

RESEARCH REPORT

Validity of Antonovsky's sense of coherence scale: a systematic review

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Study objective: The aim of this paper is to systematically review and analyse the validity and reliability of Antonovsky's life orientation questionnaire/sense of coherence scale (SOC).

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: The SOC questionnaire has been used in at least 33 languages in 32 countries with at least 15 different versions of the questionnaire. In 124 studies using SOC-29 the Cronbach's α ranges from 0.70 to 0.95. The α values in 127 studies using SOC-13 range from 0.70 to 0.92, and in 60 studies using a modified SOC scale range from 0.35 to 0.91. Test-retest correlation show stability and range from 0.69 to 0.78 (1 year), 0.64 (3 years), 0.42 to 0.45 (4 years), 0.59 to 0.67 (5 years) to 0.54 (10 years). The means of SOC-29 range 100.50 (SD 28.50) to 164.50 (SD 17.10) points and SOC-13 from 35.39 (SD 0.10) to 77.60 (SD 13.80) points. After 10 years SOC seems to be comparatively stable, but not as stable as Antonovsky initially assumed. SOC tends to increase with age. The factorial structure of SOC seems rather to be multidimensional than unidimensional. SOC predicts a positive outcome in a long term perspective, although there are divergent findings reported. The SOC scale seems to be a reliable, valid, and cross culturally applicable instrument measuring how people manage stressful situations and stay well.

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More than 20 years have passed since the American-Israeli medical sociologist Aaron Antonovsky introduced his salutogenic theory "sense of coherence" as a global orientation to view the world and the individual environment as comprehensible, manageable, and meaningful, claiming that the way people view their life has a positive influence on their health.¹ Over the first 10 years after the introduction of the salutogenesis Antonovsky developed the life orientation questionnaire, sense of coherence scale, and examined its properties. In addition, the theory was somewhat revised over time and made more explicit in his second book *Unraveling the Mystery of Health*.² The paradigm shift from the pathogenic focus on risk factors for disease to the salutogenic focus on the strengths and determinants for health was introduced. Fortigenesis, referring to the origins of one's psychological strength in general, attempts to broaden the SOC concept.³

Originally interviewing Israeli women about the adaptation to menopause Antonovsky studied a group with experiences from the concentration camps of the second world war who despite this stayed healthy.² He was intrigued and raised the salutogenic question why these people were able to stay healthy. He postulated it was because of the way they viewed their life and their essence of existence. Through research three components emerged: the ability for people to understand what happens around them, to what extent they were able to manage the situation on their own or through significant others in their social network, and the ability to find meaning in the situation. These three elements, comprehensibility (cognitive), manageability (instrumental/behavioural), and meaningfulness (motivational), formed the concept of sense of coherence. Another concept introduced were general resistance resources (GRR),¹ such as material, ego identity, knowledge, intelligence, coping strategy, social support, commitment, cultural stability, magic,

religion/philosophy, and a preventive health orientation. The GRRs are shaped by life experiences characterised by consistency, participation in shaping outcome, and a balance between underload and overload.² These resources reinforce the SOC. Persons with a strong SOC are likely to identify a greater variety of GRRs at their disposal.⁴ Antonovsky emphasises that the SOC concept is a dispositional orientation rather than a personality trait/type or a coping strategy.^{4–5} The SOC construct reflects a person's capacity to respond to stressful situations.

In 1993 Antonovsky summarised the research until 1992 reporting data from 42 studies using the life orientation questionnaire/sense of coherence.² Thereafter, unfortunately only a few researchers have reviewed results from studies on the SOC concept. However, these are only based on highly selected materials such as two Swedish reviews,^{5–6} unpublished material reviewing South-African studies,⁷ and a German review.⁸ The latter is hard to evaluate as it lacks clear inclusion criteria and a systematic methodology.

Since 2003 the Nordic School of Public Health has been running a salutogenic project. The main objective is to provide a more comprehensive understanding of the SOC concept by systematically reviewing, analysing, and synthesising the evidence on the salutogenic concept 1992–2003. So far and to our knowledge, this review is the first comprehensive attempt to review the whole area of salutogenic research after Antonovsky's sudden and unexpected death.

This paper is part of a more extensive review of the research area undertaken by the authors. The aim of this paper is to show the validity and the reliability of Antonovsky's SOC scale.

Abbreviations: SOC, sense of coherence scale; GRR, general resistant resources

METHOD

This research synthesis focuses on empirical studies of the SOC scale and seeks to summarise, analyse, and present the state of knowledge on the salutogenic concept 1992–2003.^{9–10} The study is systematic in the sense that all included papers (see appendix, tables 9 and 10 (available on the journal web site <http://www.jech.com/supplemental>)) have been critically examined according to a defined set of criteria. In the analysis the following dimensions have been applied: (1) the study objective (as the exploration of how SOC may effect health both as a dependent and an independent variable, the examination of predicting and maintaining value of the SOC regarding health, quality of life and wellbeing, the test of related measures to SOC, the exploration of the relation to different areas of life, the development of the theory base), (2) the study designs and methods for analysis, and (3) the applicability and practical use of the results. Studies using interviews for gathering data and quantitative methods for the analysis are categorised as quantitative studies.

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) postgraduate papers and doctoral thesis; (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 knowledge 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 above mentioned (French, German, Japanese, Polish), (3) double published papers, (4) papers without references to Antonovsky's SOC concept (primary or secondary references), (5) papers with weakness in power—that is, response rate <50% without a careful analysis of drop outs (after our request of completing information from the authors without an answer), (6) papers 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 appendix tables 2 to 8).

Search strategy

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

Material and procedure

Description of the material is presented in a flow chart (see 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 appendix tables 9 and 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 assume the material is adequate enough for a reasonable review.

A detailed protocol was compiled for each article or doctoral thesis. This included details on (1) the aim (general papers on theoretical and philosophical considerations; validity of the SOC scale, association with health and health behaviour, coping with stress/work conditions, life events, disability, serious disease, association with quality of life and wellbeing, applicability in practice, learning, and association with social support and social network), (2) the country, (3) the sample (randomised, consecutive/convenience, matched), (4) the method/study design, (5) the ethical considerations, (6) the methods for analysis, (7) the version of the SOC questionnaire used, (8) the language of the SOC scale, (9) statistical data such as the population size, population mean age and sex, SOC means, standard deviation, Cronbach's α , response rate, SOC division (low/weak compared with high/strong), correlation with other standardised measures, (10) the main results and limitations of the study, (11) the references, (12) the author's contact data, (13) the key words related to details in the paper, (14) the comments of the assessment, and (15) the number related to the total reference list of included papers in the review (appendix table 9 and 10). The analysis is based on these protocols.

Furthermore, data were put together in tables on statistical data using SOC-29, SOC-13, modified versions of the SOC questionnaire (see appendix, tables 2 to 4), and on means and standard deviations of subscales (see appendix, table 5). In addition, SOC was compared with other standardised measures serving as tests of criterion validity, which are used in the different empirical studies, and categorised as follows: (1) health, (2) generalised perceptions of self and environment, (3) perceived stressors, (4) quality of life and wellbeing, (5) attitudes and behaviours (see appendix, table 4). Table 5 in the appendix follows the same structure and use the same division and classification as Antonovsky in his only review.⁴ This makes it easier to compare the data over time.

It was not possible to carry out a full meta-analysis mainly because of the great 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 findings in tables and discuss the results. Validity is described and examined according to the classification in face, consensual, construct, criterion, predictive validity, and responsiveness.¹¹ Reliability is examined through internal consistency measured by Cronbach's α and test-retest correlation.

MAIN RESULTS

Face validity

The face validity of the SOC scale seems to be acceptable (see appendix, table 2–4). The respondents do not usually find the questionnaires difficult to complete (as an example no evidence that 80 year old or even older people have difficulties to complete the questionnaires.¹² However, there are other experiences reported. Lee and colleagues found that Japanese respondents reported difficulties with filling in the scale compared with Chinese.¹³ The Chinese more often skipped questions. In a Swedish qualitative study on 15 Pentecostals all the interviewees reported difficulties to answer the questions.¹⁴ The items concerning comprehensibility and manageability caused the most trouble. The strong ego-central items in the SOC questionnaire seemed to be inappropriate for these participants. These findings were not confirmed in another Swedish study among Pentecostals.¹⁵ Problems with items 5, 6, 10, and 17 are reported.^{4 16 17}

Until 1993 the SOC questionnaire had been used in at least 14 languages (Afrikaans, Czech, Flemish/Dutch, English, Finnish, German, Hebrew, Norwegian, Rumanian, Russian, Serbian, Spanish, Swedish, Tswana).⁴ To date there are

additional translations in at least 19 languages are found: Arabic,¹⁸ Bulgarian,¹⁹ Cambodian,²⁰ Chinese,^{13 21–25} Danish,^{26–31} Dutch,^{32 33} Farsi,^{34 35} French,³⁶ Greek,^{37 38} Icelandic,^{30 39 40} Italian,⁴¹ Japanese,^{13 42–46} Lithuanian,⁴⁷ Polish,^{48 49} Portuguese (Brazilian),^{50 51} Sotho,⁵² Thai,^{53–55} Turkish,³⁴ Slovenian.⁵⁶ In total the SOC questionnaire has been used in 33 languages in 32 countries (Australia, Belgium, Brazil, Bulgaria, Canada, Czechia,⁴ China, Colombia, Denmark, Finland, France, Germany, Greece, Iceland, Israel, Japan, Lithuania, New Zealand, Netherlands, Norway, Poland, Rumania,⁴ Russia, Serbia,⁴ Singapore, Slovakia, South Africa, Sweden, Switzerland, Thailand, United Kingdom, USA) on subjects in studies varying from large samples of the general population covering 20 000 persons to small samples about 20 people (for details see appendix tables 2 to 4). The SOC questionnaire has to date been used in both Western countries and countries such as Thailand, China, Japan, and South Africa. Therefore, the SOC scale seems to be a cross culturally applicable instrument.

Most of the studies are cross sectional, although some longitudinal^{17 53 57–74} studies were found. The study designs are either quantitative, qualitative,^{75–80} or intervention.^{6 58 81–83} In the data collection questionnaires, interviews (or a combination of these two techniques), focus groups, or experience sampling method (EMS⁸⁴) have been used.

The means of SOC-29 range from 100.50 (SD 28.50)⁸⁵ to 164.50 (SD 17.10)⁷¹ points (124 studies, see appendix table 2) and SOC-13 from 35.39 (0.10)⁸⁶ to 77.60 (SD 13.80)¹² points (127 studies, see appendix table 3). The mean values of the modified versions cannot be compared because of the diversity of the material (see appendix table 4).

Consensual validity

Consensual validity refers to the agreement of experts that a measure is valid.⁹ To date the consensual validity of the SOC scale seems to be moderate. Most of the studies used one of the original scales (SOC-29, SOC-13) in scientific disciplines like medicine/psychiatry/psychology, public health/health science, nursing, sociology, social work, and pedagogy. Until 1993 there were only a few attempts to modify the SOC questionnaire.⁴ However, the situation has completely changed today. Besides the original SOC questionnaire consisting of 29 items and the shorter version of 13 items there is an array of alternative instruments. At least 15 different versions exist with different scoring alternatives (including the two versions of the family sense of coherence scale,^{87–91} a questionnaire especially adjusted for children^{92–94} and the sense of school coherence instrument.)^{95 96} The alternative instruments are: 3 items^{29–32 34 35 97–103} 6 items,^{57 73} 7 items,¹⁰⁴ 9 items,^{28 58 105–118} 10 items,¹¹⁹ 11 items,⁴¹ 12 items,¹²⁰ 13 items (modified scoring alternatives),^{121–126} 16 items,^{64 127 128} 28 items,^{65 129} and 29 items¹⁰² (modified scoring alternatives). In addition, 17 items and 19 items instrument were used before 1992.⁴ Furthermore, a 39 item SOC questionnaire is mentioned, perhaps this is a printing error.^{130 131} Probably the same when talking about the original 28 item scale.¹¹⁸

The intercorrelation between the original SOC questionnaires and the alternatives are acceptable. The SOC-16 version, tested on 61 randomly selected Finns, showed a corresponding correlation of 0.87 with SOC-29.¹²⁸ The reliability of the shortest form or SOC-3 measured by weighted κ was 0.61.¹⁰¹

Antonovsky expressed that he wanted the SOC scale to be empirically examined before creating new modified scales.⁴ Unfortunately reality looks different. Besides the two original scales there are many modified versions in existence. The reasons are probably manifold. One explanation expressed is that the 29 item questionnaire sometimes seems to be too long, sometimes even the 13 items. An other argument for

modifying the SOC questionnaire is to reach a better coherence with other measures used in the studies.¹³²

Construct validity

The factorial structure of the scale in the three dimensions is not completely clear. Studies on whether the SOC scales actually correlate with the theoretical construction principles present differing results. Factor analysis has in some studies confirmed the one factor solution proposed by Antonovsky,^{17 133–136} while in others the analyses have failed to confirm this solution.^{48 70 137 138} A three factor and a second order factor model seemed to best fit the data on Finnish employees.¹³⁹ Among 300 Swedish students a five factor solution was reported: meaning in life, control of feelings, negative feelings, trust/distrust, and changing future explaining 53% of the variance in SOC.¹⁴⁰ More in line with Antonovsky are the findings from a Polish study on women staying in hospital after delivery.⁴⁸ Here they found two main dimensions corresponding with meaningfulness and comprehensibility and three subdimensions. These factors accounted for 50% of the variance in SOC. The comprehensibility dimension seemed to consist of feelings of uncertainty, life events ordinary or surprisingly, and attitudes towards people. A three factor solution, but not the same as Antonovsky, is proposed by Sandell and colleagues on Swedish patients and controls.¹⁶ Here the meaningfulness component was interpreted as a zest/depression dimension, comprehensibility as intolerance compared with tolerance for emotional conflict. The third factor was only distantly related to manageability as interpersonal trust/mistrust. The three factor solution had a lower explanation power of less than 40% of the variance.¹⁶ SOC seems rather to be a multi-dimensional than a unidimensional concept.

Antonovsky's intention was to use the SOC questionnaire as a measurement of the whole not examining the three subscales separately. Despite this some studies report mean values regarding manageability, meaningfulness, and comprehensibility (see appendix, table 5). No general pattern emerges regarding the importance of the three dimensions.

Furthermore, he recommended the SOC concept to be examined without dividing the sum of the item values into low or high SOC.² Consequently, he never expressed the level of a normal SOC. However, numbers of studies report divisions into low, moderate, or high SOC (see appendix, table 7). No general pattern of divisions emerges. Different researchers have used separate divisions.

Sex differences can be found. Men usually have a slightly higher SOC than women, although the differences are small (see appendix, table 6).

Criterion validity

Table 5 (see appendix) presents information about the relation between the SOC scale and other standardised instrument for measuring health, perceived self, stressors, quality of life, wellbeing, attitudes, and behaviours used in the studies. The extensive table follows the same structure and uses the same division and classification as Antonovsky in his only review, and gives detailed information on the existing different SOC instruments today.⁴ It would be possible and important to provide an extensive examination of the correlation and comparison of the different instruments. However, this falls beyond the scope of this paper.

Correlation below 0.20 is assessed as poor, between 0.20–0.35 slight, 0.35–0.65 moderate, 0.65–0.85 good, and above 0.85 very good.¹⁴¹ The correlation with health range in general from slight to good, using instruments such as the general health questionnaire,^{142 143} health index,^{144 145} Hopkin's symptom checklist,^{146 147} or mental health inventory^{18 148} explaining at highest 66% of the variance in SOC. Some correlations in

table 5 are not significant. However, a *p* value in the non-significant range only tells that either there is no difference between groups or that there were too few subjects, but not which one.¹⁴⁹ It is more important to examine the different values of the coefficients and the explained variance.

The relatively high negative correlation with anxiety and depression is striking, as is the strong positive correlation with optimism and self esteem. The moderate correlation with instruments measuring life events shows that SOC is related to changes in the individual environment. There are numbers of studies on the relation between SOC and quality of life and wellbeing. In general they show that a high SOC is related to a high quality of life. SOC seems also be connected with attitudes and behaviours.

Predictive validity

The capacity of the SOC scale to predict a future outcome—that is, health—is expressed by the predictive validity.¹¹ Examining the longitudinal studies the findings show a comparatively high predictability, although there are divergent results reported. In a short term perspective of three months the SOC played an important part for discriminating people at risk for developing post-traumatic stress symptoms among survivors of the MS Estonia disaster.¹²⁰ In patients with orthopaedic injuries¹⁵⁰ and patients with morbid obesity¹⁵¹ the SOC predicted a better outcome after surgery after one year. Support for the predictive validity of the SOC (18 month) is reported among schizophrenic patients.¹⁵² Having a comparatively high SOC was a predictor of a positive outcome among unemployed with a somatic disorder after two years (OR: 3.5, CI: 1.5 to 8.4).¹⁵³ In a long term perspective (five years) the SOC had a very good predictive value for disability among Finnish patients.¹⁵⁴ Kalimo and colleagues report findings from a 10 year follow up of Finnish employees, where SOC and changes in support from superior were the best predictors of burnout.⁷⁴ However, there are other findings reported. In a group of Finnish municipal employees and technical designers the findings failed to support the SOC theory. Here predictive relations from health to SOC were not found.⁷³

Responsiveness

The SOC seems to be comparatively stable over time, at least for people with an initial high SOC, but not as stable as Antonovsky assumed. The variation in means over time shows small differences. No differences or very small ones are reported in a three to five year perspective.^{61 63–65 73} However, the same situation emerges in a 10 year follow up study among Finnish employees.⁷⁴ Furthermore, SOC tends to increase with age over the whole life span. Using SOC-29 items (based on the mean age of the cross sectional studies) the oldest people show the highest mean scores on SOC—that is, 18 year old American college students 131.00,¹⁵⁵ 37 year old French adults 133.60,¹³⁴ American older women (76 years) 157.21,¹⁵⁶ and 81 year old people 158.90.¹⁵⁷

Reliability

Internal consistency

The internal consistency measured by Cronbach's¹⁵⁸ α ranges from 0.70¹⁵⁹ to 0.95¹⁶⁰ using SOC-29 (124 studies, see appendix table 2), 0.70¹⁶¹ to 0.92¹⁵⁴ (127 studies, see appendix table 3) using SOC-13. Among the modified versions of the SOC scale The EPIC-Norfolk United Kingdom prospective cohort study reports the lowest α of 0.35 using the shortest form of SOC-3.¹⁰³ The highest α of 0.91¹⁰² is reported in a study using a modified scoring alternative of the original 29 item questionnaire (5 point Likert scale) (60 studies, see appendix table 4). Coefficients above 0.70 reflect good

internal consistency.¹⁶² The SOC scale shows high internal consistency.

Test-retest

Antonovsky assumed the individual SOC was stabilised by the end of early adulthood. Thereafter the SOC fluctuates marginally.² Very few longitudinal studies were undertaken before 1993.⁴ This means the longitudinal studies reporting test-retest reliability are few. Test-retest reliability of the scales range from 0.92 (one week),¹³³ 0.65 (three weeks),³⁶ 0.93 (one month),¹³³ 0.77 (six months)⁷² using SOC-29. Fiorentino⁷⁰ reports a one year correlation range of 0.78 (SOC-29). Using SOC-13 the corresponding range is 0.69⁵⁹ to 0.72¹⁷. Among Swiss adolescents the correlation was 0.77 after 18 months.⁵⁹ However, the few longitudinal studies with an greater time span report correlations of 0.64 (three years),⁷³ 0.42 to .045 (four years),⁶² 0.59 to 0.67 (five years),⁷² and a 10 year correlation of 0.54 (personal communication with Pakkin December 2004). Such statistical data are in line with data reported by Antonovsky.⁴

DISCUSSION

The purpose of this paper was to review the validity and reliability of Antonovsky's SOC scale 1992–2003 as a part of a more extensive review on the salutogenic research. There is a need for a comprehensive understanding of the SOC concept. Therefore our attempt to make sense of the comprehensive research should be beneficial for further research. Furthermore, the extensive documentation of references serves as bibliography on the salutogenesis.

As of semantics some authors used the word salutogenetic to describe the concept. To our opinion salutogenic is a more preferable word, because the knowledge about how SOC might be related to genetic factors is not clear.

A full meta-analysis as method has not been used. Because of the diversity of the material we have adopted another approach and have tried to provide a research synthesis according to Cooper.⁹ This could be seen as a limitation. Another limitation could be the choice of included languages, but despite the location of the studies most are published in English. We have checked the English abstracts of studies in other languages. Because they generally lack statistical data they are excluded from this paper.

The SOC scale has proved to be psychometrically comparatively sound. However, the structure of the SOC concept is still not completely clear. SOC seems to have a multi-dimensional character rather than a unidimensional. To our opinion there is at present no need for further testing of the SOC instrument because the findings prove the SOC instrument being reliable, valid, feasible, and cross culturally applicable. Furthermore, there is no need to develop new SOC versions. There is rather a need of consolidation and a standardisation of the instruments. It would be more relevant to develop qualitative methods.

SOC does not seem to be as stable as Antonovsky assumed. The evidence shows that SOC tends to increase with age through the whole life span. The older the age of the population sample the higher the SOC score. Whether the increases in the individual SOC are an effect of natural selection of people—healthy people survive—or a question of people developing a strong SOC staying well is not clear. We suggest the second explanation.

Some authors propose the SOC questionnaire could be used as a screening instrument aiming at the identification of people at risk of developing a low SOC. This is perhaps justified, but there is still the problem of interpreting the individual position on the health/ease and dis-ease continuum. It is not clear where SOC no longer protects the movement towards the healthy end. Knowledge about this is

still incomplete. There is also a risk of negative health effects if one stigmatises people in groups regarding their SOC. What does the individual level of SOC at a given time really mean in practice? Therefore, we do not recommend the use of the SOC questionnaire as a screening instrument. Instead we suggest that the SOC concept could be implemented as a systematic orientation and perspective in the daily activities and actions of the professionals. There is a need to change focus from problems and obstacles to resources. The most important immediate research focus now would be to implement the theory in practice.



The appendix, papers used in the review, and the doctoral theses papers are available on the journal web site (<http://www.jech.com/supplemental>).

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