Sense of coherence, health and lifestyle in middle-aged women

Supervisor: Petra Lindfors
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STOCKHOLMS UNIVERSITET
PSYKOLOGISKA INSTITUTIONEN

Taina Galvenius
SENSE OF COHERENCE, HEALTH AND LIFESTYLE IN MIDDLE-AGED WOMEN

Taina Galvenius

According to the salutogenic theory put forth by Antonovsky, an individual’s sense of coherence (SOC) is central for maintaining health. The present study used data from middle-aged women being part of a longitudinal research program to investigate how SOC relates to health status (in terms of self-rated health and medicine consumption) and a set of lifestyle factors (physical exercise, alcohol consumption, nicotine consumption and dietary habits). Women with a strong SOC were hypothesized to exhibit better health profiles, consume less medication, and lead a healthier lifestyle than women with a weak SOC. The findings partly confirmed the hypotheses in showing that women with a strong SOC had better self-rated overall health, better psychological well-being, fewer self-reported diseases and lower medicine consumption. Contrary to the hypothesis, women with stronger SOC had more self-reported psychological and physical symptoms. Of the lifestyle factors, only dietary habits were significantly associated with SOC. The study shows that SOC is related to differences in health and medicine consumption in a homogeneous group of middle-aged women, while the association between SOC and lifestyle was found to be less prominent.

According to the World Health Organization (1948) health can be defined as: “/…/a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” This notwithstanding, research on health has traditionally focused on the negative aspects of human functioning such as physical diseases, psychological disorders and stress (Eriksson, Lindström, & Lilja, 2007; Lindfors & Lundberg, 2002). Over the last decades, a new area of research has emerged trying to investigate whether there are individual characteristics that help explaining why some people seem to better withstand risk factors and maintain health. The salutogenesis theory and the concept of Sense of Coherence (SOC) (Antonovsky, 1987) have played a pivotal role in the development of this field of research. Much of previous research has come to focus exclusively on linkages between lifestyle factors and health problems (see for instance Antonovsky, 1979; Surtees, Wainwright, Luben, Khaw, & Day, 2003). Yet, few studies have described how individual strengths, including SOC, relate to lifestyle and different aspects of health. Furthermore, few studies have focused specifically on women.

Salutogenesis
The US-Israeli medical sociologist Antonovsky (1923-1994) launched the idea that in order to promote health it is generally more important to focus on peoples’ resources and their capacities and not only on risks, health problems and diseases. Hence, he started looking into what factors are important for people in order to maintain and
develop their health, also when they are confronted with difficult external circumstances (Eriksson et al., 2007). Keeping with this perspective, Antonovsky (1979) developed a theory focusing on salutogenesis which aimed at identifying the origins of health. Salutogenesis represents a view that goes beyond the traditional pathogenic concept which tries to identify the origin of diseases by only focusing on the individual’s problems and deficits. The salutogenic concept considers health to move in a continuum between total ill health and total health (Lindström & Eriksson, 2005).

According to Antonovsky’s salutogenesis concept, the individual’s problem solving ability and capacity to use available resources are considered key elements to maintain and improve the individual’s health (Lindström & Eriksson, 2005). According to the salutogenic model, stressors may have damaging, neutral or positive effects on health. Stressors generate a state of tension which the individual has to deal with. How well one manages tension depends on the resources at one’s disposal (Feldt, 2000). The theory can be applied at an individual, a group, and a societal level (Lindström & Eriksson, 2005).

Sense of Coherence

Antonovsky presented the salutogenesis theory as a system theory in which the coherence between the individual, the group and the environment plays a major role in the development of SOC (Suominen & Lindström, 2008). SOC was defined by Antonovsky (1987) as representing the overall salutogenic resources available to individuals. Salutogenesis is thus the overall perspective, while SOC is a measurable variable, i.e. a capacity to flexibly and appropriately cope with and mobilize the resistance resources available to the individual. Antonovsky formulated the movement towards good health in terms of SOC and “generalized resistance resources” (GRRs). GRRs include a multitude of factors such as financial situation, ego identity, knowledge, intelligence, religion, social support, cultural stability and preventive health orientation. GRRs, in turn, facilitate SOC by equipping the individual with a set of meaningful and coherent tools, with which tension is generally more successfully managed (Eriksson et al., 2007; Feldt, 2000). People who have sufficient and adequate GRRs at their disposal and learn how to use them can gradually develop a strong SOC. The main aspect is not what resources are actually available, but rather whether the individual is able to use and re-use the resources for the intended purpose (Lindström & Eriksson, 2005; Suominen & Lindström, 2008). Salutogenesis is a much broader concept than simply measurement of SOC (Suominen & Lindström, 2008). 

Eriksson and colleagues (2007) summarized the relationship between SOC and the GRRs as follows: “Life experiences shape the SOC whereas the GRRs provide the individual with sets of meaningful and coherent life prerequisites”.

According to Antonovsky (1987), some people manage life’s strains - setbacks, demands, conflicts and different types of problems - by retaining their health. Some of these individuals even develop and grow through experiences of strain. However, other individuals manage strains less successfully. Antonovsky described SOC as a global orientation to the individual’s inner and outer environments in responding to life stress and proposed that SOC consists of three dynamically interrelated components, i.e. comprehensibility, manageability and meaningfulness.
**Comprehensibility** refers to the cognitive element of SOC and is described as the extent to which the individual perceives the stimuli that he/she is confronted with as making cognitive sense, i.e. that information is perceived as ordered, consistent, structured, and clear, rather than as chaotic, random, accidental or inexplicable. An individual that is high on comprehensibility believe that the stimuli he/she will encounter in the future are likely to be predictable, or when they do come as surprises, that they will be orderable and explicable, implying that there is a high probability that things will work out as well as can reasonably be expected (Antonovsky, 1987).

**Manageability** refers to the instrumental element of SOC and is described as the extent to which the individual perceives that he/she has adequate resources at his/her disposal to meet any internal or external demands. “At a person’s disposal” in this case refers to resources under the person’s own control or to resources controlled by legitimate others. To the extent that the individual has a high sense of manageability, he or she will not feel victimized by events or feel that life is unfair. Bad things do happen in life, but when they occur, one will be able to cope without endless grieving (Antonovsky, 1987).

**Meaningfulness** refers to the motivational element of SOC and is described as the extent to which the individual feels that life makes sense emotionally and that, at least, some of the problems and demands encountered are worthy of commitment and engagement, and may even be perceived as challenges. A person high on meaningfulness will be determined to seek meaning in unhappy experiences and will do her best to overcome them with dignity (Antonovsky, 1987).

In sum, SOC reflects a person’s view of life and capacity to respond to stressful situations (Lindström & Eriksson, 2005). Individuals with a stronger SOC tend to resist the harmful effects of stress by defining stimuli as either non-stressors or as being benign. They also define life happening as less stressful (comprehensibility), are able to identify and mobilize resources to manage with tension and stressful situations (manageability) and are more likely to select flexibly the most appropriate coping strategy (Pallant & Lae, 2002). Persons with stronger SOC also have a stronger motivation, wish and engagement to handle stressful situations (meaningfulness) compared to persons with weaker SOC (Antonovsky, 1987).

According to Antonovsky (1987) all three aspects of SOC are closely linked. However, Antonovsky argued that the meaningfulness component is the most central aspect of SOC because of its motivational element. There is, indeed, empirical support for Antonovsky’s theory and the linkages between the three components comprehensibility, manageability and meaningfulness. In the HeSSup Study, based on 20,000 working-age adults (Feldt et al., 2007), a confirmatory factor analysis supported the correlated three-factor solution for the SOC scale proposed by Antonovsky, i.e. that SOC is defined by the three dynamically interrelated factors comprehensibility, manageability and meaningfulness. Individuals who score high on the three components view the world as coherent, while those who score low in all components tend to view it as incoherent (Feldt, 2000).
Empirical findings on the stability of SOC
Antonovsky (1987) suggested that SOC is similar to other personality constructs, such as self-efficacy, hardness, locus of control, and learned helplessness (inversely). All these constructs influence how adaptive abilities resolve stressors and how one's perceptions of the world can affect one's health (Smith & Meyers, 1997). In line with many other personality attributes related to the individual's internal resources, Antonovsky (1987) hypothesized SOC to be a personal disposition that develops mainly during childhood and early adulthood and then stays relatively stable. He suggested that those with strong SOC will at best be able to maintain the strong SOC, a suggestion which was confirmed empirically by Nilsson (2002), as well as by Wainwright and colleagues (2007), whereas others, particularly those with a weak SOC, are most likely to experience decreasing levels of SOC after reaching adulthood (Poppius, Tenkanen, Kalimo, & Heinsalmi, 1999). Notwithstanding the view that SOC is relatively stable, Antonovsky (1987) argued that SOC could vary depending on important changes in the individual’s life situation and proposed that, for example, traumatic experiences can weaken SOC whereas social support can strengthen it.

There is empirical support for Antonovsky's suggestion that the individual’s SOC stays relatively stable over time. Feldt, Leskinen, Kinnunen, and Mauno (2000) found that SOC was moderately stable in adults over a twelve-month follow-up period. Hendrix, Nilsson, and Westman (2008) found that SOC was quite stable at a population level within a 10-year span, despite major changes in society during the same period and despite national statistics showing an increase in anxiety, sleeping problems and depression during the same period. However, some studies have indicated less stability of SOC by showing, for example, that SOC strengthens with advancing age (Eriksson & Lindström, 2005; Feldt, Leskinen, & Kinnunen, 2005; Feldt, Leskinen, Kinnunen, & Ruoppila, 2003). Moreover, Krantz and Östergren (2004) concluded that SOC is a psychological factor partly determined by an individual’s position in the social structure and partly by current work conditions, social network and support rather than predominantly by experiences in early life, i.e. before the age of 16.

Empirical findings on the link between SOC and health
Antonovsky (1987) argued that an individual’s SOC is essential to his/her long-term health. The results of various empirical studies support this argument. In order to deal successfully with the complexities of everyday life and remain healthy, all three components of SOC are necessary. To the degree that individuals with a stronger SOC can more effectively neutralize the harmful effects of stress, they appear to realize greater physical and mental health (Koushede & Holstein, 2009; Lindfors, Lundberg, & Lundberg, 2006; Lundberg & Nyström Peck, 1994; Smith & Meyers, 1997). Stronger SOC has shown to predict good health in both men and women (Lundberg & Nyström Peck, 1994; Suominen, Helenius, Blomberg, Uutela, & Koskenvuo, 2001) whereas a weak SOC is strongly related to health problems and has been found to predict adverse health prospects more than a strong SOC predicted good health (Kivimäki, Feldt, Vahtera, & Nurmi, 2000; Toivanen, 2007). The findings provide strong support for an association between stronger SOC and more favorable health and health-related behaviors, for example as it concerns coronary heart disease among white-collar workers (Poppius et al., 1999), circulatory health and mental health (Eriksson & Lindström, 2006), medicine use (Koushede & Holstein, 2009), BMI (Svartvik et al.,
as well as oral health behaviors (Bernabé et al., 2009). SOC has also been found to be strongly associated with psychosocial factors, such as self-esteem, adaptive coping, depression and hostility (Kivimäki et al., 2002; Lindfors, Lundberg, & Lundberg, 2005). Individuals with a stronger SOC appear to experience less anxiety, less depression, less anger, fewer symptoms of illnesses (Eriksson & Lindström, 2006; Smith & Meyers, 1997) and have lower risk for injuries (Poppius, Virkkunen, Hakama, & Tenkanen, 2008). All these findings support that strong SOC contributes to a greater likelihood of preventing dysregulation and achieving a more positive health outcome.

The health-promoting effects of SOC have become evident in more recent research (Feldt et al., 2000; Lindfors et al., 2005; 2006). Several cross-sectional studies have shown that a strong SOC is independently associated with good health and strongly associated with perceived good health, especially mental health (Suominen & Lindström, 2008). Studies have shown that women with a strong SOC are generally healthier, e.g. they have significantly lower levels of systolic blood pressure \((p < .05)\) and total cholesterol \((p < .05)\), than women with a weak SOC. It is furthermore suggested that the lower levels of systolic blood pressure and total cholesterol found in women with a strong SOC may constitute a biological buffer against illness and disease (Lindfors et al., 2005). A strong SOC is also associated with a reduced risk of all-cause mortality (Surtees et al., 2003).

**Empirical findings on self-rated health**

Empirical studies have shown that self-rated health (SRH) is a stronger predictor of future morbidity and mortality than medical diagnoses and it appears to be more stable than medical evaluations of health as well. Mellner (2004) proposed that one explanation might be that people make a distinction between the doctor’s diagnosis and their own explanation of their symptoms. Another important factor in self-rated general health might be the perception of control or lack of control, that is, powerlessness (Mellner & Lundberg, 2003). Mellner (2004) found that SRH is a strong predictor of health care use for a number of different diagnoses. Breidablik, Meland, and Lydersen (2008) concluded that SRH is a relatively stable construct during adolescence, and deteriorates with a poor general well-being, healthcare attendance and health-compromising behaviour. The result of a longitudinal study showed that a strong SOC seems to buffer the impact of recent stressful life events (e.g. family breakdown, financial crisis or physical abuse) on SRH (Richardson & Ratner, 2005). Previous research has shown that when employed within a sensible design, self-reports often represent a valuable and valid measurement strategy (Howard, 1994).

**Empirical findings on the link between SOC and lifestyle**

The empirical evidence of the link between SOC and health as measured by biomarkers or the existence of health problems may to a certain degree be influenced by lifestyle factors, i.e. that individuals with strong SOC tend to make healthier lifestyle choices. Previous research has shown that individual differences in SOC are associated with healthy lifestyle choices independently of social class and education (Wainwright et al., 2007). Kuuppelomäki and Utriainen (2003) found that there was association between strong SOC and physical activity, but no association was found with smoking and drinking neither for women nor for men. In contrast, Midanik, Soghikian, Ransom, and Polen (1992) showed that weak SOC was a significant negative predictor of alcohol...
problems. Lindfors and colleagues (2006), as well as Igna, Julkunen, and Ahlström (2008) concluded that for both genders smoking was associated with weaker levels of SOC, i.e. current smokers had weaker average SOC scores. Wainwright et al. (2007) reported that individuals with progressively stronger SOC reported that they smoked less, were more physically active, and had higher intakes of fruit, vegetables, and fibers. Hassmén, Koivula, and Uutela (2000) showed that individuals who exercised at least twice a week reported stronger levels of SOC.

The linkage between SOC and factors such as gender, education, and marital status

Several previous studies suggest that there is no significant difference between women and men as regards the average level of SOC (Langius & Björvell, 1993; Flannery, Perry, Penk, & Flannery, 1994; Abel, Walter, Niemann, & Weikunat, 1999; Johansson Hanse, & Engström, 1999). Some other studies show that men have a stronger average SOC than women (Buddeberg-Fisher, Klaghofer, & Schnyder, 2001). There is, however, some evidence that the linkage between SOC and physical health indicators is stronger for women than for men. For example, Kivimäki et al. (2000) concluded in a longitudinal sample of municipal employees that SOC significantly predicted sickness absences in a four-year follow-up period for women, while SOC had no predictive value for sickness absences of men. Moreover, various studies show important differences between women and men as regards symptom perception. Gijsbers van Wijk and Kolk (1997) found that there is a clear excess reporting of symptoms among women as compared to men and concluded that this difference was independent from the symptom measure, response format and time frame. Likewise, Tibblin, Bengtsson, Furunes, & Lapidus (1990) concluded that women generally presented more symptoms than men and are more attentive to their internal state. This factor may influence the relative strength of the link between SOC and health among women as compared to men.

Moreover, it can not be excluded that there are differences between women and men as regards the link between SOC and lifestyle choices. In Sweden, significantly more women than men smoke, while men consume more alcohol. The prevalence of BMI above 30 (obesity) is approximately the same for women and men (12% and 13% of population, respectively) (Swedish National Institute of Public Health, 2009). However, it is not clear how the differences in lifestyle choices are associated with SOC.

Antonovsky (1987) argued that SOC is a social concept, which develops more positively among persons growing up in a socio-economically stable environment with clearly defined norms and values. There is some empirical evidence that social class and education level are associated with SOC. Lundberg and Nyström Peck (1994) found that people employed in jobs that are usually associated with lower education (workers and farmers) had a greater than average risk of reporting a weak SOC as compared to white-collar workers and self-employed. The results of the HeSSup study revealed that unhealthy employees with low SOC and low education level were in the greatest risk to have reported intentions to retire early (Volanen et al., 2010). The EPIC-Norfolk study on SOC, lifestyle choices and mortality showed that stronger SOC was significantly associated with higher education level (Wainwright et al., 2007).

As for marital status, the empirical evidence is less clear-cut. Eriksson and colleagues (2007) reported somewhat stronger SOC for married/cohabiting individuals as
compared to non-married, divorced and widowed in a study comprising a random sample of 1500 people living in the Åland Islands, although the relationship between SOC and marital status was not statistically significant.

Purpose of the study and hypotheses
The purpose of this study was to investigate how SOC in middle-aged women relates to their health and a set of lifestyle factors. The health status was assessed through self-reported health in form of diseases and health problems, the existence and frequency of a number of physical and psychological symptoms, perceived psychological well-being, perceived overall health, as well as medicine consumption. The lifestyle factors included physical exercise, alcohol consumption, nicotine consumption and dietary habits. Moreover, the study aimed to investigate whether level of education, marital status and body mass index (BMI) vary according to the strength of SOC.

It was hypothesized that in their attempt to handle daily life and stressful events, women with a strong SOC would have better self-reported health, consume less medicines, and exhibit a healthier lifestyle (i.e. they would be more physically active, consume less alcohol and nicotine, and eat healthier) than women with a weak SOC. It was hypothesized that, according to the assumptions of Antonovsky, there would be a positive relationship between the degree of SOC and self-reported health, as well as between the degree of SOC and lifestyle, while there would be a negative relationship between the degree of SOC and medicine consumption. Further it was hypothesized that women with strong SOC would report more positive emotions and less negative emotions than women with weak SOC. It was also hypothesized that women with strong SOC would have higher education level since education might help individuals to further develop individual strengths. As it concerns marital status and BMI the study was explorative and it was hypothesized that marital status would not vary according to the strength of SOC, but that higher BMI would be associated with weaker SOC.

Method

Participants
Data were retrieved from a longitudinal research program, "The Individual Development and Adaptation" (IDA; Bergman, 2000; Wångby, 2004). The first data collection within the IDA-program was performed in 1965 and included all children who attended the third grade of compulsory schools in Örebro during the school year 1964/65, i.e. the children were at the time about 10 years old as most of them were born in 1955. This group comprised about 1,400 boys and girls which have been followed up to adult age. In 1998, when most individuals in the group were about 43 years, an extensive data collection was carried out directed to the women participating in the IDA ($N = 639$). The focus of this data collection was to gather information on women’s education, work and health situation. At the time, questionnaires were administered to all eligible 43-year-old women participating in the study ($N = 639$). A smaller but representative subsample of women ($n = 369$) was invited to participate in a routine medical examination and additional psychological tests. Of these 369 female participants, data from both the health checkup and questionnaires were made available for 366 women (Bergman, 2000; Wångby, 2004) whose data have been analyzed in the
present study. However, the data set was not complete for all of the 366 women, i.e. there were missing data for some questions for some women.

In order to get the largest possible sample size this study is limited to female participants only since less data were collected for the male participants of the IDA-program. The analysis has focused on the relationship between SOC, self-reported health and psychological well-being, medicine consumption and lifestyle factors. Information about education level, marital status and BMI were also included in the analysis.

Material
Measure of Sense of Coherence. In order to make it possible to measure an individual’s SOC, Antonovsky (1987) developed the so-called "Orientation to Life Questionnaire" (OLQ). The original SOC-questionnaire comprised 29 questions where the respondents could reply according to a seven-grade scale. A shorter form of 13 items (SOC-13) was later developed by Antonovsky (Feldt & Rasku, 1998; Lindström & Eriksson, 2005). In recent years, various alternative questionnaires have been developed with fewer questions and different scales in order to make it easier to use the SOC instrument in large-scale studies. The OLQ questionnaire has been evaluated in various studies and it has proven to be a reliable instrument. Eriksson and Lindström (2005) conducted a systematic review in order to analyze the validity and reliability of the OLQ-instrument based on 15 different versions of the questionnaire used in 458 studies published in scientific publications. The conclusion was that the SOC scale seems to be a reliable, valid and cross-culturally applicable instrument measuring how people manage stressful situations and stay well.

For the present study, participants answered the three-item version of the SOC-questionnaire that has been evaluated in a representative sample of the Swedish population aged 25–75 years (Lundberg & Nyström Peck, 1995). Based on the complex theoretical reasoning underlying Antonovsky’s (1987) original instrument, this short measure consists of three questions, corresponding to each of the components covered by the original SOC-instrument, i.e. manageability, meaningfulness and comprehensibility. The three questions used are: (a) "Do you usually see solutions to problems and difficulties that other people find hopeless?" (manageability), (b) "Do you usually feel that your daily life is a source of personal satisfaction?" (meaningfulness), and (c) "Do you usually feel that the things that happen to you in your daily life are hard to understand?" (comprehensibility). Answers were indicated with a three-point response format and have been transformed into a discrete numeric variable as follows: “yes, usually,” scored as 0, “yes sometimes,” scored as 1, and “no,” scored as 2 (Lindfors et al., 2006).

Since the third question is formulated negatively as opposed to the first two questions, the scores of the third question were reversed. Thereafter, an additive index was calculated giving a possible range of 0 (zero-score for all three questions) to 6 (score 2 for all three questions) with high scores indicating a weak SOC. In order to obtain groups of individuals with distinct profiles of SOC, previously established cut-off values were used where scores 3 and above indicate a weak SOC, 1 to 2 a moderate SOC and 0 a strong SOC (Lindfors et al., 2005). Previous studies of the three-item
measure have shown satisfactory test-retest reliability ($\kappa = .61$), and factor analyses have demonstrated that the items constitute a single factor similar to that of the original SOC measure (Lundberg & Nyström Peck, 1995). A reasonably strong association ($r = .66$) has also been reported between the three-item measure and the original scale. In addition, the relationships between the three-item measure and other variables have been found to be similar to those found in research using the original 29-item SOC measure. In sum, the validity and reliability of the three-item measure has been found satisfactory (Lundberg & Nyström Peck, 1994, 1995; Surtees et al., 2003).

Self-reported health
Self-reported health was studied with questions about diseases, existence and frequency of symptoms as well as about perceived psychological well-being according to the public health questionnaire created by The National Board of Health and Welfare in Sweden. The prevalence of diseases was assessed with the question: “Do you or did you in adult age ever have any of the following diseases?” The response alternatives were “yes/no” and each of the diseases was categorized into one of eight categories, identical to the categorization used for consumed medicines. Indices were calculated by adding diseases together using the same categorization, i.e. pain, heart diseases, respiratory organs/eyes/skin, digestive organs and metabolism, mental diseases and the nervous system symptoms, female hormones, diabetes as well as inflammatory diseases. An additional category was used to record multiple-reporting of diseases.

Symptom frequency was assessed with questions on physical and psychological symptoms commonly reported by women in the general population (Krantz & Östergren, 1999). The physical symptoms included stomach aches, headache, palpitations, sleeping problems, breathing difficulties, chest pain, dizziness, nausea, pain in arms/legs/neck/shoulders, back problems, as well as itch and skin problems. The psychological symptoms included feeling depressed, restless, anxious, tired and exhausted, difficulties unwinding, powerless, passive, as well as not wanting to meet other people. The participants reported the frequency of the symptoms they had experienced during the last 3-4 weeks according to a three-point scale (“almost daily”, “a few times a week”, “occasionally”). The symptoms were added together to calculate indices with higher scores indicating fewer symptoms.

The perceived psychological well-being was assessed from a set of questions about how the participants feel in general. The questions were modified from the Positive and Negative Affect Schedule (PANAS) (Watson, Clark, & Tellegen, 1988). The questions were divided into positive emotions (interested, alert, eager, inspired, strong, determined, attentive, enthusiastic, hard-working, proud) and negative emotions (irritable, uninterested, ashamed, displeased, nervous, guilty, frightened, hostile, tense, scared), both five-point scale, and indices were calculated accordingly with high scores indicating high negative and positive emotions, respectively.

Respondents were also asked to rate their overall health status along a five-point-scale ranging from excellent to very poor (Idler & Benyamini, 1997; Manderbacka, 1998).
Medicine consumption

Raw data concerning medicine consumption, including each individually reported medicine, were reviewed for the 369 women who participated in medical health examination. Each of the medicines (comprising approximately 130 different medicines in total) were categorized into one of the following eight categories (corresponding to the categories of self-reported diseases): 1) pain, 2) heart diseases, 3) respiratory organs/eyes/skin, 4) digestive organs and metabolism, 5) mental diseases and the nervous system symptoms, 6) female hormones, 7) diabetes and 8) inflammatory diseases. Category 9 was used to record multiple use of medicines. The categorization was done by using FASS (2009), a thesaurus of all the medicines approved by the Swedish Medical Products Agency, as the main source of information. Additive indices according to the categorization (1-9) were calculated.

Lifestyle

The lifestyle part of the questionnaire included questions on exercise, alcohol consumption, nicotine consumption and dietary habits. Exercise was assessed with the question: “Do you exercise? (e.g. aerobics, jogging, cycling or long and rapid walking)”, five-point-scale (“yes, at least three times a week”; “yes, approximately twice a week”; “yes, approximately once a week”; “yes, but not very often”; “no, never or almost never”). The question on alcohol consumption involved regularity of consumption: “How often do you drink alcohol?”, five-point-scale (“never”; “once a month or more seldom”; “2-4 times per month”; “2-3 times per week”; “4 times a week or more often”). Nicotine consumption (i.e. smoking or using snuff) was asssed by question: “Do you smoke or use snuff currently?”, three-point-scale (“yes, daily”; “yes, sometimes”; “no”). Dietary habits were evaluated with the question: “Do you try to eat healthy food?”, four-point scale (“yes, it determines almost totally what I eat”; “yes, in most cases”; “sometimes”; “no, I eat what I like”).

Education level, marital status, and body mass index

Additive indices were calculated for education level (0 = high education, studies at university; 1 = low education, upper secondary school or lower) and marital status (0 = single; 1 = married/living with a partner). BMI, kg/m², was calculated for each participant for which data were available on height and weight. WHO has presented Body Mass Index (BMI) as an international assessment of overweight and obesity. A BMI between 18.50 and 24.99 is defined as normal weight, a BMI between 25.00 and 29.99 as overweight, and a BMI 30.00 and above is defined as obesity. Persons with a BMI below 18.50 tend to be underweight.

Statistical analyses

After having divided the sample into three groups with weak, moderate and strong SOC, mean values and standard deviations for self-reported health, medicine consumption and the lifestyle factors were calculated for each group. Relationships between SOC and other variables were analyzed using χ²-tests and differences between the groups according to SOC-level were analyzed using one-way analyses of variance (ANOVA). Significant differences were further examined by post hoc comparisons using the Bonferroni method (Howell, 2007). The lifestyle factors were treated as dependent variables, which is in line with Antonovsky’s assumption that SOC is a rather stable personality trait that determines the lifestyle choices (Antonovsky, 1987). The analysis
has catered for the fact that some of the dependent variables were treated as continuous variables and others as discrete variables. Analyses were made by using SPSS Statistics 17.0. In all analyses, the significance level was set to \( p < .05 \).

Results

Sample characteristics

A majority of the 366 women (54.6%) had a lower education. 15.7% of participants had education below upper secondary school, 39.0% had upper secondary school, 8% had university studies without a degree and 37.3% had an university degree. Altogether 57.7% of the participants (\( n = 211 \)) were full-time employed whereas 19.9% (\( n = 73 \)) reported having a part-time employment. Most women (77.1%) were married or living with a partner. Descriptive statistics for all study variables are shown in Table 1.

SOC

As shown in Table 1 scores on the SOC measure (\( n = 356 \)) ranged from 0 to 5 (\( M =1.5, SD = 1.1 \)) with a median of 2.0. Categorization of the participants using established cutoff values revealed that 62.4% (\( n = 222 \)) of the women had a moderate SOC, whereas 20.8 % (\( n = 74 \)) had a strong SOC, and 16.8% (\( n = 60 \)) a weak SOC.

SOC and self-reported health

The results of the statistical \( \chi^2 \)-analyses of the link between SOC and self-reported health in form of nine categories of diseases are summarized in Table 2. The results show that there was a relationship between SOC and the various categories of self-reported diseases. However, the relationship was statistically significant only for the category “pain”. It should be noted that fibromyalgia was the only disease included in this category and just 4.0 % of the participants reported having fibromyalgia.

In order to explore differences between SOC groups, one-way between-groups analyses of variance were conducted. Women were divided into three groups according to their strength of SOC. There was a statistically significant difference at the \( p < .05 \) level in psychological symptom frequency scores for the three SOC groups: \( F(2, 259) = 6.74, p < .001 \). Women in the moderate SOC group reported highest psychological symptom frequency, followed by strong and weak SOC groups. As it regards reported physical symptom frequency the results showed no significant differences between the SOC groups, \( F(2, 333) = 2.50, p \ ns. \) Women with strong SOC had the highest reported physical symptom frequency, followed by women with moderate and weak SOC.

As for the assessment of psychological well-being, women with strong SOC reported significantly more positive emotions \( F(2, 335) = 31.92, p < .0001 \), as well as significantly less negative emotions \( F(2, 331) = 14.89, p < .0001 \) as women with moderate and weak SOC. The stronger the SOC was, the more positive emotions and the less negative emotions were reported.

The analysis also showed a significant difference between the level of SOC and the perceived overall health status \( F(2, 353) = 9.44, p < .0001 \). The stronger the SOC was, the higher the participants estimated their overall health.
Table 1. Descriptive statistics for all study variables for participating women.

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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( M )</td>
<td>1.50</td>
<td>1.08</td>
<td>0 - 5</td>
<td>3.22</td>
<td>0.49</td>
<td>1.54</td>
<td>0.50</td>
<td>0.00</td>
</tr>
<tr>
<td>( SD )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-reported health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychol. symptom freq.</td>
<td>7.19</td>
<td>6.36</td>
<td>0 - 21</td>
<td>10.28</td>
<td>6.56</td>
<td>6.90</td>
<td>6.14</td>
<td>5.92</td>
</tr>
<tr>
<td>Physical symptom freq.</td>
<td>10.34</td>
<td>6.34</td>
<td>0 - 30</td>
<td>11.82</td>
<td>6.35</td>
<td>10.34</td>
<td>6.26</td>
<td>9.41</td>
</tr>
<tr>
<td>Perceived overall health</td>
<td>1.83</td>
<td>0.83</td>
<td>1 - 5</td>
<td>2.15</td>
<td>0.90</td>
<td>1.84</td>
<td>0.81</td>
<td>1.54</td>
</tr>
<tr>
<td>Psychol. WB/pos. em.</td>
<td>36.67</td>
<td>4.51</td>
<td>19 - 49</td>
<td>33.91</td>
<td>4.40</td>
<td>36.34</td>
<td>4.33</td>
<td>39.76</td>
</tr>
<tr>
<td>Psychol. WB/neg. em.</td>
<td>17.54</td>
<td>5.97</td>
<td>10 - 40</td>
<td>20.75</td>
<td>5.95</td>
<td>17.60</td>
<td>6.10</td>
<td>15.10</td>
</tr>
<tr>
<td>Lifestyle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical exercise</td>
<td>2.42</td>
<td>1.30</td>
<td>1 - 5</td>
<td>2.65</td>
<td>1.49</td>
<td>2.38</td>
<td>1.27</td>
<td>2.33</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>2.68</td>
<td>0.77</td>
<td>1 - 5</td>
<td>2.53</td>
<td>0.79</td>
<td>2.73</td>
<td>0.77</td>
<td>2.69</td>
</tr>
<tr>
<td>Nicotine consumption</td>
<td>1.52</td>
<td>0.84</td>
<td>1 - 3</td>
<td>1.42</td>
<td>0.79</td>
<td>1.58</td>
<td>0.88</td>
<td>1.43</td>
</tr>
<tr>
<td>Dietary habits</td>
<td>2.54</td>
<td>0.72</td>
<td>1 - 4</td>
<td>2.65</td>
<td>0.76</td>
<td>2.60</td>
<td>0.72</td>
<td>2.27</td>
</tr>
<tr>
<td>Education level</td>
<td>4.48</td>
<td>2.40</td>
<td>1 - 7</td>
<td>3.84</td>
<td>2.46</td>
<td>4.42</td>
<td>2.37</td>
<td>5.16</td>
</tr>
<tr>
<td>Marital status</td>
<td>2.13</td>
<td>0.71</td>
<td>1 - 5</td>
<td>2.16</td>
<td>0.71</td>
<td>2.13</td>
<td>0.75</td>
<td>2.13</td>
</tr>
<tr>
<td>Body-Mass-Index</td>
<td>24.33</td>
<td>3.85</td>
<td>17.65</td>
<td>25.28</td>
<td>4.78</td>
<td>24.17</td>
<td>3.58</td>
<td>23.96</td>
</tr>
</tbody>
</table>

Table 2. Self-reported health in form of diseases as related to strength of SOC.

<table>
<thead>
<tr>
<th>Diseases</th>
<th>SOC</th>
<th>Asymp. Sig.</th>
<th>Exact Sig.</th>
<th>Sig. (2-sided)</th>
<th>Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weak (n = 60)</td>
<td>Moderate (n = 222)</td>
<td>Strong (n = 74)</td>
<td>Total</td>
<td>%</td>
</tr>
<tr>
<td>Pain</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>14</td>
<td>4.0</td>
</tr>
<tr>
<td>Heart diseases</td>
<td>12</td>
<td>29</td>
<td>9</td>
<td>50</td>
<td>14.2</td>
</tr>
<tr>
<td>Respiratory organs/eyes/skin</td>
<td>12</td>
<td>41</td>
<td>15</td>
<td>68</td>
<td>19.3</td>
</tr>
<tr>
<td>Digestive organs and metabolism</td>
<td>2</td>
<td>10</td>
<td>5</td>
<td>17</td>
<td>5.4</td>
</tr>
<tr>
<td>Mental diseases and the nervous system</td>
<td>13</td>
<td>31</td>
<td>7</td>
<td>51</td>
<td>14.5</td>
</tr>
<tr>
<td>Female hormones</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td>9</td>
<td>2.6</td>
</tr>
<tr>
<td>Diabetes</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>8</td>
<td>2.3</td>
</tr>
<tr>
<td>Inflammatory diseases</td>
<td>13</td>
<td>30</td>
<td>11</td>
<td>54</td>
<td>15.2</td>
</tr>
</tbody>
</table>

* Cells have expected count less than 5.
Note: The analysis showed that eight cells had expected count below five, so an exact significance test was selected for chi-square.

**SOC and medicine consumption**

When a nurse asked the women about their current medication, 43.4% of the participants (n = 159) reported that they consumed some kind of medicine. The percentage of women reporting medicine consumption, as well as the results of the statistical χ²-analyses of the linkage between SOC and self-reported medicine consumption for each of the nine categories of medicines, are summarized in Table 3. According to Pearson’s correlation there was a significant negative correlation between SOC and the use of medicines for mental diseases and nervous system symptoms, between strong and weak SOC groups (r = -.17, p < .05), as well as between moderate and weak SOC groups (r = -.13, p < .05). There was also a significant negative correlation between SOC and consumption of female hormones between moderate and weak SOC groups (r = -.12, p < .05). The analysis showed a negative correlation between strong and weak (r = -.15, p < .05), as well as between moderate and weak SOC groups (r = -.16, p < .05) for the multiple use of medicines, i.e. women with weak SOC used medicines from several categories more often compared to women with strong and moderate SOC.

**SOC and lifestyle**

Table 1 presents descriptives for the analysis of the association between SOC and lifestyle factors. A one-way analysis of variance revealed a significant main effect regarding SOC in relation to dietary habits $F(2, 350) = 6.74, p < .001$ indicating that women with strong SOC had the healthiest dietary habits. In contrast, the analysis showed no significant differences between the SOC groups as regards physical exercise $F(2, 351) = .30, p$ ns; alcohol consumption $F(2, 353) = 1.63, p$ ns, and nicotine consumption $F(2, 349) = 1.407, p$ ns. There was a positive correlation between exercise
and healthy dietary habits, \((r = .114, p < .05)\) and a negative correlation between nicotine consumption and healthy dietary habits and \((r = -.267, p < .001)\).

Table 3. Self-reported health in form of medicine consumption as related to strength of SOC.

<table>
<thead>
<tr>
<th>Medicine category</th>
<th>SOC</th>
<th>Mode-rate (n = 60)</th>
<th>Strong (n = 74)</th>
<th>Total (n = 222)</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>%</td>
<td>(\chi^2)</td>
</tr>
<tr>
<td></td>
<td>Weak (n = 60)</td>
<td>7</td>
<td>21</td>
<td>7</td>
<td>35</td>
<td>9.8</td>
</tr>
<tr>
<td></td>
<td>Strong (n = 74)</td>
<td>6</td>
<td>29</td>
<td>13</td>
<td>48</td>
<td>13.5</td>
</tr>
<tr>
<td>Heart diseases</td>
<td></td>
<td>5(^a)</td>
<td>9</td>
<td>6(^a)</td>
<td>20</td>
<td>5.6</td>
</tr>
<tr>
<td>Respiratory organs/eyes/skin</td>
<td></td>
<td>6</td>
<td>29</td>
<td>13</td>
<td>48</td>
<td>13.5</td>
</tr>
<tr>
<td>Digestive organs/metabolism</td>
<td></td>
<td>7</td>
<td>18</td>
<td>9</td>
<td>34</td>
<td>9.6</td>
</tr>
<tr>
<td>Mental diseases and the nervous system</td>
<td></td>
<td>11(^a)</td>
<td>12</td>
<td>1</td>
<td>24</td>
<td>6.7</td>
</tr>
<tr>
<td>Female hormones</td>
<td></td>
<td>12</td>
<td>17</td>
<td>9</td>
<td>38</td>
<td>10.7</td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
<td>0(^a)</td>
<td>3(^a)</td>
<td>2(^a)</td>
<td>5</td>
<td>1.4</td>
</tr>
<tr>
<td>Inflammatory diseases</td>
<td></td>
<td>2(^a)</td>
<td>11</td>
<td>2(^a)</td>
<td>15</td>
<td>4.2</td>
</tr>
<tr>
<td>Multiple medicines</td>
<td></td>
<td>16</td>
<td>24</td>
<td>9</td>
<td>49</td>
<td>13.8</td>
</tr>
</tbody>
</table>

\(^a\) Cells have expected count less than 5.

Note: The analysis showed that eight cells had expected count below five, so an exact significance test was selected for chi-square.

**SOC and education**

The \(\chi^2\)-analysis showed a statistically significant relationship between SOC and level of education \(\chi^2(2, n = 317) = 9.900, p = .007\). Women with strong SOC had higher education than women with weak SOC.

**SOC and marital status**

The result of a \(\chi^2\)-analysis showed no significant relationship between the SOC and marital status \(\chi^2(2, n = 321) = 3.681, p = ns\).

**BMI**

The data on BMI \((n = 341)\) ranged from 17.65 to 43.21 \((M = 24.33, SD = 3.85)\). Altogether 65.1% of the women \((n = 222)\) had a BMI < 25, three of these women \((0.9\% of the sample)\) had a BMI under 18.5. In total 27.0% \((n = 92)\) of the participants were defined as overweight and 7.9% \((n = 27)\) as obese. In order to explore the differences in BMI between the SOC groups, a one-way between-groups analysis of variance was conducted. The results showed no significant differences in BMI between the groups \(F(2, 336) = 2.564, p = ns\), though BMI tended to be higher, the lower the SOC was.
This study aimed at investigating how sense of coherence in middle-aged women relates to their health status, medicine consumption and a set of lifestyle factors. Moreover, the study investigated whether level of education, marital status and body mass index vary according to the strength of SOC. In line with the hypotheses the results show a generally positive relationship between the degree of SOC and most of the indicators used to assess the health status (in terms of self-reported health), while there is a negative relationship between the degree of SOC and consumption of some medicine. The association between the degree of SOC and lifestyle factors was found to be less prominent and only dietary habits were strongly associated with SOC. The result of the study is in line with the hypothesis as it concerns level of education as women with strong SOC had significantly higher education than women with weak SOC. The results of the present study showed no significant differences between the SOC groups as regards marital status and BMI.

The results show a relationship between SOC and the nine categories of self-reported diseases, i.e. women with strong SOC reported fewer diseases. However, the result was statistically significant only for the category “pain”, which included just one disease, namely fibromyalgia and only 4.0 % of the women reported having this disease. It is problematic to draw conclusions from this, because the $\chi^2$-analysis did not consistently fulfill the requirement that all expected frequencies should be at least five. Given that fibromyalgia is rather infrequent and complex to diagnose, this result should be interpreted with some caution. Though, previous research on women with fibromyalgia has shown that women with a stronger SOC perceived greater well-being than those with weaker SOC (Söderberg, Lundman, & Norberg, 1997).

In line with the initial hypothesis the present study showed that women with strong SOC had better psychological well-being as they reported significantly more positive emotions and significantly less negative emotions than did women with a weak SOC. The findings on self-rated overall health status followed a similar pattern, and were also in line with the hypothesis and Antonovsky’s theory (1987), by showing that women with strong SOC reported significantly higher perceived overall health. However, women with strong SOC declared that they more frequently perceived symptoms of physical and psychological health problems. This result is somewhat surprising, and it is in contrast to the hypothesis. The present findings indicate that stronger SOC is associated with more perceived symptoms of health problems, which seem to be in conflict with the result that strong SOC is associated with higher rating of perceived overall health. One plausible explanation could be that participants with strong SOC endure symptoms of illnesses better than individuals with weaker SOC so that they report more perceived symptoms but still consider their overall health status to be good. Another explanation could be that people make downward comparisons to maintain a positive self-image (Breetvelt & van Dam, 1991). That could lead to a tendency to evaluate one’s own general health status as better in general than it might be from a medical point of view (Mellner & Lundberg, 2003).

The association between SOC and medicine consumption is a relatively novel area of research and the IDA data has previously not been used for this purpose. The present
study showed a relationship between SOC and the use of medicines, although statistically significant for three medicine categories only. As regards medicines for mental diseases and nervous system symptoms the relationship was significant between strong and weak SOC groups, as well as between moderate and weak SOC groups, i.e. women with weak SOC consumed significantly more medicines for mental diseases and nervous system symptoms than women with both strong and moderate SOC. There was also a significant relationship between SOC and consumption of female hormones between moderate and weak SOC groups, i.e. women with weak SOC consumed significantly more female hormones than women with moderate SOC. As for the multiple use of medicines, there was a significant relationship between strong and weak, as well as between moderate and weak SOC groups, i.e. multiple use of medicines was significantly more common among women with weak SOC as compared to women with strong and moderate SOC. The results are in line with the hypothesis of this study and also with previous empirical studies showing that persons with weak SOC tend to consume more medicines. For example, Koushede et al. (2009) concluded that adolescents with weak SOC used medicine to cope with headaches to a greater extent than adolescents with strong SOC. This is an area where more research would be of particular interest in order to investigate why certain individuals may be inclined to excessive consumption of medicines.

As regards the association between SOC and lifestyle factors, the results of the present study confirmed a statistically significant difference between the SOC groups for dietary habits only, i.e. women with strong SOC had the healthiest dietary habits. This result is in line with previous research. As dietary habits may influence individuals’ health and BMI (Lindfors et al., 2005), it would have been expected that better dietary habits would lead also to significantly lower BMI. In this connection, it is interesting to note that the results showed no significant difference between the SOC groups as to the level of BMI and physical exercise. However, women with weak SOC had higher mean BMI than women with strong and moderate SOC.

The study results did not indicate any significant difference between SOC-levels and physical exercise, which differs from the findings of Hassmén and colleagues (2000) as they concluded that individuals who exercised at least twice a week reported significantly stronger levels of SOC. Neither did the study results give evidence of differences between the SOC groups as regards alcohol consumption or nicotine consumption. This is somewhat surprising, but is still in line with previous findings by Kuuppelomäki and Utriainen (2003). Regardless of this, some previous studies have shown negative correlation between SOC and alcohol consumption (Midanik et al., 1992), as well as between SOC and nicotine consumption (Igna, Julkunen, & Ahlström, 2008).

The result of the study shows that women with stronger SOC had significantly higher education than women with weaker SOC. This result is in line with the hypothesis since higher education might help individuals to further develop individual strengths. Previous research has also found a clear positive association between SOC and education level. For example, the EPIC-Norfolk study on SOC, lifestyle choices and mortality showed significantly stronger SOC for individuals with higher education (Wainwright et al., 2007).
The result of the study showed no significant relationship between the SOC groups as regards marital status. This is intuitively somewhat surprising given the conventional view in society on the positive aspects of having close relationships. However, the result actually fits well with previous research reporting that the association between SOC and marital status was only weak (e.g. Eriksson et al., 2007).

Taken together, the results support generally the hypotheses of the present study that there is a positive association between SOC and health. The results also fit well with previous empirical studies which have showed positive linkages between SOC and health (e.g. Koushede & Holstein, 2009; Lindfors et al., 2006; Lundberg & Nyström Peck, 1994). Eriksson and Lindström (2005) concluded that the positive association between SOC and health is manifested in study populations regardless of age, sex, ethnicity, nationality, and study design.

It should be emphasized that the structure of the SOC concept is still not completely clear. SOC seems to be multidimensional rather than a unidimensional in character (Lindfors et al., 2006). The SOC theory is not distinct, in particular, there is lack of knowledge of causalities. According to the theory, SOC influences individual’s health, but it can be discussed if the direction of the causality is a plausible assumption. It is more likely that the association between SOC and health is a mutual interplay, i.e. that SOC can be influenced by an individual’s health and even by lifestyle choices and education level. Antonovsky (1987) assumed that SOC can vary due to different life situations. It can be assumed that SOC might even vary between e.g. professional and private situations. Due to this mutual interplay between SOC and different health variables it is difficult to comment on the causality. In the same vein, Wainwright and colleagues (2008) proposed that there appear to be multiple explanations why SOC is associated with health and future mortality risk. These explanations may be linked to confounding factors, e.g. factors associated with socioeconomic status or physical state (confounded by pre-existing preclinical diseases), factors influencing the pathways mediated by lifestyle choices (independently of socioeconomic status) and other pathways possibly involving social stress. Wainwright and colleagues (2008) concluded that these findings support SOC as a marker of future disease risk and as a potential aid to understanding differences in health outcomes between individuals.

Method discussion
On the whole, the design and the method of the present study should cater for a relatively high validity of the results. Although studies relying on self-report variables have some inherent weaknesses, since it is generally difficult to assess whether it is the trait or method components that are responsible for the observed correlation, longitudinal studies normally allow for more confident conclusions about causal relations as compared to studies with cross-sectional designs (Spector, 1994). The sample used in the present study material can be considered to be of good quality since it is extracted from among the female participants of a longitudinal study. It includes a full age cohort of a middle-sized Swedish town thus comprising participants from all social classes and individuals who over the years have developed different health characteristics. This can be considered as a benefit when making a cross-sectional analysis in order to construct a representative sample. Nevertheless, the sample is not
representative for the general population. The participants are homogeneous as regards age, sex and geographical origin. This must be taken into account when generalizing the findings. Moreover, self-reports often represent a valuable and valid measurement strategy (Howard 1994). Empirical studies have also shown that self-rated health is a stronger predictor of future morbidity and mortality than medical diagnoses and it appears to be more stable than medical evaluations of health as well (Mellner, 2004).

This notwithstanding, there are some clear limitations to the chosen design and the method of the study, mostly reflecting limitations to the existing data. The SOC measure used here is based on three items alternative reply choices only, but despite its limitations the three-item version is a valid short form measure of SOC (Lundberg & Nyström Peck, 1995). Caution is anyhow required in order to interpret the associations between SOC, lifestyle factors and self-reported health in the present study. Using Antonovsky’s original 29-item questionnaire would, without doubt, have given more comprehensive interval data for the SOC variable, thus being more amenable to various types of statistical testing with parametrical methods. Instead, the present study was based on ordinal data, which limits the possibility for regression and variance analysis. However, results from previous research support the fact that the SOC scale is a valid instrument also in the condensed three-item version. The proponents behind the simplified three-item version of the SOC questionnaire, Lundberg and Nyström Peck (1995), argued that the simplified measure is a useful substitute for the original scale, especially in cases where information on SOC would otherwise have been totally omitted. This conclusion is supported for example by Lindfors and colleagues (2005, 2006), as well as by Ericsson and Lindström (2005, 2006) in their systematic review of 458 scientific articles and 13 doctoral theses applying various versions of the SOC scale, including the three-item version. Eriksson and Lindström concluded that the SOC scale has proven to be psychometrically comparatively sound. They also concluded that the intercorrelation between the original SOC questionnaires and the alternatives are acceptable. The reliability of the three-item version (SOC-3) measured by weighted $k$ was 0.61 (Eriksson & Lindström, 2005), which indicates moderate reliability.

The data set was not complete for all of the 366 women included in the sample, i.e. there is missing data for some questions for some women. Despite this fact, it is important to include as many participants as possible in every analysis without assigning them answers (e.g. “no answer” was not treated as “no”). The existence of missing data was acknowledged in the statistical analyses and the overall number of missing data varied somewhat. Anyhow, the internal drop-out was not of such a magnitude that it would materially influence the results of the study.

It could be seen as a limitation that this study includes only women. It can also be seen as strength that all the participants are of the same gender, in the same age and that the group is quite homogenous. In earlier studies the sample has been estimated as representative (Lindfors et al., 2005, 2006) and therefore it can be assumed that it is possible to generalize the results of the study at least for Swedish women in corresponding age.

In fact, there are good reasons to investigate the link between SOC and health particularly for women. Even though the definition of health is equally valid for both
sexes, conditions to achieve health may vary significantly between men and women. From a medical viewpoint, men probably live less healthy lives, but from a sociomedical viewpoint, women have less healthy lives – women simply do not feel well as often as men do (Verbrugge, 1982). Differences in morbidity between women and men can be explained in different ways. There are biological differences between the sexes: genes, hormones and physiology entail differing risks on ill health (National Heart, Lung and Blood Institute, 2002). There are also differences primarily in health-related behaviors and conditions of life. For example, the biggest risks for women to develop a coronary heart disease are heredity, high blood pressure, abdominal obesity, diabetes - and smoking is the dominating risk factor. In Sweden more women than men smoke, yet despite of the fact that women and men are affected as often by coronary heart diseases, which are the most common causes of death for both men and women in Sweden, women are affected about ten years later than men. When women are affected by some other diseases, for example chronic obstructive lung disease, they also become sicker than men and require more medical care (The Swedish Heart-Lung Foundation, 2010).

In interviews and questionnaires regarding health, women report more often than men many symptoms (Gijsbers van Wijk & Kolk, 1997; Tibblin et al., 1990). Women also seek medical care more often and consume more pharmaceuticals. In Sweden, the state support paid for medicines is approximately 30% higher for women than for men in the age group 15-44 years. The number of female patients is almost 70% higher than the number of male patients in the national health care system (The National Board of Health and Welfare, 2010). Though there is no evidence that women seek medical care unnecessarily, women can be more observant and have a higher degree of bodily awareness than men have. There are also some indications that women find it easier than men to report on possible problems and to seek help (The National Board of Health and Welfare, 1998). These facts indicate that it is important to better understand the link between SOC and health for women in order to find ways to improve the health situation among women, to reduce health risks and to reduce health care costs in society.

As a general conclusion, although women live longer than men, they seem to suffer from illness more than men and they also in many ways experience worse conditions, such as, on average, lower salaries, less influence in working life and greater responsibility for home and children in parallel with employment (The National Board of Health and Welfare, 1998). Research on women’s health is an expanding field and it has a great societal importance and impact. It is important to assess middle-aged women’s health, psychological well-being and lifestyle, as well as to identify eventual health risks before women enter menopause, in order to counteract and take actions to prevent ill health, mitigate existing physical and psychological complaints, as well as to reduce the burden on society.

Antonovsky (1987) argued that the individual’s SOC is rather stable over time, particularly after the individual has reached the age of 30. If this assumption is true, the fact that survey data was measured only on one age cohort would not imply a major distortion. However, recent research shows that the stability of SOC over time may be lower than Antonovsky assumed. Eriksson and Lindström (2006) concluded that SOC
tends to increase with age over the whole life span, although only small differences are found over a time span of three to five years. Eriksson and Lindström note that it is unclear whether the increased SOC over the life span is an effect of natural selection (that healthy people survive) or rather an effect which reflects that people staying healthy develop a stronger SOC over time. Moreover, it can not be excluded that “generational” factors could influence the results, i.e. that specific problems encountered by persons of the same age group or borne and raised in the same generation could influence the strength of the link between SOC and health (Eriksson & Lindström, 2006). Ideally, it would thus have been useful to study data from different age groups, particularly also including younger people, and with a follow-up period longer than six years.

It is also a weakness that the study relies entirely on existing data. For the present study there was no possibility to influence the design of the data collection methods to minimize measurement errors. Making errors in data collection and measurements or missing some data is possible. It is also possible that self-reports are influenced for instance by participants’ attitudes, motivation, cognitions, mood, personality, memory, social desirability or current life situation. The fact that the research participants have been participating in a longitudinal study since they were ten years old, as well as that they know they will participate in the future examinations the rest of their lives (if they wish so) might also have an impact on the study results. The knowledge that one has been included in a lifelong study can affect the participants in different ways. The motivation to participate can vary from positive and enthusiastic to negative and frustrated or “tired”, e.g. depending on what is being studied (e.g. self-reports or physical indicators of health), the current life situation, as well as over time. The participants might feel “flattered” by the attention they receive by being included in the study and that can, accordingly, have an impact on their behavior and lifestyle, both timely close to or during research occasions and/or lifelong. The fact that participants might recall research questions, as well as their own answers from previous research occasions, may also influence their current and/or future answers.

Conclusions
Despite these limitations and weaknesses, the results of this study can be beneficial and valuable both on an individual, as well as on a society level. SOC offers a useful model for understanding the relationship between personality, as well as psychological well-being and physical health. It is important to study whether the strength of SOC plays an important role on how successfully an individual manages the strains of daily life and how it might affect the individual’s lifestyle choices and health. For example, Wainwright and colleagues (2007) concluded that poor diet, physical inactivity, smoking, and excessive alcohol consumption were major causes of morbidity and mortality in the United Kingdom, and have a huge impact on the national health system. Previous research has also shown that a weak SOC had a significant effect on frequent attendance in primary health care (Bergh, Baigi, Fridlund, & Marklund, 2006).

A lower self-rated general health is associated with a weaker SOC. Mellner and Lundberg (2003) considered that self-rated health is strongly associated with health care utilization and might be used as a risk indicator. They also concluded that in preventing poor health development, individuals reporting poor self-rated health might be in need
of more help and support from the health service. Hence, it is of significant importance for the follow-up of these considerations, both for an individual as well as for the society, when confronting the problems to manage the daily strains.

To conclude, the results of this study support the hypothesis that a strong SOC in middle-aged women is an important health promoting resource which strengthens resilience and develops a positive subjective state of health. Because only few studies have examined linkages between SOC and medicine consumption, this study extends previous findings by indicating a linkage between medicine consumption and SOC. Weak SOC is associated with higher consumption of medicines. It is thus important that further research gives attention to the development of interventions that could strengthen SOC. This study showed a linkage between strong SOC and healthy dietary habits, while no or only weak linkages were found for physical exercise, alcohol and nicotine consumption. The findings thus seem to indicate that the health promoting effects of SOC are to a certain extent independent from the individual’s lifestyle, which is well in line with Antonovsky’s theory (1987).

References


