indicated. The strengths and limitations of the study are discussed, and the possibilities of directions for future research are addressed.

8.1. Main findings

Research question 1.

Chapter 3 of the manuscript discussed the following research question: Is there evidence from the literature supporting the hypothesis of a socioeconomic gradient in the occurrence of psychosocial factors (like anger, depression, hostility, social support) among patients with coronary heart disease?

A review of the studies describing socioeconomic differences in coronary heart disease risk factors showed that socioeconomic status (educational and occupational grade, income level) was adversely associated with the psychosocial factors that contribute to coronary heart disease. With regard to hostility and depression, the socioeconomic

gradient was significant in all of the studies reviewed. Available studies also showed a similar trend in other factors: social support, perception of health and a lack of optimism. Results related to anger and perceived stress were less consistent: some of the studies included in the review reported contradictory results: no associations with socioeconomic position were found. Moreover, in the case of stress, a reverse relationship has also been found (higher stress has been reported in the higher socioeconomic group).

Research question 2.

Chapters 4 and 5 provided answers to the following research questions: Are there socioeconomic inequalities in psychosocial factors (psychological well-being, perceived mental health status, perceived quality of life, vital exhaustion) among patients with coronary heart disease?

Socioeconomic status was found to be negatively associated with the psychological outcomes and perceived quality of life among CHD patients in the present study. Participants with low income or education had a higher probability of having poor psychological well-being, worse perceived mental health status and lower perceived quality of life compared to participants with high income or education. Participants with low socioeconomic status were also more likely to report higher vital exhaustion, but these SE differences were significantly more salient among men than among women. Associations between SES and psychological factors remained significant after controlling for the effect of medical variables.

Research question 3.

Chapter 6 shifted the attention to the ethnic inequalities in psychosocial factors:

Are there ethnic inequalities in psychosocial factors and quality of life among patients with coronary heart disease? To what extent are the inequalities influenced by socioeconomic status?

Ethnic inequalities were found among Roma and non-Roma patients with coronary heart disease: in psychological well-being (anxiety, depression), vital exhaustion and in health-related quality of life Roma patients scored worse compared to non-Roma. With regard to personality characteristics, ethnicity played a less significant role. A part of these differences could be explained by socioeconomic status of the participants –income level and educational grade.

Research question 4.

In chapter 7 longitudinal data were analyzed in order to provide an answer to the following research question:

Do psychosocial factors predict a change in health related quality of life among patients with coronary heart disease?

We found that psychological well-being and vital exhaustion were significant predictors of positive change in health related quality of life among patients with coronary heart disease. A change in the physical HRQL was predicted by baseline psychological well-being and baseline HRQL. A change in the mental HRQL was predicted by (baseline) psychological well-being, vital exhaustion and baseline HRQL. However, these factors were significant only among patients who improved in their health-related quality of life but not among those participants who remained stable or declined in their HRQL. Socioeconomic status and personality traits (Type D, hostility) were not identified as significant predictors of change in the health related quality of life among patients with coronary heart disease.

8.2. Discussion of the main findings

One of the main findings of this thesis concerns the strong socioeconomic and ethnic inequalities in psychosocial factors, mainly psychological well-being and vital exhaustion, which are significant factors contributing to a worse prognosis and a lower quality of life among CHD patients. In the theoretical model proposed in the introduction of this thesis (Chapter 1) we assumed that one of the pathways by which SES influences CHD might be via a psychological mechanism. The results of the present thesis provide support for the validity of the first part of the relationships – SES inequalities in psychosocial factors among patients with CHD were found to be significant. Most of the psychological factors used in this thesis have already been shown in previous research (1,2,3) to have a significant impact on the CHD prognosis. The strong socioeconomic inequalities in these factors among CHD patients as shown in the present study support the assumption that socioeconomic disadvantage has a negative effect on later prognosis of disease among patients with coronary heart disease via psychological mechanisms, as proposed in the theoretical model in the introduction.

Additional support for this might be seen also in the fact that all mentioned associations between socioeconomic position and psychological factors of CHD were statistically significant even after controlling for the effect of functional status and/or severity of disease (indicated by the ejection fraction or type of the intervention indicated after the CAG). If the relationship between SES and psychosocial factors were to disappear after controlling for disease severity, it would be more likely that the association between SES and psychosocial factors is weak and influenced by other factors (in other words, patients with low SES have worse medical status from some other reason and their worse medical

status is the cause of their worse quality of life, higher depression and exhaustion). But our results show that the association between SES and psychosocial factors is both strong and valid. Moreover, the fact that we found SES inequalities in psychosocial factors among coronary patients has important implications itself, especially due to equity concerns. We know that SES inequalities exist in risk for CHD (4,5,6), but our results confirm that these inequalities persist also among people with developed disease, that is, patients with lower education and income were more depressed, anxious and exhausted.

Quality of life among CHD patients was also found to be significantly influenced by socioeconomic status, but only cross-sectionally (Chapter 4). Longitudinal analyses showed that depression and vital exhaustion, but not socioeconomic status, predict a positive change in the health-related quality of life (Chapter 7). However, it might be hypothesized that this relationship also fits with our proposed indirect psychosocial pathway, by which socioeconomic disadvantage influences a patient's quality of life. Income and education could affect quality of life also directly via worse SES, resulting in lower quality of life, but our results suggest that psychological factors (especially depression and vital exhaustion) are important mediators between SES and quality of life. This might not be surprising when considering the strong association between depression and CHD aetiology and prognosis: depression has been shown in numerous studies not only to increase the likelihood of CHD but also to have independent adverse effects on later prognosis among patients (7,8). Similar connections between vital exhaustion and CHD have been well established (9). The results of the present study show that similar to depression, vital exhaustion seems to play significant role also in the association between SES and CHD outcomes.

Socioeconomic position was shown to be a highly significant factor explaining part of the difference in psychological outcomes and health-related quality of life between Roma and non-Roma. This strengthens the assumption that SES is one of the important ethnicity-related variables contributing to the differences in health between minority ethnic groups and the majority population, as indicated in the literature (10,11,12). However, despite the highly important role of socioeconomic position, we also found another effect of ethnicity on psychosocial factors which can not be explained by SES. As reported in the literature, there are factors such as living conditions and discrimination (13), language and cultural background (14), different anger and stress coping strategies (15) and differences in the use of the cardiological interventions (16) which might contribute to the relationship between ethnicity and CHD outcomes. This is likely to hold for psychological factors as well. The results of our study may also apply to other ethnic minority groups, but probably only among those with a significantly adverse societal position compared to the

majority population. For instance in the study by Kaul et al. (16) among black and white cardiac patients in the USA, similar ethnic differences in HRQL were found, but demographic variables explained fewer of these differences than in our study. However, this might be also due to the fact that education was used as an indicator of SES-while in our study income turned out to be most important factor.

It is of interest that SES and ethnicity have only a weak association with Type-D personality and hostility. It is probable that personality traits tend to be more stable and persistent than psychological well-being or vital exhaustion and thus could be less likely influenced by SES or ethnicity. Factors such as genetic predisposition or influences during development might be more important in the causal pathway in this case, as indicated in the literature (17, 18). However, it is probable that personality traits such as Type D mediate both adequate and inadequate coping behavior, thus creating via coping mechanisms higher emotional distress (depression, exhaustion) which have impacts on CHD prognosis.

Gender differences were not the main focus of the study. However, we controlled our analyses for this variable and gender was found to play an important role with regard to vital exhaustion: socioeconomic differences were more salient among men than among women with regard to this psychosocial factor. As we proposed in Chapter 5, the pathway mechanisms between socioeconomic status and psychosocial factors influencing CHD might be different among males and females. For instance, males seem to be more susceptible to a loss of status, and also differences in psychosocial distress perception and coping strategies are probable between men and women.

8.3. Strengths and limitations of the study

One of the strengths of the present study is the fact that we were able to obtain a rather high response in a sample representative for Eastern Slovakia among such a difficult to reach group as Roma patients with coronary heart disease.

Another positive aspect of the study is that besides cross-sectional data, we also obtained longitudinal data, which allowed us to assess whether psychological factors and socioeconomic status predict a change in the quality of life among patients with coronary heart disease during their recovery process after an invasive coronary procedure (PTCA, CABG). Identifying factors which influence a positive or negative change in quality of life is of high relevance in the context of the increasing number of patients dealing with chronic conditions such as coronary heart disease, which pervasively influence their lives.

With regard to ethnic inequalities in coronary heart disease, the question often arises to which extent ethnic differences might be influenced

by the poor socioeconomic position of the minority ethnic groups. The design of the present study allowed us to distinguish ethnic vs. SES inequalities in quality of life and psychological factors among coronary patients due to our matching of Roma and non-Roma participants by socioeconomic status, and as a consequence to be able to contribute to this important, but somehow neglected area of research.

One of the aspects which might be perceived as both a strength and a limitation is the quite broad definition of psychosocial characteristics in this study. This allowed us to focus on a wide range of factors (including psychological well-being, anxiety, depression, vital exhaustion, hostility, Type-D personality, health related quality of life). However it also makes it more difficult to integrate and interpret the associations that we found between socioeconomic status/ethnicity, psychosocial factors and coronary heart disease. This clearly deserves additional study.

Due to the use of self-reported questionnaires for measuring of some of the variables, information bias may have occurred. However, several studies support the validity of self-reported indicators of health. They have been shown to be important predictors of mortality and morbidity data among patients with chronic disease, and particularly with the coronary heart disease (19,20,21,22).

As El Baz et al. conclude, in a large number of studies focusing in clinical pathways of diseases, controlling for the possible confounders is missing (23). We controlled for some demographic variables (age, gender), and the possible effect of objective health status on association was controlled in statistical analyses by adding in medical variables (i.e. disease severity, ejection fraction, functional status). We can not exclude that some confounding has remained though.

Moreover, our results might be biased by other factors, like access to treatment or diagnostic procedures, e.g. a selection bias might be present. We collected data among all patients coming for coronary angiography in the East Slovakian Institute for Cardiac and Vascular Diseases as scheduled by their local cardiologist, but we did not collect data among all patients from cardiology out-patient clinics. Thus, we were not able to record a possible selection bias by SES in the referral procedure from the local cardiologist by which patients are scheduled for coronary angiography CAG. However, we do not expect a significant selection bias in attending this medical center. Due to the system of health insurance coverage in Slovakia, SES inequalities in the access to the standard medical care (access to the hospitals and diagnostic/ treatment procedures) are still less pronounced. The fact that our sample came only from a population of patients with CHD indicated for coronary angiography implies that our results cannot be generalized to the whole population of coronary patients but only to the subsample referred for CAG. Also, other potential confounding factors might play a role in this context, including both

internal resources of the individual (coping mechanisms) and external factors (social support, family situation). The other important fact is that because of the backward social position of Roma, some of them may not have reached cardiology care and thus have died without reaching care, or may have reached the specialized cardiology treatment relatively late. Such a selection bias occurring would have led to the Roma being in a worse condition on average, which might have consequences for our findings – some of the differences between Roma and non-Roma could be accentuated not by the specific ethnic-related factors (or socioeconomic position), but by the worse medical status of Roma patients compared to non-Roma. However, we hope that we were able to partially prevent this bias by controlling for the effect of the disease severity in our analysis.

One possible limitation that also needs to be mentioned is the relatively small number of female patients with high socioeconomic position, which might have influenced our results in SES and gender differences regarding vital exhaustion. The small proportion of women with high SES compared to men is quite characteristic for the population of women in this age group in the Slovak population. Also the small size of Roma sample might account for a part of the results with regard to the effects of ethnicity on psychological outcomes and HRQL. However, the number of Roma patients in study (38 from 399 interviewed patients- 9.5%) is quite characteristic for the population in Slovakia.

8.4. Implications of our findings

8.4.1. Implications for future research

Our study has shown that psychosocial factors related to CHD (especially depression, vital exhaustion), and health related quality of life among patients with CHD differ by SES. However, there are still several questions which require further research efforts. We found that socioeconomic status was significantly associated with the health-related quality of life among coronary patients cross-sectionally but not longitudinally. A more comprehensive clarification of the associations between the key SES factors, psychosocial factors and CHD is therefore needed, based on longitudinal data, with special emphasis on how SE inequalities consequently influence the prognosis of CHD. This would provide more insight into the pathway mechanisms and possible mediating or moderating effects. Second, more studies are needed on the association with other important factors in the SES-CHD relationship, such as coping mechanisms and health-related risk behavior; this would provide a more comprehensive explanatory model.

Moreover, research should be focused not only on well-known risk factors such as depression, but also on some lesser known psychosocial factors such as Type D and vital exhaustion and their role in the relationship

between coronary heart disease and socioeconomic position. With regard to quality of life, as Swenson & Clinch (24) have pointed out, HRQL for the general population is not well known in all countries, including Slovakia. Thus, it is hard to decide to what extent quality of life among patients with coronary heart disease is different from the general population, showing the need for data on quality of life among community samples of non-patients.

With regard to ethnicity, it would be useful to include in future research factors such as living conditions, discrimination, access to the health care and lifestyle in order to clarify the mechanisms that may explain the additional effect of ethnicity on psychosocial outcomes (besides from socioeconomic status). Because of the specific cultural background of the Roma minority and the possible language and intellectual barriers, specific measurement methods and more qualitative oriented approach might add.

The present study is an example of a multidisciplinary-oriented research effort, as the key constructs (coronary heart disease, socioeconomic position/ethnicity, and psychological factors) represent different scientific fields. Including psychosocial factors in CHD research and treatment has quite a long tradition, but there is still some controversy in this approach. Frohlich (25) proposed that some of the problems are due to conceptual and methodological confusion between psychological and sociological theories when explaining, for instance, health-related behavior. However, it seems that it is needed to pay attention to both: psychological theories that help us understand some of the psychological reasons for an individual's behavior, and sociological theories which try to explain why certain groups of people tend to engage in certain health behaviors more than others (25). Integration of these two approaches could be useful in this case, and psychology might play a significant role in this context. But to achieve this, it would be necessary to pay far more attention to the topics related to mind-body interactions (the mechanisms of interaction among biological, behavioral, cognitive, sociocultural and environmental contributions to disease and health). Knowledge of "mind-body" interaction has largely accrued through multidisciplinary research in new fields such as psycho-neuro-endocrinology or behavioral medicine. Hence, greater attention must be paid to the mechanisms of mind-body interaction, and more attention to strengthening multidisciplinary research and care (26).

8.4.2. Implications for public health interventions and patient care

The fact that significant socioeconomic differences have been found in quality of life and psychological well being or exhaustion levels among patients who already have been diagnosed with coronary heart disease has important implications for public health practice. Socioeconomic position in particular should be taken into account when targeting

accordingly adapted intervention strategies aimed at enhancing a patient's quality of life. This also applies to psychosocially oriented intervention strategies among coronary patients. Such interventions have yielded quite inconsistent results regarding the improvement of medical indicators (such as the number of re-infarctions, revascularization), but they reported significant improvement in many aspects of quality of life among patients (27,28,29,30). Moreover, interventions aimed at risk behavior modification should be targeted at lower socioeconomic groups of the population and should take into account the higher incidence of risk psychological factors (depression, exhaustion) among patients with a lower socioeconomic position.

Another important implication from the present study is that ethnicity-specific factors among coronary patients should be taken into account. The adverse health-related quality of life, psychological well-being and vital exhaustion found among Roma coronary patients may warrant additional care. This care should target their low SES, but also other factors related to their ethnic background, such as culture and living conditions. Regarding this, Roma patients may warrant a personalized intervention (respecting their cultural background) when enhancing their quality of life.

The need for a socioeconomic perspective for research and practice in the field of cardiovascular disease is becoming more evident also with respect to the increasing costs for treatment within the system of medical care; cost-effective results should be integrated in interventions in this field in which an integrative approach, including psychological and socioeconomic factors, appears to be effective (31,32,33).

8.5. Conclusion

The focus of this thesis was on a less explored field of the research: socioeconomic/ethnic inequalities in psychosocial factors and quality of life among patients diagnosed with coronary heart disease. Research in this field is generally lacking, especially in the countries of Central and Eastern Europe. Moreover, psychosocial predictors of quality of life in CHD are a somewhat overlooked topic, and even less is known about the issue of Roma coronary patients and their quality of life or mental state (34,35). The results of our study support the idea of the existence of significant SES and ethnic inequalities in psychosocial factors, in particular psychological well-being and vital exhaustion, which are significant factors contributing to a worse prognosis and lower quality of life among patients with coronary heart disease. Our findings also bring more insight into the predictors of health-related quality of life, as we found that socioeconomic position was associated with quality of life among CHD patients on cross-sectional level, but that longitudinally psychological variables (depression,

vital exhaustion) were more significant predictors of the patient's quality of life than socioeconomic status. We hope that this thesis will contribute to emphasizing the importance of an integrative approach to coronary heart disease, including both traditional biomedical risk factors, as well as psychosocial factors, which contribute to the prognosis of coronary heart disease.

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Summary

Research in the field of socioeconomic inequalities in coronary heart disease (CHD) has significantly increased during recent decades. Socioeconomic and ethnic inequalities in coronary heart disease have been shown in the occurrence of CHD risk factors, as well as in the CHD prognosis and mortality. Also the importance of psychosocial factors in the aetiology and prognosis of CHD has already been well established. However, socioeconomic (SES) and ethnic inequalities in quality of life and psychosocial factors among patients with diagnosed CHD has been less often studied. If such inequalities in quality of life exist, it would be highly important to take socioeconomic and ethnic factors into account also when targeting accordingly adapted intervention strategies aimed at enhancing the quality of life of patients.

The most common way of understanding the pathway mechanisms of CHD is that SES and psychological factors influence coronary heart disease as independent factors. However, the focus of this thesis is on an indirect pathway mechanism- i.e. how SES influences CHD via psychosocial mechanism (higher occurrence of psychological risk factors in low SES settings consequently influencing CHD). The relationship between SES, ethnicity, psychosocial factors and CHD is a complex one and includes several pathways and a number of mediating factors: lifestyle, access to health care, social environment, psychosocial factors and stress situations. Recognizing the complexity of the proposed associations, we limited our focus within this thesis to one element of these relationships, thus the aim of the thesis is to explore the association between socioeconomic position/ ethnicity and psychosocial factors/ quality of life in CHD.

At the end of the Chapter 1 four research questions are formulated. They concerned the available evidence about socioeconomic gradient in the occurrence of psychosocial factors among CHD patients (Chapter 3), SES inequalities in psychosocial factors among CHD patients (Chapter 4 and 5), on ethnic inequalities in psychosocial factors and quality of life among CHD patients (Chapter 6), and psychosocial predictors of change in cardiac health related quality of life (Chapter 7).

In Chapter 2 participants in the study and the measures used within the thesis are described. A personal interview was performed with 399 patients referred for coronary angiography (CAG) between 2004 and 2007. Data collection consisted of three waves: cross sectional (time point T0), and longitudinal (point T1- 3 to 6 months after the CAG, and point T2- 12 to 24 months after the CAG). The response rate was higher than 90% in the first wave and more than 60% in the longitudinal waves (T1 and T2). One

third of the participants were women, and 9.5% were Roma. The central dependent variables were the indicators of psychological well-being, vital exhaustion and health-related quality of life, while independent variables were socioeconomic status (income, education), ethnicity (Roma vs. non Roma) and medical characteristics (indicating the severity of disease).

Chapter 3 consists of a review of the studies on socioeconomic differences in CHD risk factors showing that socioeconomic status (education, occupation, income) was adversely associated with psychosocial factors that contribute to CHD. With regard to hostility and depression, the socioeconomic gradient was significant in all the reviewed studies. Available studies also showed a similar SE gradient in other factors: social support, perception of health and lack of optimism. Results related to anger and perceived stress were less consistent.

Socioeconomic status (SES) was found to be negatively associated with psychological outcomes and perceived quality of life among CHD patients in Chapters 4 and 5. Participants with a low income or education were more likely to have a poor psychological well-being, poor perceived mental health status and a low perceived quality of life compared to participants with high income or education. Patients with low SES were also more likely to report higher vital exhaustion, but these SES differences were significantly more salient among men than among women. Associations between SES and psychological factors remained statistically significant after controlling for the effect of medical variables.

Chapter 5 deals with the ethnic inequalities found among Roma and non/Roma CHD patients. In psychological well-being (anxiety, depression), vital exhaustion and health-related quality of life Roma patients scored worse compared to non-Roma. With regard to personality characteristics, ethnicity played a less significant role. We also found that some of these differences could be explained by the socioeconomic status of the Roma participants.

In Chapter 6 it is shown that psychological well-being and vital exhaustion were significant predictors of positive change in health-related quality of life (HRQL) among CHD patients. The change in the physical HRQL was predicted by baseline psychological well-being and baseline HRQL. The change in the mental HRQL was predicted by (baseline) psychological well-being, vital exhaustion and baseline HRQL. However, these factors were significant only among patients who improved in health-related quality of life, and not among those who remained stable or declined in their HRQL. Socioeconomic status and personality traits (Type D, hostility) were not identified as significant predictors of change.

In the last chapter, overall results are discussed and implications for future research and practice are indicated. The results of the present thesis provide support for the theoretical model proposed in the introduction—strong socioeconomic and ethnic inequalities were found in psychosocial

factors which are significantly contributing to worse prognosis and lower quality of life among CHD patients. Our findings also provide more insight into the predictors of health-related quality of life: we found that socioeconomic position was associated with quality of life on a cross-sectional level, but longitudinally psychological variables (depression, vital exhaustion) were more significant predictors of the patient's quality of life than SES.

One of the merits of the present study is its focus on a less explored field of the research: SES inequalities in psychosocial factors and quality of life in CHD. Data on these inequalities are lacking particularly in the countries of Central and Eastern Europe. The rather high response rate in a sample representative for a region and a difficult to reach group such as the Roma is another positive aspect. Longitudinal data analysis (in Chapter 7) and the matching of the Roma and non-Roma participants by socioeconomic status (in Chapter 6) are methodological strengths as well. Some of the limitations include the fact that our sample comes only from a population of CHD patients indicated for coronary angiography, thus results cannot be generalized to the whole population of CHD patients. The relatively low number of participants in the group of the Roma and in high SES women group, as well as the quite broad definition of psychosocial characteristics in the study, are possible limitations as well.

Future research studies should also focus on the association with other important factors in the SES-CHD relationship, which appear to be, for instance, coping mechanisms or health risky behaviour. A more comprehensive clarification of the associations between the key factors like SES, psychosocial factors and CHD would be also useful, based on longitudinal data. Moreover, not only well-known CHD risk factors such as depression should be explored, but also some lesser known (Type D, vital exhaustion) and their role in relationship between CHD and SES.

The present study also has important implications for care: it is needed to take socioeconomic position into account not only when planning the prevention strategies, but also when designing suitably adapted interventions focusing on improving of quality of life among coronary patients. These intervention strategies should especially pay attention to the higher incidence of psychological risk factors (depression, exhaustion) among patients with lower SES. Also, the adverse HRQL, psychological well-being and vital exhaustion found among Roma patients may warrant additional care. Such care should target their low SES, but also other factors related to their ethnic background, such as culture and living conditions.

We hope that this thesis will contribute to emphasizing the importance of an integrative approach to coronary heart disease, including both traditional biomedical risk factors, as well as the psychosocial factors which contribute to coronary heart disease.

Samenvatting

Onderzoek op het terrein van sociaal-economische verschillen en coronaire hartziekten (CHZ) is gedurende de afgelopen decennia significant gegroeid in omvang. Dit onderzoek laat sociaal-economische en etnische verschillen zien in de incidentie van CHZ, en ook in de prognose van en mortaliteit aan CHZ. Ook is het belang van psychosociale factoren in de etiologie en prognose van CHZ verduidelijkt. Echter, sociaal-economische en etnische verschillen in levenskwaliteit en psychosociale factoren bij patiënten met gediagnosticeerde CHZ zijn veel minder vaak onderzocht. Als zulke verschillen in levenskwaliteit bestaan, is het uitermate belangrijk zijn om rekening te houden met sociaal-economische en ethische factoren, ook bij het inzetten van interventiestrategieën die tot doel hebben de levenskwaliteit van zulke patiënten te verbeteren.

De meest gebruikelijke interpretatie van het werkingsmechanisme van CHZ in dit kader is dat sociaal-economische status (SES) en psychosociale factoren als onafhankelijke factoren de coronaire hartziekte beïnvloeden. Dit proefschrift richt zich echter op een ander, indirect werkingsmechanisme: hoe sociaal-economische status CHZ beïnvloedt via psychosociale mechanismen, d.w.z. dat een frequenter voorkomen van psychologische risicofactoren in een populatie met een lage SES vervolgens CHZ beïnvloedt. Het verband tussen SES, etniciteit, psychosociale factoren en CHZ is zeer complex en omvat verschillende werkingsmechanismen en een aantal mediërende factoren: leefstijl, toegang tot gezondheidszorg, sociale omgeving, psychosociale factoren en stresserende situaties. Vanwege de complexiteit van deze mogelijke verbanden, beperkten we ons in dit proefschrift tot een onderdeel daarvan. Het doel van dit proefschrift is daarom het verband te verkennen tussen socio-economische positie / etniciteit en psychosociale factoren / levenskwaliteit bij CHZ.

Aan het eind van Hoofdstuk 1 worden vier onderzoeksvragen geformuleerd. Ze zijn achtereenvolgens gericht op de beschikbare aanwijzingen voor een socio-economische gradiënt in het voorkomen van psychosociale factoren bij patiënten met CHZ (Hoofdstuk 3), op sociaal-economische verschillen in psychosociale factoren bij patiënten met CHZ (Hoofdstuk 4 en 5), op etnische verschillen in psychosociale factoren en levenskwaliteit bij patiënten met CHZ (Hoofdstuk 6), en op psychosociale voorspellers van verandering in levenskwaliteit na een cardiologische behandeling (Hoofdstuk 7).

In Hoofdstuk 2 worden de deelnemers aan het onderzoek en de meetinstrumenten die in het proefschrift gebruikt worden, beschreven. Van 399 patiënten die tussen 2004 en 2007 verwezen waren voor coronair

angiografie (CAG) werden door middel van een interview data verkregen. De dataverzameling vond plaats op drie momenten in de tijd: cross-sectioneel op T0, en longitudinaal op T1 (3 tot 6 maanden na CAG) en T2 (12 tot 24 maanden na CAG). De response was op T0 ruim 90%, en op T1 en T2 ruim 60%. Een derde van de respondenten was vrouw, en 9,5% was Roma. De centrale afhankelijke variabelen waren indicatoren van psychisch welbevinden, vitale uitputting, en gezondheidsgerelateerde levenskwaliteit, terwijl de onafhankelijke variabelen sociaal economische status (inkomen, opleiding), etniciteit (Roma vs. non-Roma) en medische kenmerken (maten voor de ernst van de ziekte) waren.

De review in Hoofdstuk 3 die sociaal-economische verschillen in risicofactoren voor CHZ beschrijft, laat zien dat er een omgekeerd verband bestaat tussen sociaal-economische status (opleiding, beroep, inkomen) en psychosociale factoren die bijdragen aan CHZ. Wat betreft vijandigheid en depressie was de sociaal economische gradiënt significant in alle onderzochte studies. De beschikbare studies laten ook een dergelijke sociaal economische gradiënt zien voor andere factoren: sociale steun, ervaren gezondheid en gebrek aan optimisme. De resultaten met betrekking tot woede en ervaren stress waren minder consistent.

De Hoofdstukken 4 en 5 laten zien dat er een negatief verband bestaat tussen sociaal-economische status (SES) enerzijds en psychologische uitkomstmaten en ervaren levenskwaliteit bij patiënten met CHZ anderzijds. Respondenten met een laag inkomen of een lage opleiding hebben een grotere kans op een slecht psychisch welbevinden, een als slecht ervaren psychische gezondheid en een lage ervaren levenskwaliteit in vergelijking met patiënten met een hoog inkomen of een hoge opleiding. Patiënten met een lage SES achtergrond hebben ook een grotere kans om een hogere vitale uitputting te rapporteren, maar deze sociaal-economische verschillen waren duidelijker zichtbaar bij mannen dan bij vrouwen. De gevonden verbanden tussen SES en psychische factoren bleven statistisch significant, ook na het verdisconteren van het effect van medische variabelen.

In Hoofdstuk 5 wordt ingegaan op de etnische verschillen tussen Roma en non-Roma patiënten met CHZ. Met betrekking tot psychisch welbevinden (angst, depressie), vitale uitputting en gezondheidsgerelateerde levenskwaliteit scoren Roma patiënten slechter dan non-Roma. Met betrekking tot persoonlijkheidskenmerken speelt etniciteit een minder belangrijke rol. Sommige van deze verschillen kunnen worden verklaard door de sociaal-economische status van de respondenten.

Hoofdstuk 6 laat zien dat psychisch welbevinden en vitale uitputting significante voorspellers zijn van een positieve verandering in gezondheidsgerelateerde levenskwaliteit (HRQL) bij CHZ patiënten. De verandering in fysieke HRQL wordt voorspeld door het psychisch

welbevinden bij de nulmeting en de HRQL bij de nulmeting. De verandering in de mentale HRQL wordt voorspeld door het psychisch welbevinden en de vitale uitputting bij de nulmeting en de HRQL bij de nulmeting. Deze voorspellers zijn echter alleen significant bij patiënten bij wie de HRQL verbeterde, en niet bij degenen die stabiel bleven of verslechterden met betrekking tot hun HRQL. Sociaal-economische status en persoonlijkheidskenmerken (Type D, vijandigheid) bleken geen significante voorspellers van verandering te zijn.

In het laatste hoofdstuk worden de bevindingen besproken en worden de implicaties ervan aangegeven voor toekomstig onderzoek en voor de praktijk. De resultaten van dit proefschrift ondersteunen het in de Inleiding gepresenteerde theoretisch model: er werden sterke sociaal-economische en etnische verschillen gevonden met betrekking tot psychosociale factoren die significant bijdragen aan een slechte prognose en lagere levenskwaliteit bij patiënten met CHZ. Onze bevindingen verschaffen ook meer inzicht in voorspellers van gezondheidsgerelateerde levenskwaliteit: in cross-sectioneel onderzoek bleek de sociaal-economische positie gerelateerd te zijn aan levenskwaliteit, maar in longitudinaal onderzoek bleken psychologische variabelen (depressie, vitale uitputting) van groter belang voor de levenskwaliteit van de patiënt dan SES.

Een van de verdiensten van deze studie is dat deze is gericht op een weinig onderzocht onderzoeksterrein: sociaal-economische verschillen in psychosociale factoren en levenskwaliteit bij patiënten met CHZ. Dergelijk onderzoek ontbreekt in de Centraal en Oost Europese landen. De tamelijk hoge respons in een steekproef die representatief is voor een regio en een moeilijk te bereiken groep omvat als de Roma is een ander positief aspect van deze studie. Andere methodologisch sterke punten zijn de longitudinale analyses in Hoofdstuk 7 en de matching van Roma en non-Roma. Een beperking van deze studie is dat de steekproef gebaseerd is op een populatie CHZ patiënten die een indicatie had voor coronair angiografie. De resultaten kunnen daardoor niet gegeneraliseerd worden naar de totale populatie van CHZ patiënten. Het verhoudingsgewijze beperkte aantal Roma en vrouwen met een hoge SES in de steekproef en de brede definitie van psychosociale kenmerken in het onderzoek vormen andere potentiële beperkingen van dit onderzoek.

Toekomstig onderzoek zou moeten zijn gericht op andere factoren die bijdragen aan de relatie tussen SES en CHZ, zoals bijvoorbeeld coping mechanismen of riskant gezondheidsgedrag. Een meer omvattende verklaring van de verbanden tussen de sleutelvariabelen zoals SES, psychosociale factoren en CHZ gebaseerd op longitudinale data zou zeer welkom zijn. Daarbij zouden niet alleen bekende CHZ risicofactoren als depressie moeten worden onderzocht, maar ook minder bekende (Type D, vitale uitputting) en hun rol in het verband tussen CHZ en SES.

Het huidige onderzoek heeft ook belangrijke implicaties voor het zorgproces: het is van belang rekening te houden met sociaal-economische positie, niet alleen bij de ontwikkeling van preventiestrategieën, maar bij het opzetten van interventies die zijn gericht op het verbeteren van de levenskwaliteit van patiënten met CHZ. Zulke interventiestrategieën zouden in het bijzonder rekening moeten houden met het vaker voorkomen van psychische risicofactoren (depressie, uitputting) bij patiënten met een lage SES. Ook vraagt de verhoudingsgewijs slechtere levenskwaliteit, psychisch welbevinden en vitale uitputting van Roma om aanvullende zorg. Zulke zorg zou zich moeten richten op hun lage SES, maar ook op andere factoren die verband houden met hun etnische achtergrond, zoals hun cultuur en hun woon- en leefsituatie.

Wij hopen dat dit proefschrift eraan zal bijdragen om het belang zichtbaar te maken van een geïntegreerde benadering van coronaire hartziekten. In die benadering moet zowel plaats zijn voor de klassieke biomedische risicofactoren als voor de psychosociale factoren die bijdragen aan coronaire hartziekten.

Zhrnutie

V posledných desaťročiach sa výrazne rozvíja výskum v oblasti socio-ekonomického kontextu ischemickej choroby srdca (ICHS). Boli nájdené významné rozdiely vo výskyte rizikových faktorov ICHS, a tiež v prognóze a úmrtnosti pacientov z hľadiska socio-ekonomického zázemia a etnickej príslušnosti. Takisto významná úloha, ktorú zohrávajú psychosociálne faktory v etiológii a prognóze ICHS bola dostatočne preukázaná. Socio-ekonomické a etnické nerovnosti v kvalite života a psychickom zdraví pacientov s diagnostikovanou ICHS sú však skúmané omnoho zriedkavejšie. Pritom pokiaľ by sa takéto rozdiely potvrdili, bolo by potrebné brať socio-ekonomické a etnické faktory do úvahy ako významný činiteľ aj pri správnom a efektívnom zacielení intervencií, ktoré si kladú za úlohu dosiahnuť zlepšenie kvality života pacientov.

Často sa predpokladá, že socio-ekonomické postavenie a psychologické faktory ovplyvňujú ischemickú chorobu srdca ako *nezávisle pôsobiace* činitele. Ako však poukazuje integratívny prístup k ICHS, je omnoho pravdepodobnejšie že medzi týmito faktormi existujú komplexné vzájomné prepojenia. Zámerom tejto práce je poukázať na nepriamy mechanizmus pôsobiaci medzi spomínanými faktormi- a to že socio-ekonomické postavenie ovplyvňuje ICHS aj *prostredníctvom* psychologických faktorov (vyšší výskyt psychologických rizikových faktorov v znevýhodnených socio-ekonomických podmienkach pôsobí následne na vyššie riziko ICHS). Vzťahy medzi socio-ekonomickými a psychologickými faktormi a ICHS sú komplexné a zahŕňajú viacero mechanizmov a množstvo pôsobiacich činiteľov, ako napr. životný štýl, dostupnosť zdravotnej starostlivosti, sociálne prostredie, psychosociálne faktory, stres. Berúc do úvahy komplexnosť týchto prepojení, sústredili sme sa v tejto práci na určitú časť vzťahov: na spôsob, akým ovplyvňuje socio-ekonomická pozícia a etnicita psychosociálne faktory ischemickej choroby srdca a kvalitu života pacientov.

Na konci prvej kapitoly sú formulované štyri výskumné okruhy, zaoberajúce sa otázkou či jestvujú dôkazy v odbornej literatúre o socio-ekonomickom gradiente vo výskyte psychosociálnych rizikových faktorov medzi pacientmi s ICHS (Kapitola 3), takisto skúmajúce socio-ekonomické nerovnosti v týchto faktoroch v konkrétnej skupine pacientov s ICHS (Kapitola 4 a 5), etnické rozdiely v kvalite života a psychologických faktoroch ICHS medzi pacientmi (Kapitola 6) a psychosociálne prediktory zmeny v kvalite života pacientov s ischemickou chorobou srdca (Kapitola 7).

Charakteristika meracích nástrojov a účastníkov výskumu je obsiahnutá v Kapitole 2. Výskumného rozhovoru sa zúčastnilo 399

pacientov odporučených na koronarografické vyšetrenie (CAG) v rokoch 2004-2007, zber dát prebiehal v troch vlnách: prierezový zber dát (T0) a longitudinálny (T1- 3 až 6 mesiacov po CAG, a T2- 12 až 24 mesiacov po CAG). Viac ako 90% oslovených pacientov súhlasilo s účasťou v prvej vlne výskumu a približne 60% v longitudinálnych vlnách; tretinu zúčastnených tvorili ženy, a 9, 5% pacienti z rómskeho etnika. Hlavnými závislými premennými boli ukazovatele psychickej pohody, vitálnej exhauscie (syndrómu vyčerpania) a kvality života, zatiaľ čo nezávislými premennými boli socio- ekonomický status (vzdelanie, príjem), etnicita (rómska vs. nerómska) a medicínske ukazovatele (závažnosť ochorenia).

V Kapitole 3 je prezentované review výskumných štúdií opisujúcich socio- ekonomické rozdiely v psychosociálnych rizikových faktoroch ICHS, ktoré ukázalo že nízky socio- ekonomický status (vzdelanie, príjem, zamestnanie) súvisel s psychosociálnymi faktormi prispievajúcimi k ICHS. Tento vzťah bol významný vo všetkých skúmaných článkoch v prípade hostility a depresie. Skúmané štúdie ukázali podobný trend aj v iných faktoroch: sociálnej opore, subjektívnom hodnotení zdravia a nedostatku optimizmu. Výsledky v prípade hnevu a stresových situácií boli menej konzistentné.

Socio- ekonomický status bol negatívne spojený s úrovňou psychologických ukazovateľov a kvality života pacientov s ICHS v Kapitole 4. a 5. Medzi pacientmi s nízkym príjmom a vzdelaním bola vyššia pravdepodobnosť nízkej úrovne psychickej pohody, horšieho subjektívne vnímaného zdravotného stavu a nižšej kvality života v porovnaní s účastníkmi s vyšším vzdelaním a príjmom. Pacienti s nízkym socio- ekonomickým statusom takisto s väčšou pravdepodobnosťou pociťovali vyššiu hladinu vitálnej exhauscie (vyčerpania)- a tieto rozdiely boli významnejšie medzi mužmi než medzi ženami. Vzťahy medzi socio- ekonomickým statusom a psychologickými faktormi boli štatisticky významné aj pri kontrolovaní pre efekt medicínskych premenných.

Kapitola 5 sa zaoberá etnickými rozdielmi medzi rómskymi a nerómskymi pacientmi s ICHS: Rómovia mali horšie hladiny psychickej pohody (úzkosť, depresia), vitálnej exhauscie (vyčerpania) a kvality života ako nerómski pacienti. V prípade osobnostných charakteristík, etnicita hrala menšiu úlohu. Bolo však tiež preukázané, že časť týchto rozdielov môže byť štatisticky vysvetlená socio- ekonomickým postavením.

Kapitola 6. sa zameriava na psychickú pohodu a vitálnu exhausciu ako významné prediktory pozitívnej zmeny, teda zlepšenia kvality života pacientov s ICHS. Pozitívna zmena vo fyzickej dimenzii kvality života pri kontrolnom vyšetrení bola signifikantne predikovaná úrovňou psychickej pohody a kvality života pri prvom vyšetrení, v psychickej dimenzii úrovňou psychickej pohody, vitálnej exhauscie a kvality života pri prvom vyšetrení. Avšak úroveň týchto premenných nesúvisela so zmenou pri zhoršení v kvalite života. Socio- ekonomický status a osobnostné

premenné sa neukázali ako významné prediktory zmeny kvality života u pacientov s ICHS.

Posledná kapitola prezentuje všeobecné závery a diskusiu výsledkov, takisto ako implikácie pre prax a ďalší výskum. Výsledky tejto štúdie poskytujú dôkazy podporujúce platnosť teoretického modelu prezentovaného v úvodnej časti práce- boli zistené výrazné socio-ekonomické a etnické rozdiely v kvalite života a výskyte psychosociálnych faktorov prispievajúcich k horšej prognóze pacientov s ICHS. Výsledky takisto objasňujú niektoré prediktory kvality života: je zaujímavé že socio-ekonomický status bol významne spojený s kvalitou života pri analýze prierezných dát, ale na longitudinálnej úrovni sa psychologické faktory (depresia, vitálna exhauscia), ukázali ako významnejšie prediktory kvality života pacientov.

Jedným z pozitívnych aspektov štúdie je fakt, že sa sústreďuje na málo preskúmanú oblasť výskumu, chýbajúcu najmä v oblasti Strednej a Východnej Európy. Takisto vysoké percento účasti pacientov vo vzorke reprezentatívnej pre daný región a obzvlášť v skupine rómskych pacientov, je pozitívom. Metodologickými prednosťami výskumu sú aj longitudinálna analýza dát (Kapitola 7) a štatistické „párovanie“ (matching) rómskych a nerómskych pacientov (Kapitola 8). Medzi metodologické limity výskumu patrí fakt, že do štúdie boli zaradení len pacienti odporučení na koronarografiu, a tak sa výsledky štúdie nedajú zovšeobecniť na celú populáciu pacientov s ICHS. Pomerne malý počet účastníkov v skupine rómskych pacientov a v skupine žien s vysokým socio- ekonomickým statusom je takisto možným metodologickým nedostatkom.

Ďalšie štúdie v tejto oblasti by mali sústrediť pozornosť aj na ostatné faktory ovplyvňujúce vzťah medzi socio- ekonomickým statusom a ICHS- napríklad na mechanizmy zvládania stresu a rizikové faktory životného štýlu. Užitočné by bolo aj pokračovanie v podrobnejšom objasnení vzťahov medzi kľúčovými faktormi: socio- ekonomickým statusom, psychosociálnymi faktormi a ICHS, založené najmä na longitudinálnych porovnaníach. Pozornosť by sa okrem toho mala sústrediť nielen na známe rizikové faktory ako je depresia, ale aj na menej známe faktory (Typ D, vitálna exhauscia) a ich úlohu vo vzťahu medzi socio- ekonomickým statusom a ICHS.

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Zuzana Škodová was born on February 5th, 1981, in Martin, Slovakia. In 2004 she defended her Master dissertation (An integrative approach to the risk factors in cardiovascular diseases) at the Department of Psychology, Faculty of Arts of the University of Presov.

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