THEORY AND METHODS

Antonovsky's sense of coherence scale and the relation with health: a systematic review

Monica Eriksson, Bengt Lindström

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See end of article for authors' affiliations

Correspondence to: Monica Eriksson, Folkhälsan Research Centre, Health Promotion Programme, PO Box 63, FIN-00250 Helsinki; monica.eriksson@folkhalsan.fi

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Study objective: The aim of this paper is to synthesise empirical findings on the salutogenic concept sense of coherence (SOC) and examine its capacity to explain health and its dimensions.
Design: The study is descriptive and analytical with a systematic integration of the contemporary knowledge base on the salutogenic research published 1992–2003. The review includes 458 scientific publications and 13 doctoral theses.
Setting: Worldwide, based on postgraduate scientific publications in eight authorised databases, doctoral theses, and available books.
Main results: SOC is strongly related to perceived health, especially mental health. The stronger the SOC the better the perceived health in general, at least for those with an initial high SOC. This relation is manifested in study populations regardless of age, sex, ethnicity, nationality, and study design. SOC seems to have a main, moderating or mediating role in the explanation of health. Furthermore, the SOC seems to be able to predict health. SOC is an important contributor for the development and maintenance of people's health but does not alone explain the overall health.
Conclusion: SOC seems to be a health promoting resource, which strengthens resilience and develops a positive subjective state of health. Salutogenesis is a valuable approach for health promotion and would be worth to implement in practice much more than to date.

This paper continues to review, analyse, and synthesise the evidence base of research on the sense of coherence (SOC) concept in the light of 25 years of research undertaken by the authors.[1–4] The main purpose is to provide a more comprehensive understanding of the SOC concept from research between 1992–2003. This is a relevant contribution to health promotion and public health research. It is necessary to get deeper knowledge about the interaction between SOC and socioeconomic characteristics like age, sex, social class, and how SOC might be related to physical and mental health. Are there any relations and does the SOC have an impact on health at all?

Fundamental in the salutogenic theory is to consider health as a position on a health ease/dis-ease continuum and the movement in the direction towards the health end.[1 2] The salutogenic model of health, developed and formulated in the framework of system theory thinking, proceed from the assumption of the human nature as heterostatic rather than homoeostatic.[5] Antonovsky was confronted with the salutogenic question why some people, regardless of major stressful situations and severe hardships, stay healthy and others do not.

How do people manage the lack of control of their life? The answer was formulated in terms of SOC and general resistance resources (GRRs). The SOC is a resource that enables people to manage tension, to reflect about their external and internal resources, to identify and mobilise them, to promote effective coping by finding solutions, and resolve tension in a health promoting manner. The SOC scale has proved to be psychometrically sound.[3 6] The theory of the salutogenesis and the validity of the orientation to life questionnaire (sense of coherence) is described more in detail elsewhere.[3 7]

An extensive review is in process, processed by the authors and by the Health Promotion Programme at the Folkhälsan Research Centre to clarify the contribution of the SOC to the development and maintenance of health. This paper is part of this extensive review of the research.

The aim of this paper is to synthesise findings on the relation between the SOC and health.

METHOD

This research synthesis is based on empirical studies of the SOC scale and presents the state of knowledge on the salutogenic concept 1992–2003.[8 9] The review is systematic in the sense that all included papers (see Eriksson and Lindström[3] appendix, table 9–10) have been critically examined according to a set of criteria. The papers are analysed according to the following dimensions: (1) the study objective, (2) the study designs and methods for analysis and, (3) the applicability and practical use of the results. The analysis of the papers is described more in detail elsewhere.[3]

The synthesis of the findings in this paper are based on studies where multivariate analyses were used in the study design and simultaneously controlled for confounding variables like age, initial health status, health behaviour, leisure time activities, income, education, marital status, and social support.[10–15] Relation between variables implies more than associations. Relation implies dependency.[13] The relation between SOC and health is examined according to SOC both as a dependent or criterion and an independent or predictor variable for the outcome of health. Cross sectional studies where only bivariate analysis were used are excluded from the synthesis because of the purpose of this particular paper.[16–21]

The effect sizes of the correlation applied in this review follows the Cohen's understanding and recommendation for behavioural sciences.[22] The effect size $r = 0.10$ is small, $r = 0.30$ medium, and $r = 0.50$ large.

Cross sectional and longitudinal studies are analysed separately, and so are quantitative and qualitative studies. Longitudinal studies are needed to confirm causality between the SOC and health. To clarify what are the results of the examined studies and what are the interpretations and

conclusions of the authors the results are presented as study generated results and synthesis generated findings.[8]

Inclusion and exclusion criteria

The inclusion criteria are: (1) papers dealing with the SOC concept and/or using some of the different versions of the SOC questionnaire published in scientific peer reviewed journals; (2) postgradual papers and doctoral theses; (3) quantitative, qualitative, and intervention studies with equal weight to the method used; (4) papers in English, Finnish, Danish, Norwegian, and Swedish; (5) papers with a careful description of the translation process to other languages than English; (6) quantitative studies with an acceptable reliability and validity (face, consensual, construct, criterion, predictive, and responsiveness); (7) publication in the time span 1992–2003. Completing information has been acquired from the authors.

Excluded are: (1) papers not using Antonovsky's life orientation questionnaire (SOC) for measuring coherence, (2) papers in other languages than the before mentioned (French, German, Japanese, Polish), (3) double published papers, (4) papers without references to Antonovsky's SOC concept (primary or secondary references), (5) papers afflicted with weakness in power—that is, response rate <50% without a careful analysis of drop outs (after request of completing information from the authors without an answer), (6) papers afflicted with insufficient validity of the SOC scale (that is, dealing only with one or two dimensions of the concept), (7) papers on master of science level or lower. Statistical data are systematically compiled (see Eriksson and Lindström[3] appendix table 2–8). Despite country of origin most studies are published in English.

Search strategy

The following search strategy has been used: (1) electronic search in the databases PubMed (Medline), Bibsys, ISI, Libris, PsychInfo, Cinahl, Social Services Abstracts, Sociological abstracts, (2) search on the key words salutogenesis, salutogenic, sense of coherence, and the Swedish and Finnish translations, (3) reviewing reference lists in identified papers, (4) personal communication with the authors and colleagues.

MATERIAL AND PROCEDURE

The description of the material is presented in a flow chart (see Eriksson and Lindström[3] appendix table 1). After adjustment for double listing in the databases and doctoral theses 458 hits met the inclusion criteria (as of 31 December 2003). The review is based on these articles and 13 doctoral theses (see Eriksson and Lindström[3] appendix table 9–10). In addition some other relevant books on this topic are included. We have been aware of the potential limitation of this analysis—that is, papers in other languages than the before mentioned—but we still consider the material is adequate enough for a reasonable review.

A detailed protocol was compiled for each article or doctoral thesis. The assessment of the included papers is described in detail elsewhere.[3] It was not possible to carry out a full meta-analysis mainly because of the diversity of the base material and the variations in methods. The review material includes studies of varying sizes, samples, study design, and methods of analysis. Therefore we prefer to present the synthesis in tables and discuss the results (see Eriksson and Lindström[3] appendix).

RESULTS

Study generated results

The study generated findings of how SOC might influence health are presented as a main, a moderating, and a mediating effect on health.[10–12 14 23] Furthermore, the ability of the SOC questionnaire to predict health is described. In addition, studies where the findings failed to support an effect on health are presented.

The interpretation of causality is somewhat complicated. There are no statistical tests available that can tell us whether we have made a correct interpretation. The choice of variables to include in a health model is dependent on the substance and the researcher's theoretical insights into the problem under investigation. A correct conclusion of the study results requires a careful step by step analysis in the study design.[14] Despite this, some of the techniques still can give us a clue to the effects on health.

By using hierarchical regression analyses a main effect on health can be estimated. A significant increment in R^2 detected in the final step of the regression model shows a direct effect of SOC on the health outcome.[12] A moderator is a variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable.[23] Moderator variables always function as independent variables, whereas mediating events shift roles from effects to causes, depending on the focus of the analysis. A variable functions as a mediator when it accounts for the relation between the predictor and the criterion variable. Mediators specify why such effect occurs.[23] Structural equation modelling is considered as a technique for estimating causality.[11 24]

SOC has a main, a moderating, and a mediating effect on health

Findings from cross sectional studies on Finnish,[25 26] Swedish,[27 28] English,[29] Canadian populations,[30–33] French,[34] students,[35 36] employees,[33 37–39] health social workers,[40] patients with rheumatic diseases[41 42] or depressive disorder,[43] and immigrants[44] support a direct or an indirect relation between perceived good health and a strong SOC: the stronger the SOC the lower the number of subjective complaints and symptoms of illness. General health was measured among others by using study specific questions of the perceived health,[25 26 28 30 33 45] medical examination and questions about medical history,[27 29] items from the stress profile and the life style profile,[28] health and life experiences questionnaire,[29] health utility index score, and items in the national population health survey,[30–32] and items on work stress from the Whitehall II study.[37] The SOC scale has been examined in relation to MOS short form 36 (SF-36), a frequently used for measuring physical as well as mental health.[46–48] The relation with the physical component in the SF-36 is much weaker than with the mental component. The different measures used for physical and mental health as well as for wellbeing are described more in detail elsewhere (see Eriksson and Lindström[3] appendix table 5).

The population distribution of the SOC-29 showed a range of the means from 100.50 points (SD 28.50) to 164.50 points (SD 17.10). The corresponding range for the SOC-13 was 35.39–77.60 points (SD 0.10–13.80). For more details on the distribution of the SOC see table 2–4 in the appendix.[3]

A large study investigated factors related to mental health on Canadians. Here a mixed results of the relation between positive and negative outcome measures were shown.[31] The data showed a consistently strong and independent association of current stress, social support, life events, education, and childhood traumas with both positive and negative indicators of mental health. The number of childhood traumas was strongly correlated to SOC, depression and distress, and to mastery and happiness. Hood and colleagues report findings, also on a Canadian population, confirming that people with a high SOC tended to be in better health.[30]

However, here the SOC explained alone only 10% of the total variance in health.

In a Swedish longitudinal study on high risk families for mental illness, the Lundby study, 22 different coping mechanisms were discriminated. SOC was here associated to the combined coping mechanisms and explained 22% of the variance in health. Independent of sex a relation between low SOC scores and poor perceived health were found in the Swedish population in the MONICA study.[27] Here men scoring low on SOC had twice the risk for reporting poor perceived health. The EPIC-Norfolk study (United Kingdom) reports findings that a strong SOC was associated with a 30% reduction in all cause mortality.[29]

There is a strong relation with factors measuring mental health like optimism, hardiness, learned resourcefulness, locus of control, mastery, self esteem and self efficacy, acceptance of disability, and social skills. SOC is strongly and negatively associated with anxiety, anger, burnout, demoralisation, hostility, hopelessness, depression, perceived stressors, and post-traumatic stress disorder (see Eriksson and Lindström[3] appendix table 5). SOC is strongly and negatively related to perceived depression.[35 42 43 49 50 53] The stronger the SOC the less are the symptoms of perceived depression. A strong SOC is associated to negative and positive affectivity.[51] Kravetz and colleagues found a considerable overlap between SOC and negative affectivity.[52] This does not necessarily mean that SOC only measures the absence of neuroticism or anxiety. Von Bothmer and Fridlund showed among students that positive affect/optimism together with alienation and hardiness had the highest relative importance for understanding the SOC, explaining about 60% of the variance in SOC.[35]

SOC seems to decrease the number of circulatory health problems in adults. People with a strong SOC had lower diastolic blood pressure, serum triglycerides, heart rate at rest, and higher oxygen uptake capacity. A low SOC was related to mental and circulatory health problems.[53] In the Helsinki heart study the lowest incidence of coronary hearth disease was in the highest SOC quintile. The incidence was 25% lower than in the lowest SOC quintile.[54] However, the SOC failed to have a salutogenic effect for blue collar workers.

Among children and young people the relations between SOC and health are the same as in the adult population. The better the health is perceived the higher the SOC and simultaneously the lower are the subjective health complains. Nordic studies on school children in different ages and their parents showed the impact of poor SOC on the subjective health.[55–57] The children's ill health was related to the parents' SOC and life satisfaction. The lower the parents' SOC the more psychosomatic complaints reported by children. Parental complaints were associated with a 1.63 (CI 1.45 to 1.83) higher odds of having poor SOC.[57] Among Norwegian 15 year old school children the SOC accounted for more than 50% of the variance in subjective health complains.[56] Using the specific SOC questionnaire adjusted for children (CSOC) Vinson found, that the higher a child's SOC and self esteem, the fewer general physical symptoms in acute asthmatic episodes were reported by the children.[58]

Based on confirmatory factor analysis and structural equation modelling, findings show that SOC and mental health are two independent but correlated constructs. SOC is a mediator between stress and mental health.[59] Evidence for a mediating effect of the SOC between hostility and health was found among Finnish female employees.[60] Low SOC was here found to be a psychological background factor partially underlying the adverse effect of hostility on ill health. An opposite finding of the mediating role of the SOC was reported by Lundberg.[61] SOC did not mediate the effect of childhood factors on adult health in a Swedish population.

Key points

The evidence proves the salutogenic model as a health promoting resource that improves resilience and develops a positive subjective state of both physical and mental health, quality of life and wellbeing. The orientation to life questionnaire/sense of coherence scale (SOC) refers to an enduring attitude and measures how people view life and in stressful situations identify, use, and reuse their general resistance resources to maintain and develop their health. It is a valid, a reliable, and a cross culturally applicable instrument for measuring health. The SOC scale consists of at least three dimensions: the comprehensibility, the manageability, and the meaningfulness components. In contrast with Antonovsky's view the structure of the scale seems to be multidimensional rather than unidimensional. It has been used in at least 33 languages in 32 countries with at least 15 different versions of the questionnaire on subjects from both Western cultures and countries like Thailand, China, Japan, and South Africa. The mean SOC seems to be independent of the cultural context. The instrument has been examined on healthy populations from children to older adults, in different patients groups and professionals, within many areas of practice like health services, social work, working environment, care of relatives, and in learning situations.

In stressful situations SOC seems to have a moderating effect on health. People with high SOC seem to be more resilient under stress than people with a low SOC.[45 62] The stronger the SOC the lower the level of symptoms and distress. Albertsen and colleagues reported both a main, a moderating, and a mediating effect on health.[37] In the first large epidemiological study of the SOC concept undertaken in a non-western culture, Thailand, there was no association between SOC and physical health but a direct effect and a moderating effect on mental health.[63]

Does SOC predict good health?

The capacity of the SOC scale to predict a future outcome—that is, health—is expressed by the predictive validity.[64] Examining the longitudinal studies the SOC questionnaire shows a relatively high predictability, both in a short term (some months) and a long term (some years) perspective. Results supporting the salutogenic theory as a factor promoting resilience and a positive health outcome were reported in a Finnish population,[65] among survivors of the m/s Estonia Disaster,[66] in patients with orthopaedic injuries,[67] among schizophrenic patients,[68] in vocational rehabilitation of unemployed with somatic disorders,[69] and employees.[54 70–74]

In a long term perspective (five years) the SOC had a very good predictive value for disability among Finnish patients.[75] A 10 year follow up of Finnish employees SOC and changes in support from superior was the best predictors of burnout.[76 77] A strong SOC was the most important determinant of the differences between those with serious burnout and those without burnout.

However, there are different results reported.[3] A study of Finnish municipal employees and technical designers failed to give support for the SOC as a salutogenic resource. Predictive relations from health to SOC were not found. The results showed no support for the status of SOC as a salutogenic resource.[78] Only a poor SOC seemed to have implications for health among Canadian labour force. Smith and colleagues recommended caution of using the SOC to represent a stable global orientation within a causal context.[79]

The results from their study showed that more research is required to define what can be considered to be a change in the SOC measure and what factors in the external environment bring about this change. In two separate studies, one among American Veterans in a rehabilitation unit, the other among Swedish primary care patients, SOC did not predict a positive outcome of health.[80 81]

The limitations of SOC on health

A study focusing on control of diabetes and its relation to SOC showed no direct relation between SOC and the treatment results, measured as glucolysed haemoglobine (HbA1c). However, there was a positive correlation between SOC, self assessed health, and HbA1c. The better the patients' estimation of their health, the higher the SOC scores and the lower HbA1c.[82] Similar findings were reported by Svartvik and colleagues, the glucose tolerance was not affected by SOC.[83]

Synthesis generated findings

Our synthesis applies a probabilistic rather than a deterministic approach and is based on studies where multivariate analysis was applied.[13] This means that the outcome might include an uncertainty. ''Given a particular value of the independent variable some values of the dependent variable are more likely to occur than others, but these values do not necessarily occur, and other values are possible, albeit less likely'' (page 65). The uncertainty also means that it is never possible to rule out all the possible alternatives to a causal interpretation. We have to accept a result where the most probable alternatives are eliminated and be content with a science distinct from absolute certainty. Correlative study design alone does not go far enough in the analysis of relation between SOC and health. It is more beneficial for the analysis to investigate the square of the correlation coefficient.[24]

There seems to be different effects of the SOC on the various dimensions of health. SOC seems to be strongly associated to perceived good health, especially the mental dimension, at least among persons scoring high on SOC. The prediction for people scoring moderate or low on SOC is not completely clear and needs further clarification. The relation between SOC and physical health is more complex and seems to be weaker than with mental health. Despite some uncertainty our interpretation and conclusion of the investigation of the included studies is that SOC seems to be a health resource promoting resilience and the development of a positive subjective state of health. In the middle of the 1980s Antonovsky pointed out the importance of a salutogenic orientation for the development of people's mental health through the life cycle.[84] Today several longitudinal studies clearly support the importance of a strong SOC for the development and maintenance of a positive state of mental health.

The very strong correlation to determinants of mental health, especially to positive emotions and opposing negative affectivity, raises the question whether SOC is a parallel expression of mental health. At least it means that a person with a strong SOC can cope with stressful situations and stay well in a better way than a person with a low SOC. Furthermore, SOC seems to have qualities reaching beyond only the presence of positive and the absence of negative emotions. The strong relation with factors measuring positive dimensions of health like optimism and hardiness and the opposite or anxiety and depression tend to interpret the SOC as an overlapping construct of other measures of health. Our suggestion and conclusion is that SOC comes close to mental health and mental wellbeing but is not the same as mental health.

There was one finding in the review that is quite surprising. Very few investigators are aware of the potential measurement error of the SOC questionnaire regarding normal variations in the analysis of change in the SOC. A change in SOC (mean) has usually been interpreted as a real change. One exception is a study on Canadian labour force.[79] Here the reliability of change index was used to distinguish between measurement error and a real change. The findings show that a high SOC protects health, but we have no clear indication of where the cut off point is and where SOC loses this protective effect. Is it around the mean value, median, or somewhere else? Is it identical for all individuals, probably not. Antonovsky talks about high and low SOC but he never defined what could be seen as a normal SOC.[1 2] This complicates the interpretation of the effect on health and requires further research.

We here list some of the criticism that has been presented in earlier studies on SOC. The SOC concept has been criticised from many points of view: to be psychometrically unclear,[85–89] a theory confounded with emotionality,[62] other concepts available to explain health,[90] a theory full of contradictions,[91] the results to be trivial and overrated,[92] only a few have considered the concept to be worth examining,[93] and lack of evidence of the stability over time.[90] We consider the above mentioned statements partially as wrong and reject them because the empirical evidence supports the theory. The psychometric properties of the SOC concept has been discussed elsewhere.[3] We agree with the critique that there are other concepts with salutogenic elements that can explain health, but still we want to emphasise the important contribution and comprehensibility of the SOC concept in health promotion.

DISCUSSION

The main intention of this paper was to summarise 25 years of salutogenic research to present evidence of the relation between SOC and health. This objective is relevant in a public health and health promotion perspective. We agree with Stephens *et al* in their conclusion that strategies that promote resilience and other psychological resources also will contribute to problem reduction and prevention. Health promotion and disease prevention can perhaps, in a sense, be seen as two sides of the same coin.[31]

Another intention was to make a coherent analysis of the salutogenic concept to clarify both the strengths and the weaknesses of the theory. Such an approach contributes to the development of the theory.[13] Is SOC the same as health? To our knowledge the answer is no. The analysis of variance shows that SOC is strongly related to health, especially mental health, partly explaining health. The rest of the variance is explained or accounted for by other factors like age, social support, and education. The interpretation could be that SOC is not the same as health but still an important disposition for people's development and maintenance of their health.

What people are at risk for developing poor health? Social class and social conditions have an effect on the individual health.[53] As a sociologist Antonovsky knew very well about the impact of social conditions in a society on the people's health. The SOC concept can be understood as a concept only for people with a high education, a good economy, a good social support, and social integration, an elite. We do not understand the concept in such a way, neither did Antonovsky. In a lecture at the Nordic School of Public Health in Gothenburg in 1993 he explicitly pointed out the responsibility of the society to create conditions that foster the strengths of coping—that is, SOC. It is not question about a free choice of the person to cope well. The key lies in a society and in people who care about others.[94] A salutogenic

orientation provides no prescription for a good life in the moral sense of the term; it can only help us understand health/illness.[95] Furthermore, the potential of the salutogenic concept lies in its implications for creating societies adopting a healthy public policy, where the content and the structure of the services is salutogenic, not only a healthy policy for the health services. Here it is important to strengthen available and create new kinds of general resistance resources to make it possible for the citizens to identify and benefit them. An implementation of the salutogenic construct in practice could be the salutogenic dialogue described by Malterud.[96 97] In addition, the salutogenesis could be the theoretical foundation for the health promotion research.

There is a need for a further synthesis as of the relation between the SOC and quality of life and wellbeing, health behaviour, working life, education and learning, social support and social integration, life events, family SOC, development of the SOC, and other concepts with salutogenic elements that contribute to the explanation of health.

Now having concluded the contemporary evidence base it is remarkable the saluotgenic framework has not been used more frequently in research and practice. One of the reasons is probably the fact that Antonovsky died quite unexpectedly just at the time when the concept had been accepted and introduced to the global community of health promotion researchers. His death created a vacuum as the field lost its most distinguished and natural leader.

Authors' affiliations

M Eriksson, Folkhälsan Research Centre, Health Promotion Programme, Helsinki, Finland
B Lindström, Folkhälsan Research Centre

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