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## Coronary heart disease from a psychosocial perspective

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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).

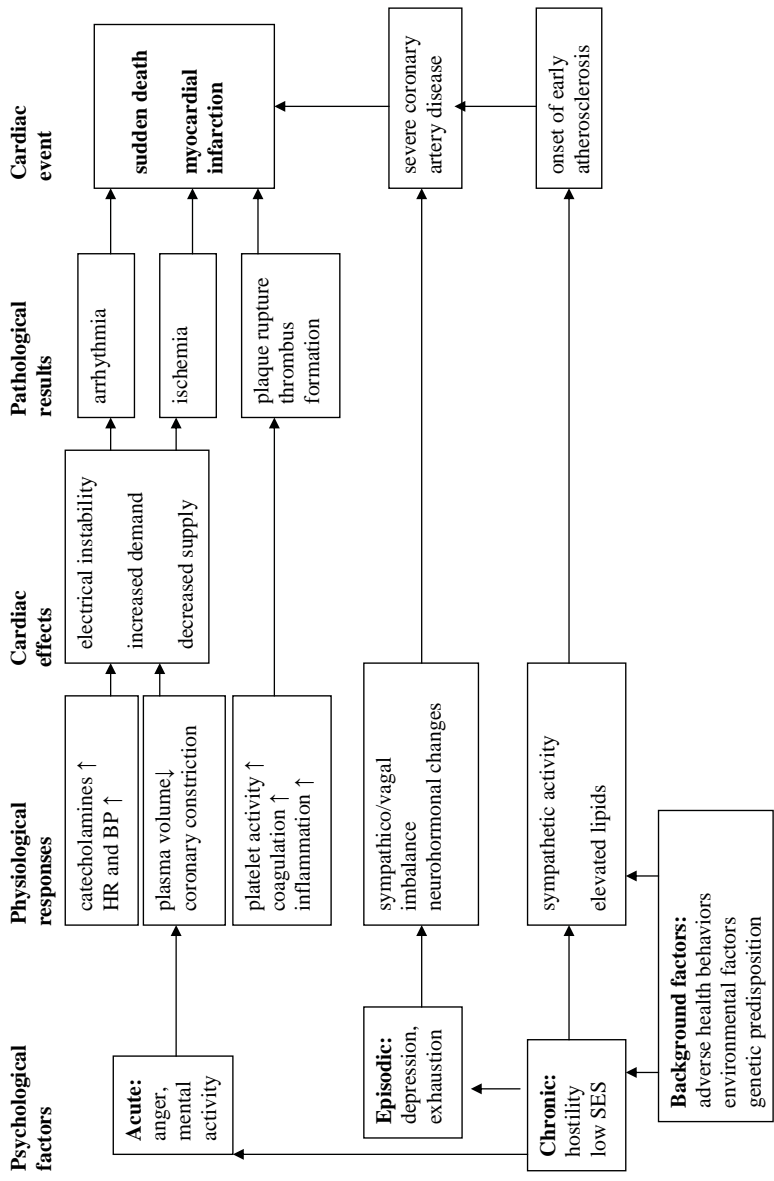
The perception of CHD, its treatment and prevention have changed considerably over the last few decades. Halfway through the last century, health was perceived from a mechanistic biomedical viewpoint, and very small importance was given to psychosocial factors. Since then a large amount of attention 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  $\geq 1.50$  and  $< 2$ )

++ strong association (relative risk  $\geq 2$ )

## 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

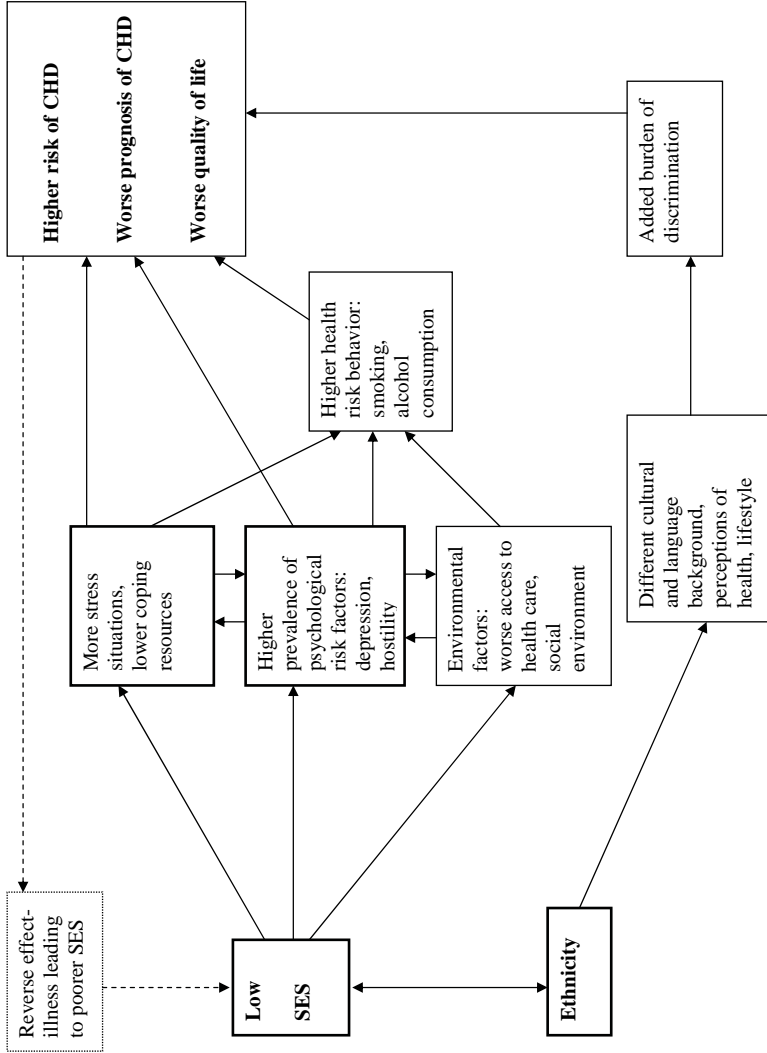
with an already diagnosed disease, thus negatively influencing their overall quality of life.

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 than 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	<p><b>Decreased:</b> functional capacity, impaired left ventricular function, residual myocardial ischemia, arrhythmias,</p> <p><b>Increased:</b> likelihood of AMI, CABG or PTCA, use of cardiac medications (e.g. BB, ACE inhibitors, statins)</p>	<p><b>Increased:</b> anger, depression, emotional stress/distress, vital exhaustion, and sexual dysfunction, job/economic strain</p>
Angina pectoris	<p><b>Decreased:</b> symptom-limited functional capacity (cold exposure, exertion, heavy meal, and emotional triggers)</p> <p><b>Increased:</b> likelihood of CABG or PTCA, use of cardiac medications (e.g. BB, NTG)</p>	<p><b>Increased:</b> depression, emotional stress/distress, anxiety, and sexual dysfunction, job strain</p>
Coronary artery bypass graft surgery	<p><b>Decreased:</b> 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)</p>	<p><b>Increased:</b> depression, emotional stress/distress, anxiety, and sexual dysfunction, job strain/economic strain</p>
Percutaneous transluminal coronary angioplasty	<p>Relatively high likelihood restenosis, repeat PTCA, AMI or CABGS, use of cardiac medications (e.g. BB, statins, NTG)</p>	<p><b>Increased:</b> depression, anxiety, emotional stress/distress</p>

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)

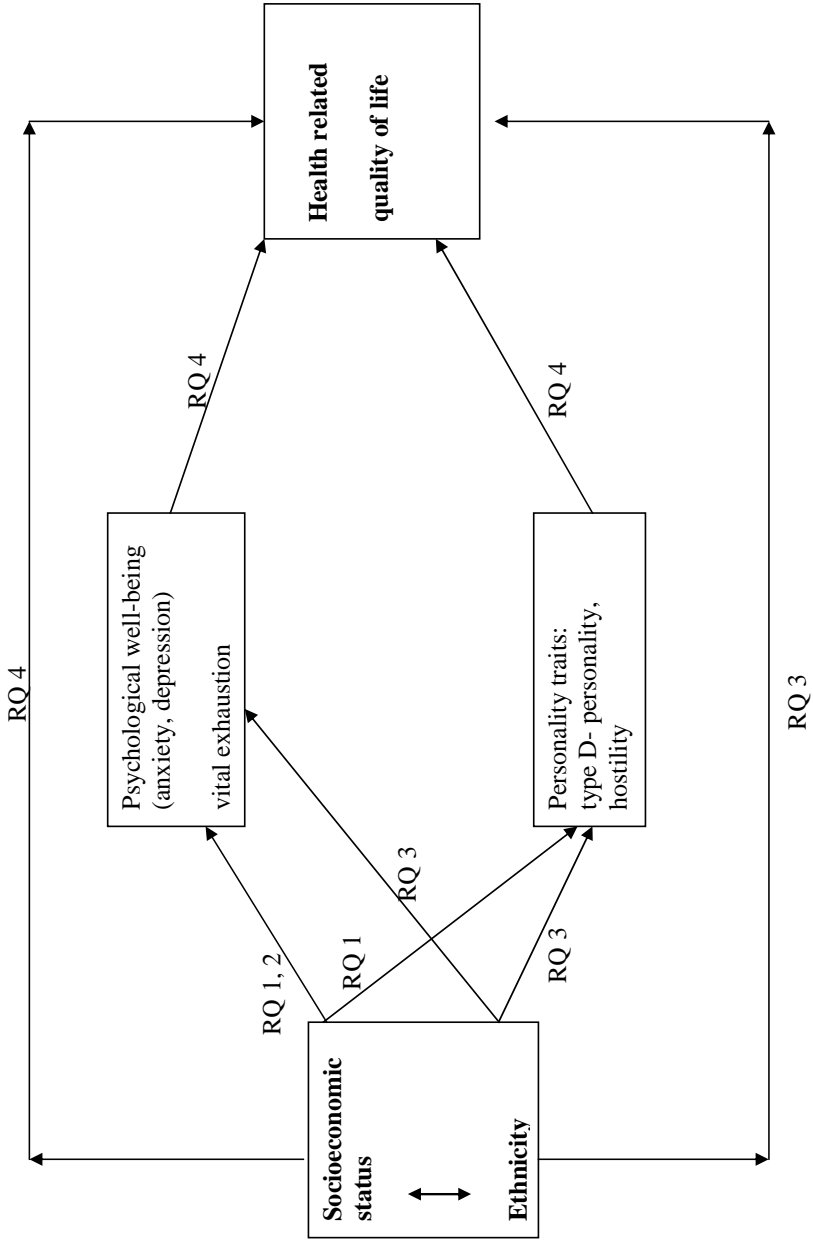
### **Research question 3.**

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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