

University of Groningen

Unraveling the role of sense of coherence in coronary heart disease patients

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Document Version

Publisher's PDF, also known as Version of record

Publication date:

2014

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Silarova, B. (2014). *Unraveling the role of sense of coherence in coronary heart disease patients*. [Thesis fully internal (DIV), University of Groningen]. s.n.

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Chapter 8

General discussion, implications and conclusions

The aim of this study was to explore the role of SOC in CHD patients. It provides evidence on the potential utility of SOC in cardiovascular research, prevention and rehabilitation. Additionally, it examines whether SOC and other psychological factors are part of the pathways explaining ethnic differences in the recurrence of CHD. Possible explanatory factors and confounding variables, such as sex, age, SES and the severity of disease, were taken into account.

In this chapter the main findings of this study are summarized (8.1) and discussed (8.2). Next, the strengths and limitations of this study are addressed (8.3). Finally, we discuss its general implications for practice, as well as for future research (8.4).

8.1 Main findings

The main findings are summarized per research question, as defined in Chapter 1; the number of the chapter that reports the study concerned is provided in parentheses.

Research question 1 (*Chapter 3*)

Is SOC prospectively associated with health-related behaviours among patients with CHD?

We found that SOC was a predictor of non-smoking and quitting smoking 12-28 months after CHD treatment, both crude and adjusted for sociodemographic and clinical characteristics. Furthermore, SOC was a predictor of healthier nutrition behaviour among patients treated with PCI, but not with CABG or pharmacotherapy. We also found an association between SOC and alcohol consumption among patients treated with CABG. However, we did not find an association between SOC and physical activity.

Research question 2 (*Chapter 4*)

Is SOC prospectively associated with mental and physical HRQoL among patients with coronary heart disease?

Baseline SOC was a strong predictor of both mental and physical HRQoL measured at 12-28 months follow-up after CAG, both crude and after adjustment for sociodemographic characteristics. SOC also remained a predictor of mental HRQoL after adjustment for medical characteristics. Furthermore, the pattern of the associations between SOC and mental and physical HRQoL was similar, independent of the time when SOC was measured (the day preceding CAG or 12-28 months after CAG).

Research question 3 (*Chapter 5*)

Does SOC affect the association between hostility and mental and physical HRQoL among patients with coronary heart disease?

High levels of hostility were strongly associated with a worse mental HRQoL and a low SOC in CHD patients, crude and when adjusted for age and sex. In turn, a low SOC was associated with a worse mental HRQoL when adjusted for age and sex. In our study, approximately 60% of the effect of hostility on mental HRQoL was explained via SOC. This may be interpreted as meaning that most of the adverse effect of hostility on low mental HRQoL runs via SOC. High levels of hostility and low levels of SOC were not significantly associated with poor physical HRQoL. Thus, the mediator role of SOC between hostility and physical HRQoL was not further tested.

Research question 4 (*Chapter 6*)

Is there an association between Roma ethnicity and mental and physical HRQoL among patients with CHD? Does hostility affect this association?

We found that Roma ethnicity was associated with worse mental and physical HRQoL, crude and also after adjustment for sociodemographic characteristics. Moreover, Roma were more likely to have increased levels of hostility than non-Roma CHD patients, crude and also after adjustment for sociodemographic characteristics. In turn, hostility was a predictor only of worse MCS in Roma and non-Roma patients. Next, our study confirmed that hostility mediated the relationship between Roma ethnicity and mental HRQoL. Last, higher levels of hostility were not a significant predictor of worse PCS in Roma and non-Roma CHD patients; thus, the association of Roma ethnicity with PCS is not mediated by hostility.

Research question 5 (*Chapter 7*)

Is Roma ethnicity associated with lower SOC and higher levels of anxiety among patients with CHD?

Roma cardiac patients had more anxiety symptoms than non-Roma CHD patients. The association of Roma ethnicity with more anxiety symptoms was present even after adjustment for potential confounding factors, including SES. Roma ethnicity was associated with lower SOC when adjusted for age, sex and functional status among CHD patients. However, in our study, SES explained 19% of the variance in SOC and partly explained the association between Roma ethnicity and SOC.

8.2 Discussion of main findings

The main findings will be discussed within the framework of the general aims, as outlined in Chapter 1. We will focus on various characteristics, such as health-related behaviours, HRQoL and hostility, associated with SOC in patients with CHD. Furthermore, we will focus on the role of Roma ethnicity in the recurrence of CHD and the specific role of psychosocial factors (SOC, hostility and anxiety) in this association. Next, the role of other factors, such as SES and the severity of disease influencing the examined associations, will be discussed (Figure 8. 1).

Sense of coherence and health-related behaviours among coronary heart disease patients

Our finding that SOC was a predictor of non-smoking, quitting smoking, healthier nutrition behaviour and lower alcohol consumption is consistent with previous studies (Bergman et al., 2009; Lindmark et al., 2009; Schane et al., 2009). It confirms Antonovsky's theory (1987) that CHD patients with a higher SOC are more likely to make choices regarding behaviour that explicitly promotes health, as was also found in the aforementioned other studies (Bergman et al., 2009; Lindmark et al., 2009; Schane et al., 2009). According to Antonovsky (1987) people with a high SOC have a lower tendency to turn to inappropriate coping strategies than people with a low SOC, since the former have various alternatives and can thus select the most appropriate coping behaviour for the problem.

Our finding that SOC could contribute to healthier behaviours among CHD patients is supported by evidence coming from those at high risk of developing CHD (Botha et al., 2002; Nabi et al., 2008) and from various healthy populations (Midanik et al., 1992; Myrin & Lagerstrom, 2006; Sagy et al., 2009). SOC thus deserves attention within the evidence-based framework for the planning of promotion or improvement of health-related behaviours. To be more specific, evidence clearly indicates that those who adhere to a healthier lifestyle after a CHD event are at lower risk of recurrent events (O'Donnell et al., 2010). People in general are aware of the risks and harmful effects of unhealthy behaviours (Carroll et al., 2006). However, there is still a huge discrepancy between patient knowledge of healthy behaviours and their adherence to healthy behaviours (Chow et al., 2010; Koon et al., 2013). It seems that a change in health-endangering behaviours is challenging and determined by many factors (e.g. emotions, psychological beliefs, information needs, support from family and friends, Murray et al., 2012), and indeed SOC may be one of these factors which need to be continually explored and taken into account when designing successful interventions.

The lack of an association between SOC and frequency of physical activity that we found contradicts the results of the study by Bergman et al. (2009), who did find such an association. In their longitudinal

study they showed that persons with a first myocardial infarction and with high SOC scores were more physically active compared with those with medium or low SOC. A possible explanation for the inconsistency in the results could be that the strength of the association between SOC and health-related behaviours is limited by the presence of many factors which influence the adherence to lifestyle prescriptions, such as the sociodemographic (e.g. gender, age, SES and marital status) and clinical characteristics (e.g. functional status, severity of the disease, length of the disease) of the studied population.

Sense of coherence and health-related quality of life in coronary heart disease patients

Our longitudinal finding that SOC was a strong predictor of HRQoL confirms the evidence from earlier longitudinal studies on specific subgroups of CHD patients (Karlsson et al., 2000; Dantas et al. 2002; Drory et al., 2002; Kattainen et al., 2006; Norekval et al., 2010; Bergman et al. 2012; Pragodpol & Ryan, 2013). This evidence shows that SOC seems to be an important predictor of HRQoL in patients with different cardiac conditions. In addition to the aforementioned studies, high levels of SOC positively predicted the perceived health among adolescents with congenital heart disease (Apers et al., 2013a). Berg et al. (2013) also found this among adults with a complex heart condition (single-ventricle physiology). Based on the longitudinal findings among various samples of patients with a chronic disease, it seems that SOC is a universal predictor of QoL among patients with chronic disease conditions (Eriksson & Lindstrom, 2007).

Next, we found that the influence of SOC on mental HRQoL was stronger than on physical HRQoL. The strength of the associations between SOC and HRQoL varied from medium (0.12) for the mental component to trivial (0.04) for the physical component, if measured as Cohen's effect sizes (Cohen, 1977). This confirms the systematic review by Eriksson and Lindstrom (2006), who reported that the relation between SOC and physical HRQoL is much weaker than between SOC and mental HRQoL. On the other hand, a two-year cross-lagged study (Veenstra et al., 2005) in patients with chronic illnesses, such as diabetes, CHD or chronic obstructive pulmonary disease, concluded that high SOC was a prospective predictor of high levels of physical HRQoL. One possible explanation for the inconsistency in the above studies could be that the strength of the associations between SOC and physical HRQoL manifests over time. This explanation seems possible, as in this study SOC was a predictor of physical HRQoL at 12-28 months follow up but not when measured at baseline. Another possible explanation is that factors other than SOC may be important predictors of physical HRQoL, including physical symptoms, physical function and fatigue (for a review see Pragodpol & Ryan, 2013).

Hostility and coronary heart disease: the role of sense of coherence

We found that high levels of hostility were strongly associated with a worse mental HRQoL. This confirms a recent critical review by Pragodpol and Ryan (2013) which reported that hostility was a negative predictor of HRQoL in newly diagnosed patients with CHD. In addition, intervention studies have shown that a decrease in levels of hostility leads to lower mortality and morbidity and to an increase in HRQoL among individuals after an acute heart attack and after cardiac surgery (Linden et al., 1996; Ormish et al., 1998; Lavie & Milani, 2005; Shen et al., 2006).

Interestingly, in our study hostility was not a predictor of worse physical HRQoL. Other psychological variables, such as depression, anxiety, and stress (Smith et al., 2000), should be taken into account as possible determinants of physical HRQoL in CHD patients. However, it is also possible that physical conditions (such as functional status in this study) are more important predictors of physical HRQoL than psychological factors. This study thus clearly indicates that it is important to distinguish between mental and physical HRQoL, as it seems that the same variable may play different role in these two components of HRQoL. This may have consequences not only for further research but also for developing successful interventions.

Moreover, we found that higher levels of hostility were strongly associated with a low SOC in CHD patients, which is in line with previous studies (Kivimaki et al., 2002; Julkunen & Ahlstrom, 2006). Julkunen and Ahlstrom (2006) have shed light on the relationship between SOC and hostility. Their results showed that high SOC was associated with the ability to control the expression of anger and with low levels of suppressed or openly expressed anger. In addition, high SOC scores were predicted by low levels of cynicism (a cognitive component of hostility). The results of this study indicate that SOC may have an important relationship to other psychological predictors of CHD, such as hostility. This relationship deserves not only further attention in research, but it also provides an opportunity for planning successful interventions.

In our study, hostility was inversely associated with SOC, which in turn was associated with poor mental HRQoL. This study shows that most of the adverse effect of hostility on poor mental HRQoL is mediated via SOC (approximately 60%). Evidence indicates that possible mechanisms regarding how hostility may influence CHD outcomes include the activation of stress response systems (autonomic dysfunction, inflammation, immunosenescence, thrombogenesis), the continuation of unhealthy behaviours (e.g. smoking, alcohol consumption) (for a review, see Ormish et al., 1998) or psychological factors, such as lower social support, more use of maladaptive coping and more severe depressive symptoms (Shen et al., 2006). Thus, our finding that most of the adverse effect of hostility on poor mental

HRQoL was mediated via SOC provides another possible mechanism regarding the impact of hostility on HRQoL. Longitudinal studies have found similar results; in particular a study by Kivimaki et al. (2002) confirmed the mediating role of SOC in the association between hostility and health and a study by Julkunen & Ahlstrom (2006) the mediation role of SOC between hostility and HRQoL. Despite the cross-sectional character, the present study complements these findings in several important ways. Firstly, in this study we included the whole spectrum (regarding gender, age and severity of disease) of patients with developed CHD, while a study by Kivimaki et al. (2002) included full-time female municipal workers, and a study by Julkunen and Ahlstrom (2006) included a high-risk sample of people with elevated blood pressure. In addition, in our study both HRQoL and hostility were measured using the questionnaires which are used by the majority of researchers.

Roma ethnicity and coronary heart disease: health-related quality of life, hostility, anxiety and sense of coherence

Our finding that Roma ethnicity was associated with worse HRQoL is in line with previous studies (Skodova et al., 2010) and indicates that Roma CHD patients are at higher risk of poor HRQoL. Additionally, the results of the present study indicate that only a part of the ethnic differences in HRQoL can be explained by SES. To be more specific, when we added SES measured by family income into our models, Roma ethnicity remained a significant predictor of both mental and physical HRQoL. Leow et al. (2013) pointed out that evidence on the relationship between ethnicity and HRQoL is still limited and somehow contradictory. However, compared with non-Roma, Roma have been shown to have worse outcomes regarding clinical risk factors (Sudzinova et al., 2013), biochemical markers (Babinska et al., 2013) and health behaviours (Kosa et al., 2007; Babinska et al., 2013; Sudzinova et al., 2013), which may explain the identified differences in HRQoL between Roma and non-Roma.

Our finding that Roma are at higher risk of having higher levels of hostility is in line with previous research (Skodova et al., 2010) and may reflect their marginal position in society. Brondolo et al. (2005) showed that individuals exposed to ethnicity-based social exclusion expressed their feelings aggressively more often during interpersonal interactions. Our study shows that mean levels of hostility are indeed higher among Roma. Given the fact that adult levels of hostility are partly shaped by childhood environmental circumstances (Nabi et al., 2010), this may easily be due to experiences of discrimination over the life course (Brondolo et al., 2011).

In this study hostility mediated the relationship between Roma ethnicity and mental HRQoL, even when including SES. This confirms the finding of studies by Williams (1998) and Kawachi et al. (1997)

that hostility may be linked to health inequalities as a mediator. The possible mechanism explaining the mediation role of hostility between Roma ethnicity and mental HRQoL may be the experience of racism and discrimination. As reported in EU-MIDIS (2009), Roma (in the Czech Republic) indeed experience the worst discrimination in general out of 45 specific groups surveyed. This explanatory mechanism is also supported by studies conducted among other ethnic or minority groups. To be more specific, high levels of discrimination in the last 12 months were reported, e.g., by African immigrants in Malta, Sub-Saharan Africans in Ireland and North Africans in Italy (EU-MIDIS, 2009). The higher levels of hostility when compared with the majority population were reported in African-American women (Tindle et al., 2009) and Blacks and Latinos (Broudy et al., 2007) in the United States. Thus, it seems that the mediating role of hostility (seen as a response to the experience of discrimination) between ethnicity and health outcomes may be applicable to other minority or ethnic groups.

Our finding that Roma cardiac patients have more anxiety symptoms than non-Roma CHD patients complements previous findings on ethnic differences (Parry et al., 2007; Peters et al., 2009; Carrasco-Garrido et al., 2010; Vorvolakos et al., 2012), but now with a particular focus on CHD patients. The association of Roma ethnicity with more anxiety symptoms was still present after adjustment for potential confounding factors, including SES. Other factors that may contribute are the experiencing of higher levels of stress due to poor living conditions, unemployment, discrimination and exclusion, as well as the cultural distance that Roma experience towards the society they live in (UNDP 2005; Kouivula et al., 2010).

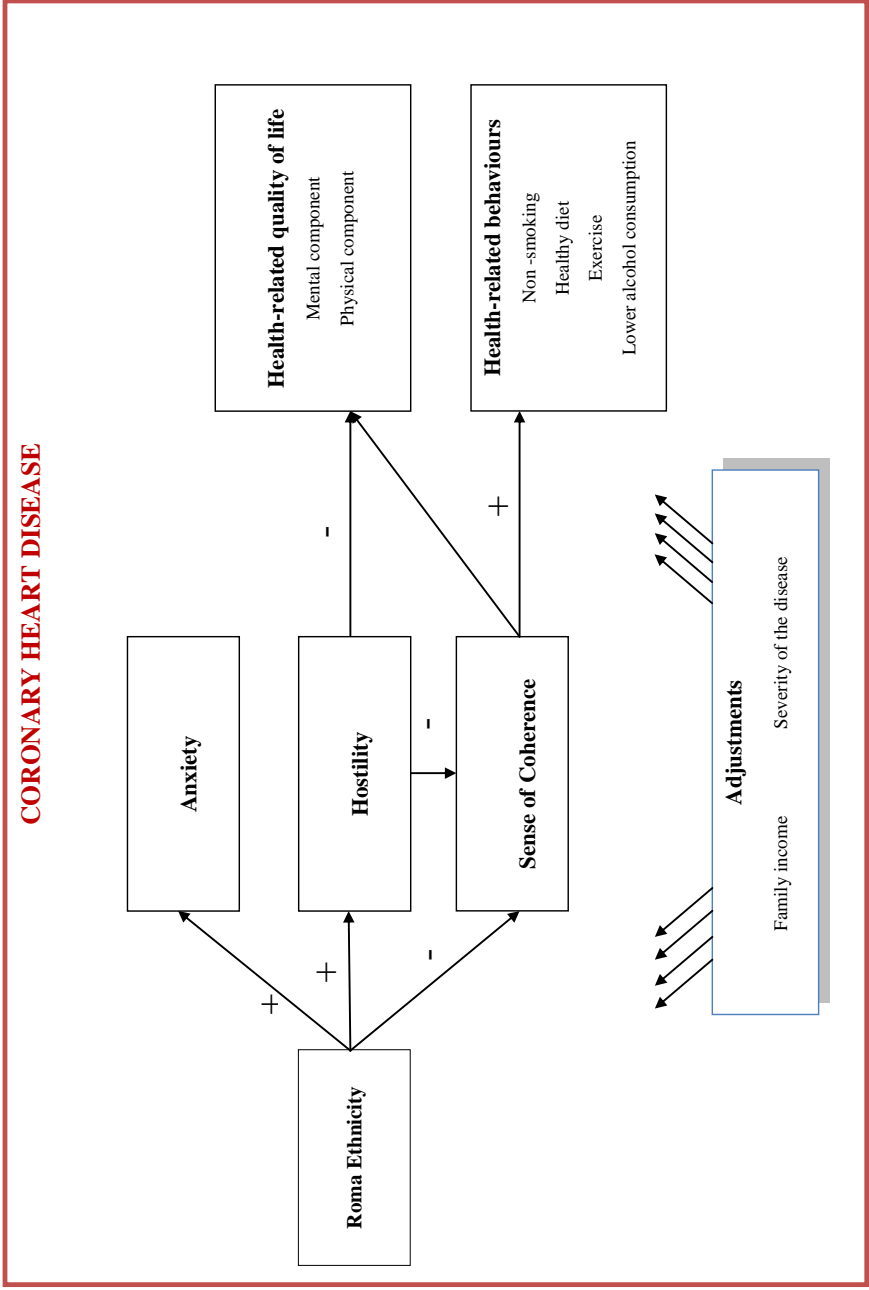
A novel finding of this study is that Roma CHD patients have a lower SOC when adjusted for age, sex and functional status than non-Roma CHD patients. Some previous studies (Bayard-Burfield et al., 2001; Glanz et al., 2005) also found that the levels of SOC were lower among ethnic minorities, but none were focused on Roma. As SOC represents the basis for successful coping with stressors, our study indicates that ethnic differences in coping styles may be understood using a conceptual model, such as SOC. To be more specific, as advocated by Antonovsky (1987), individuals with high SOC should have more adaptive and appropriate reactions to situations, more successful coping efforts and should experience less affective impairment of their coping behaviour. As SOC is rooted in the sociocultural and historic context of one's life, one of the options for how to promote more successful coping behaviour in ethnic groups is to use structures such as social support, environmental conditions and family relationships (Antonovsky, 1996).

Socioeconomic status and the severity of coronary heart disease as potential confounders

In our study a lower SES was a predictor of poorer physical HRQoL and weakened the effect of SOC on physical HRQoL, but not on mental HRQoL. This confirms the findings of Failde and Ramos (2000), Lindsay et al. (2000) and Pragodpol and Ryan (2013), who reported that worse SES was associated with lower HRQoL. On the other hand, the effect of SES on physical and mental HRQoL was small among patients with angina pectoris (Guldvog, 1999). These inconsistent findings thus require further exploration among other populations of patients with CHD. Such studies should be aware of the possible role of SES in CHD outcomes. In addition, future studies should pay special attention to SES when exploring ethnic differences in health. In our study, SES explained 19% of the variance in SOC and partly explained the association between Roma ethnicity and SOC. Thus, the association of income with SOC may explain a part of the SES inequalities in CHD prognosis (Skodova et al., 2008).

In this study, functional status was an important predictor of poor physical HRQoL. Furthermore, after adjustment for the severity of CHD, the prospective association between SOC and physical HRQoL disappeared. This is in line with a recent review conducted by Pragodpol and Ryan (2013) which reported that clinical variables, such as angina, physical functioning and fatigue, negatively affected HRQoL in patients newly diagnosed with CHD. Thus, it is important that clinicians focus on symptoms management in order to improve HRQoL among patients with CHD (Pragodpol & Ryan, 2013).

Figure 8.1 Model of the relationships between key constructs as a framework for coronary heart disease prevention and rehabilitation



8.3 Strengths and limitations

The strengths of our study are that it was based on a sample covering a wide range of patients regarding sex (both men and women), age range (32-75), type of intervention following CAG (PCI, CABG or pharmaceutical treatment) and that it included a significant share of Roma (15.4% of our sample) and had a high response rate at baseline (96.0%). Additionally, we used a longitudinal design, which allowed us to measure whether SOC was a predictor of health-related behaviours and health-related quality of life at 12-28 months follow-up after CAG. Lastly, we used valid and reliable measures of the relevant variables.

However, in interpreting our results one has to consider certain limitations. First, selection bias may have occurred because of the relatively low response rate at follow-up (61.2%). However, there were no statistically significant differences in terms of age, functional status, type of intervention and SOC between those who participated in the follow-up and those who declined, though there were differences by gender (Cramer's $V=0.15$, $p=0.01$). More men than women (63.4% vs. 46.5%) were willing to participate at follow-up, but these differences were trivial. In addition, women in our sample were underrepresented from baseline on.

Next, our data collection period was long and the time to follow-up varied between subjects. This was caused by the limited research and clinical capacity. As a result, patients were included at random when research and clinical capacity was available, i.e., independent of the clinical or mental status of patients, making this bias less likely. Next, the associations identified in this study may be due to other factors not measured in this study. Such possible factors may be, e.g., a clinical diagnosis of depression and anxiety. Evidence has shown that depression or anxiety can interfere with adherence to treatment, can affect coping responses in the face of stressors and have been associated with biological responses (e.g. autonomic nervous system, inflammatory markers) (Wells, & Miranda, 2013). However, in our study those with a diagnosis of any psychiatric disease were excluded from the baseline sample, making this bias rather unlikely.

8.4 Implications

Our study has several important implications for practice and for further research.

8.4.1 Implications for practice

Our finding that CHD patients with a low SOC fare worse implies that clinicians should pay special attention to those with a low SOC. At present knowledge about the role of SOC in CHD is increasing, especially in the field of cardiological nursing, which further supports this extra attention. The 3-item SOC instrument may be a good measure for use in daily practice to get information on patients' SOC (Eriksson & Lindstrom, 2005). This may help to identify low-SOC patients.

Clinicians may also directly improve the SOC of their patients. Firstly, since it seems that comprehension (knowledge about health) is the most important component of SOC change (Bergman et al., 2012a), health care professionals should ensure that patients receive sufficient and comprehensible information about their disease, including its prevention and treatment. The better the patients understand the causes of their disease, the prognosis and what they can do about their conditions, the more they feel to be in control over their own lives, which in turn increase meaningfulness (Bergman & Bertero, 2001). Thus, interventions regarding, e.g., health-related behaviours should also be designed and delivered in an accessible and understandable way. The focus on an increase of comprehension is especially important in Roma CHD patients who are often characterized by low health literacy. Thus, improvement in understanding instructions given by their cardiologist in Roma may increase the adherence to recommendations regarding, e.g., health related behaviours. Clinicians may use education materials adapted to the language, culture and literacy of the Roma CHD patients (Jones et al., 2013).

Moreover, clinicians can advise on routes for patients to increase their SOC and their ability to manage (the consequences of) their disease to a certain degree. This may regard, for example, patients' clubs, social support from family or friends, regular meetings with the cardiologist or other professional and in case of Roma CHD patients also Roma community workers. The above mentioned examples represent potential resources for how to support patients' ability to manage their disease and increase their SOC.

In addition, clinicians can advise their patients to participate in psychological interventions, such as talk-therapy groups, mindfulness-based stress reduction programmes (Wiessbecker et al., 2002), social exchanges (Forsberg et al., 2010) and individualised psychoeducational programmes based on dialogue (Lee & Garvin, 2003). These interventions have been shown to be promising methods for increasing the levels of SOC of patients (Wiessbecker et al., 2002; Lee & Garvin, 2003; Forsberg et al., 2010).

8.4.2 Implications for research

More research is still needed to answer important unresolved questions regarding SOC not only among CHD patients but also among other groups of cardiac patients (e.g. congenital heart disease) (Moons & Norekval, 2006; Apers et al., 2013b). Future research should focus on the underlying mechanisms and the effectiveness of the interventions mentioned regarding SOC. In addition, as our study indicates, the role of SES and the severity of the disease should be taken into account in the associations between SOC and cardiac outcomes in future research designs.

First, most of our findings should be replicated, as studies assessing the specific role of SOC in CHD outcomes among patients with different treatment of CHD are scarce. Such studies should preferably include cross-lagged analyses to identify the predominant direction of the effects over time and should include a larger sample from different hospital settings.

As a next step, underlying mechanisms could be identified regarding the pathways between SOC and cardiac outcomes. Possible explanatory pathways should include, for example, biological pathways (hypothalamic-pituitary-adrenal axis, autonomous nervous system and inflammatory system), as the level of SOC determines the activation of different complex reactions (Kohut et al., 2006). Other possible explanatory pathway may include other well-established psychosocial factors, such as treatment beliefs (Horne, 1997), illness perception and coping strategies (Hagger & Orbell, 2003), depression, stress and vital exhaustion (Skodova et al., 2008). A proper understanding of the effect of SOC on cardiac outcomes will potentiate the designing, testing and implementing of tailored interventions to strengthen patient's SOC.

Regarding Roma, our study is the first to show that Roma CHD patients have higher levels of hostility and anxiety symptoms and lower levels in SOC when compared with other groups of CHD patients. Thus, our findings should be confirmed by future research, including on other ethnic groups of CHD patients, and longitudinal data should be used to identify causal relationships. Such causal relationships may be racism, discrimination, poor SES and limited employment opportunities (Anderson & Armstead, 1995). More light on the topic of the disadvantaged position of the Roma population regarding CHD and the possible pathways may be also shed by community-based participatory research (CBPR) (Thomas et al., 2011; Wells & Miranda, 2013). CBPR considers the actions that communities can take to promote health and target barriers specific to a minority group to reduce disparities in care and outcomes (Thomas et al., 2011; De Las Nueces et al., 2012). The involvement of Roma communities in the research process may be one promising approach to improve, e.g., their HRQoL and reduce mortality due to CHD, especially for those with lower SES and those experiencing psychological distress.

Researchers who will design a study regarding the role of SOC in CHD should be aware of several methodological concerns regarding the concept of SOC. The first concern is the potential

overlap of SOC with other concepts developed within the context of stress research (Bengel et al., 1999). Antonovsky (1996, 1977) acknowledged the similarities between SOC and other theories of stress and coping. Among the most well-known personal or internal protective factors are resilience (Rotter, 1975), hardiness (Kobasa, 1979), purpose in life (Frankl, 1966), self-transcendence (Frankl, 1963) and self-efficacy (Bandura, 1977). In addition, one may argue that there might be a content overlap between SOC and mental-health, as well as with other constructs of negative affectivity. Lastly, content similarities might exist between comprehensibility (the knowledge about disease) and health literacy (Kwan et al., 2006). Despite the fact that these constructs are close to SOC, the theoretical basis of these constructs can be clearly distinguished (Bengel et al., 1999; Eriksson & Lindstrom, 2007). However, the use of several variables with similar content in one modelling may cause multicollinearity issues and lead to inaccurate parameter estimates.

In this study, SOC was used as a global, unitary construct in line with recommendations by Antonovsky (1987, 1993). However, recent evidence indicates that it may be reasonable to use the different SOC components separately (Bergman et al., 2012). The construct validity of SOC still remains unclear (Eriksson & Lindstrom, 2007). Studies have supported a first order, three-correlated factor model and a second-order model consisting of a general SOC factor and three first-order factors (Feldt & Rasku, 1998; Gana & Garnier, 2001). On the other hand, Hittner (2007) indicated in his study based on confirmatory factor analysis a single factor model. In the study by Sandell et al. (1998) neither the one-factor nor the three-factor solutions of SOCS were confirmed. Thus, SOC seems to be rather multidimensional than unidimensional, but further testing of the SOC scale in different groups is required.

In this study, the SOC summary score was treated as a continuous variable, in line with previous studies exploring the topic of SOC in the field of CHD. Despite the fact that several previous studies have divided SOC into categories (weak, moderate, strong), there is no agreement on the preferred cut-off points (Eriksson & Lindstrom, 2005). We agree with Norekval et al. (2010, p.829), who stated that “researchers should use an agreed cut-off point” to increase the possibility of comparing studies, and thus the best cut-off points deserve additional study.

8.5 Conclusion

We found that SOC was a predictor of health-related behaviours, HRQoL and explained the major part of adverse effect of hostility on low mental HRQoL. Additionally, we found that Roma ethnicity was associated with higher hostility, more anxiety symptoms, lower SOC and lower HRQoL when compared with non-Roma CHD patients. SOC may thus play an important role in CHD outcomes and in decreasing ethnic inequalities in health.

References

- Anderson NB, Armstead CA (1995) Toward understanding the associations of socioeconomic status and health: a new challenge for the biopsychosocial approach. *Psychosomatic Medicine*, 57, 213-225.
- Antonovsky A (1979) *Health, stress and coping*. Jossey-Bass, San Francisco.
- Antonovsky A (1987) *Unraveling the mystery of health. How people manage stress and stay well*. Jossey-Bass, San Francisco.
- Antonovsky A (1993) The structure and the properties of the Sense of Coherence scale. *Social Science & Medicine*, 36, 725-733.
- Antonovsky A (1996) The salutogenic model as a theory to guide health promotion. *Health Promotion International*, 11, 11-18.
- Antonovsky A, Bernstein J (1977) Social class and infant mortality. *Social Science & Medicine*, 11, 453-470.
- Apers S, Luyckx K, Moons P (2013b) How meaningful is sense of coherence to cardiovascular nursing? *European Journal of Cardiovascular Nursing*, 11, 375-377.
- Apers S, Luyckx K, Rassart J, et al. (2013a) Sense of coherence is a predictor of perceived health in adolescents with congenital heart disease: A cross-lagged prospective study. *International Journal of Nursing Studies*, 50, 776-785.
- Babinska I, Dankulinova Veselska Z, Bobakova D, et al. (2013) Is the cardiovascular risk profile of people living in Roma settlements worse in comparison with the majority population? *International Journal of Public Health*, 58, 417-425.
- Bandura A (1977) Self-efficacy: towards a unifying theory of behavioural change. *Psychological Review*, 84, 191-215.
- Bayard-Burfield L, Sundquist J, Johansson S (2001) Ethnicity, self reported psychiatric illness, and intake of psychotropic drugs in five ethnic groups in Sweden. *Journal of Epidemiology and Community Health*, 55, 657-664.
- Bengel J, Strittmatter R, Willmann H (1999) What keeps people healthy? The current state of discussion and the relevance of Antonovsky's salutogenic model of health. *Research and Practice of Health Promotion*, 4, 3-130.
- Berg SK, King C, Overgaard D (2013) Sense of coherence as resource for quality of life in patients with congenital heart disease: The benefits continue into adulthood. *European Journal of Cardiovascular Nursing*, DOI: 10.1177/1474515113488023.
- Bergman E, Arestedt K, Fridlund B, et al. (2012a) The impact of comprehensibility and sense of coherence in the recovery of patients with myocardial infarction: a long-term follow-up study. *European Journal of Cardiovascular Nursing*, 11, 276-283.
- Bergman E, Bertero C (2001) You can do it if you set your mind to it: a qualitative study of patients with coronary artery disease. *Journal of Advanced Nursing*, 36, 733-741.
- Bergman E, Malm D, Karlsson JE, et al. (2009) Longitudinal study of patients after myocardial infarction: Sense of coherence, quality of life, and symptoms. *Heart & Lung: the journal of critical care*, 38, 129-140.

- Bergman E, Malm D, Ljunquist B, et al. (2012) Meaningfulness is not the most important component for changes in sense of coherence. *European Journal of Cardiovascular Nursing*, 11, 331-338.
- Botha KFH, Du Plessis WF, van Rooyen JM, et al. (2002) Biopsychosocial determinants of self-management in culturally diverse South African patients with essential hypertension. *Journal of Health Psychology*, 7, 519-531.
- Brondolo E, Brady N, Thompson S, et al. (2008) Perceived racism and negative affect: Analyses of trait and state measures of affect in a community sample. *Journal of Social & Clinical Psychology*, 27, 150-173.
- Broudy R, Brondolo E, Coakley V, et al. (2007) Perceived ethnic discrimination in relation to daily moods and negative social interactions. *Journal of Behavioral Medicine*, 30, 31-43.
- Carrasco-Garrido P, Lopez de Andres A, Barrera VH, et al. (2011) Health status of Roma women in Spain. *European Journal of Public Health*, 21, 793-798.
- Carroll SL, Lee RE, Kaur H, et al. (2006) Smoking, weight loss intention and obesity-promoting behaviours in college students. *The Journal of the American College of Nutrition*, 25, 348-353.
- Chow CK, Jolly S, Rao-Melacini P, et al. (2010) Association of diet, exercise, and smoking modification with risk of early cardiovascular events after acute coronary syndromes. *Circulation*, 121, 750-758.
- Cohen J (1977) *Statistical Power Analysis for the Behavioural Sciences*. Academic Press, New York.
- Dantas RAS, Motzer SA, Ciol MA (2002) The relationship between quality of life, sense of coherence and self-esteem in persons after coronary artery bypass graft surgery. *International Journal of Nursing Studies*, 39, 745-755.
- De Las Nueces D, Hacker K, Digirolamo A, et al. (2012). A systematic review of community-based participatory research to enhance clinical trials in racial and ethnic minority groups. *Health Services Research*, 47, 1363–1368.
- Drory Y, Kravetz S, Hirschberger G (2002) Long-term mental health of men after a first acute myocardial infarction. *Archives of Physical Medicine and Rehabilitation*, 83, 352-359.
- Eriksson M, Lindstrom B (2005) Validity of Antonovsky's sense of coherence scale: a systematic review. *Journal of Epidemiology and Community Health*, 59, 460-466.
- Eriksson M, Lindstrom B (2006) Antonovsky's sense of coherence scale and the relation with health: a systematic review. *Journal of Epidemiology and Community Health*, 60, 376-381.
- Eriksson M, Lindstrom B (2007) Antonovsky's sense of coherence scale and its relation with quality of life: a systematic review. *Journal of Epidemiology and Community Health*, 61, 938-944.
- European Union Agency for Fundamental Rights (2009) EU-MIDIS. European Union minorities and discrimination survey. Main results report, pp 36.
- Failde I, Ramos I (2000) Validity and reliability of the SF-36 Health Survey Questionnaire in patients with coronary artery disease. *Journal of Clinical Epidemiology*, 53, 359-365.
- Feldt T, Rasku A (1998) The structure of Antonovsky's Orientation to Life Questionnaire. *Personality and Individual Differences*, 25, 505-516.

- Forsberg KA, Bjorkman T, Sandman PO, et al. (2010) Influence of lifestyle intervention among persons with a psychiatric disability: a cluster randomized controlled trial on symptoms, quality of life and sense of coherence. *Journal of Clinical Nursing*, 19, 1519-1528.
- Frankl VE (1963) *Man's Search for Meaning; An Introduction to Logotherapy*. Washington Square Press, New York.
- Frankl VE (1966) Logotherapy and existential analysis—a review. *American Journal of Psychotherapy*, 20, 252–260.
- Gana K, Garnier S (2001) Latent structure of the sense of coherence scale in a French sample. *Personality and Individual Differences*, 31, 1079-1090.
- Glanz K, Maskarinec G, Carlin L (2005) Ethnicity, sense of coherence, and tobacco use among adolescents. *Annals of Behavioral Medicine*, 29, 192-199.
- Guldvog B (1999) Can patient satisfaction improve health among patients with angina pectoris? *International Journal for Quality in Health Care*, 11, 233-240.
- Hagger MS, Orbell S (2003) A meta-analytic review of the common-sense model of illness representations. *Psychology & Health*, 18, 141–184.
- Hittner JB (2007) Factorial invariance of the 13-item Sense of Coherence Scale across gender. *Journal of Health Psychology*, 12, 273-280.
- Horne R (1997) Representations of medication and treatment: advances in theory and measurement. In: Petrie KJ, Weinman J, eds. *Perceptions of health and illness: current research and applications*. Harwood Academic, Amsterdam, pp.155–187.
- Jones CA, Nanji A, Mawani S (2013) Feasibility of community-based screening for cardiovascular disease risk in an ethnic community: the South Asian Cardiovascular Health Assessment and Management Program (SA-CHAMP). *BMC Public Health*, 13, e160.
- Julkunen J, Ahlstrom R (2006) Hostility, anger, sense of coherence as predictors of health-related quality of life. Results on ASCOT substudy. *Journal of Psychosomatic Research*, 61, 33-39.
- Karlsson I, Berglin E, Larsson PA (2000) Sense of coherence: quality of life before and after coronary artery bypass surgery – a longitudinal study. *Journal of Advanced Nursing*, 31, 1383–1392.
- Kattainen E, Merilainen P, Sintonen H (2006) Sense of coherence and health-related quality of life among patients undergoing coronary artery bypass grafting or angioplasty. *European Journal of Cardiovascular Nursing*, 5, 21–30.
- Kawachi I, Kennedy BP, Lochner K et al. (1997) Social capital, income inequality and mortality. *American Journal of Public Health*, 87, 1491-1498
- Kivimaki M, Elovainio M, Vahtera J, et al. (2002) Sense of coherence as a mediator between hostility and health. Seven-year prospective study on female employees. *Journal of Psychosomatic Research*, 52, 239-247.
- Kobasa SC (1979) Stressful life events, personality and health: An inquiry in hardiness. *Journal of Personality and Social Psychology*, 34, 839–850.

Kohut ML, McCann DA, Russell DW, et al. (2006) Aerobic exercise, but not flexibility/resistance exercise, reduces serum IL-18, CRP, and IL-6 independent of β -blockers, BMI, and psychosocial factors in older adults. *Brain, Behaviour, and Immunity*, 20, 201-209.

Koivula M, Hautamaki-Lamminen K, Astedt-Kurki P (2010) Predictors of fear and anxiety nine years after coronary artery bypass grafting. *Journal of Advanced Nursing*, 66, 595-606.

Koon T, Scott L, Prem M, et al. (2013) Prevalence of a healthy lifestyle among individuals with cardiovascular disease in high-, middle- and low-income countries. The Prospective Urban Rural Epidemiology (PURE) Study, *JAMA: the Journal of the American Medical Association*, 309, 1613-1621.

Kosa Z, Szeles G, Kardos L, et al. (2007) A comparative health survey of the inhabitants of Roma settlements in Hungary. *American Journal of Public Health*, 97, 853-859.

Kwan B, Frankish J, Rootman I, et al. (2006) The development and validation of measures of “health literacy” in different populations. University of British Columbia, Institute of Health Promotion Research & University of Victoria Centre for Community Health Promotion Research, Vancouver.

Lavie CJ, Milani R (2005) Prevalence of hostility in young coronary artery disease patients and effects of cardiac rehabilitation and exercise training. *Mayo Clinic Proceedings*, 80, 335-342.

Lee RG, Garvin T (2003) Moving from information transfer to information exchange in health and health care. *Social Science & Medicine*, 56, 449-464.

Leow KSM., Griva, K., Choo R, et al. (2013) Determinants of health-related quality of life (HRQoL) in the multiethnic Singapore population – national cohort study, *Plos One*, 8, e67138.

Linden W, Stossel C, Maurice J (1996) Psychosocial interventions for patients with coronary artery disease: a meta-analysis. *Archives of Internal Medicine*, 156, 745-752.

Lindmark U, Stegmayr B, Nilsson B, et al. (2005) Food selection associated with sense of coherence in adults. *Nutrition Journal*, 4, e9.

Lindsay GM, Hanlon P, Smith LN, et al. (2000) Assessment of changes in general health status using the Short Form 36 questionnaire 1 year following coronary artery bypass grafting. *European Journal of Cardio-thoracic Surgery*, 18, 557-564.

Midanik LT, Soghikian K, Ransom LJ et al. (1992) Alcohol problems and sense of coherence among older adults. *Social Science & Medicine*, 34, 43-48.

Moons P, Norekval TM (2006) Is sense of coherence a pathway for improving the quality of life of patients who grow up with chronic diseases? A hypothesis. *European Journal of Cardiovascular Nursing*, 5, 16-20.

Murray J, Craigs CL, Hill KM, et al. (2012) A systematic review of patients reported factors associated with uptake and completion of cardiovascular lifestyle behaviour change. *BMC Cardiovascular Disorders*, 12, e120.

Myrin B, Lagerstrom M (2006) Health-behaviour and sense of coherence among pupils aged 14-15. *Scandinavian Journal of Caring Sciences*, 20, 339-346.

Nabi H, Vahra J, Singh-Manoux A, et al. (2008) Do psychological attributes matter for adherence to antihypertensive medication? The Finnish Public Sector Cohort Study. *Journal of Hypertension*, 26, 2236-2243.

Norekval TM, Fridlund B, Moons P, et al. (2010) Sense of coherence - a determinant of quality of life over time in older female acute myocardial infarction survivors. *Journal of Clinical Nursing*, 19, 820-831.

O'Donnell MJ, Denis X, Lisheng; L et al. (2010) Risk factors for ischaemic and intracerebral haemorrhagic stroke in 22 countries (the INTERSTROKE study): a case-control study, *Lancet*, 376, 112-123.

Ornish D, Scherwitz LW, Billings JH, et al. (1998) Intensive lifestyles changes for reversal of coronary heart disease. *JAMA: the Journal of the American Medical Association*, 280, 2001-2007.

Parry GP, van Cleemput J, Peters S, et al. (2007) Health status of Gypsies and Travellers in England. *Journal of Epidemiology and Community Health*, 61, 198-204.

Peters J, Parry GD, van Cleemput P, et al. (2009) Health and use of health services: a comparison between Gypsies and Travellers and other ethnic groups. *Ethnicity & Health*, 14, 359-377.

Pragodpol P, Ryan C (2013) Critical review of factors predicting health-related quality of life in newly diagnosed coronary artery disease patients. *Journal of Cardiovascular Nursing*, 28, 277-284.

Rotter JB (1975) Some problems and misconceptions related to the construct of internal versus external control of reinforcement. *Journal of Consulting and Clinical Psychology*, 43, 56-67.

Sagy S, Shani E, Leibovich E (2009) Factors related to attitudes towards drug use and alcohol drinking: Comparing immigrants from the former Soviet Union and Israeli-born adolescents. *Journal of Substance Use*, 14, 10-18.

Sandell R, Blomeberg J, Lazar A (1998) The factor structure of Antonovsky's sense of coherence scale in Swedish clinical and nonclinical samples. *Personality and Individual Differences*, 24, 701-711.

Schane RE, Ling PM, Glantz SA (2010) Health effects of light and intermittent smoking: A review. *Circulation*, 121, 1518-1522.

Shen BJ, Myers HF, McCreary CP (2006) Psychosocial predictors of cardiac rehabilitation quality-of-life outcomes. *Journal of Psychosomatic Research*, 60, 3-11.

Skodova Z, Nagyova I, van Dijk JP, et al. (2008) Socioeconomic differences in psychosocial factors contributing to coronary heart disease: a review. *Journal of Clinical Psychology in Medical Settings*, 15, 204-213.

Skodova Z, van Dijk JP, Nagyova I, et al. (2010) Psychosocial factors of coronary heart disease and quality of life among Roma coronary patients: a study matched by socioeconomic position. *International Journal of Public Health*, 55, 373-380.

Smith HJ, Taylor R, Mitchell A (2000) A comparison of four quality of life instruments in cardiac patients: SF-36, QLI, QLMI, and SEIQoL. *Heart*, 84, 390-394.

Sudzina A, Nagyova I, Studencan M, et al. (2013) Roma coronary heart disease patients have more medical risk factors and greater severity of coronary heart disease than non-Roma. *Internal Journal of Public Health*, 58, 409-415.

Thomas SB, Crouse Quinn S, Butler J et al. (2011) Toward a fourth generation of disparities research to achieve health equity. *Annual Review of Public Health*, 32, 399-416.

Tindle HA, Chang Y-F, Kuller LH (2009) Optimism, cynical hostility, and incident coronary heart disease and mortality in the women's health initiative. *Circulation*, 120, 656-662.

Veenstra M, Moum T, Roysamb E (2005) Relationship between health domains and sense of coherence: A two-year cross-lagged study in patients with chronic illness. *Quality of Life Research*, 14, 1455-1465.

Vorvolakos T, Samakouri M, Tripsianis G, et al. (2012) Sociodemographic and clinical characteristics of Roma and non-Roma psychiatric outpatients in Greece. *Ethnicity & Health*, 17, 161-169.

Wells KB, Miranda J (2013) Differential mortality for persons with psychological distress and low socioeconomic status. What does it mean and what can be done? *JAMA Internal Medicine*, 173, 27-28.

Wiessbecker I, Salmon P, Studts JL, et al. (2002) Mindfulness-based stress reduction and sense of coherence among women with fibromyalgia. *Journal of Clinical Psychology in Medical Settings*, 9, 297-307.

Williams RB (1998) Lower socioeconomic status and increased mortality: early childhood roots and the potential for successful interventions. *JAMA: the Journal of the American Medical Association*, 279, 1745-1746.