Salutogenesis and Antonovsky's Sense of Coherence Scale: A Literature Review in Relation to Self-Management of Diabetes

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Abstract

Background: It has been argued that Sense of Coherence, a concept within Antonovsky's notion of salutogenesis, relates to a person's general outlook on the world and can help people move towards health and cope more successfully with stressful factors in life. Numerous empirical studies on Sense of Coherence have been conducted but no systematic review of this knowledge in the context of diabetes self-care has been undertaken nor is it known whether knowledge and application of this concept might add value to health practitioners' practice in promoting patients' self management of diabetes.

Aim: To conduct a systematic review of the literature relating to the Sense of Coherence scale and diabetes.

Methods: Using the principles of systematic review a thorough search of published research was conducted to locate and retrieve the most relevant studies regarding Sense of Coherence in relation to diabetes self-management. Selected papers were critically appraised to elicit answers to the main research questions.

Results: The research studies were conducted in England, Sweden, Sudan, Israel and Hong Kong. The heterogeneity of the studies and some methodological limitations made it impossible to draw any firm conclusions as to the value of the Sense of Coherence Scale in the self management of diabetes. Analysis of the studies suggests that a high Sense of Coherence may improve the psychological well being of diabetic patients. However since most of the studies had weaknesses in their internal validity and sampling methods, it remains uncertain to what extent a high Sense of Coherence can contribute to diabetes self-management.

Conclusion: More varied research is needed to explore the value of the Sense of Coherence scale in the assessment of patients with diabetes.

Introduction

This aim of this paper is to explore Antonovsky's concept of sense of coherence in the context of diabetes. The reason for this is that salutogenesis, from which the term sense of coherence has been derived, is embedded in the notion of positive health and health care. The focus moves away from a pathological study of disease to looking at factors that might improve health and wellbeing. Antonovsky's work has shown how certain factors might protect people from the experiencing the full force of disease or remaining relatively well despite extreme adverse circumstances (Antonovsky 1987). Due to the high incidence and prevalence of diabetes it essential that patients with diabetes are enabled to manage their own care as far as they possibly can. Thus the aim of this paper is to explore the extent to which public health practitioners who come into contact with people with diabetes might find the assessment of a patient's sense of coherence (SOC) about their condition helpful in promoting self-care and self-management of diabetes.

The paper begins with a brief outline of the nature of diabetes and then moves onto explain in more detail the meaning and characteristics of SOC. The methods for conducting the review are detailed. It proceeds to an in depth critical appraisal of the retrieved literature and provides some tentative answers to the research question guiding this review. Recommendations to practice and research are provided.

Diabetes a major global public health concern

Diabetes is defined as a chronic disease resulting from a lack of insulin production by the pancreas or from an ineffective use of the secreted insulin by the body (World Health Organisation (WHO) 2010a).There are several types of diabetes; however this study focuses on type 1 and type 2 diabetes. Type 1 diabetes is the result of an auto-immune reaction leading to a lack of insulin production (International Diabetes Federation 2009a) whereas type 2 diabetes is often caused by poverty, overweight and lack of physical activity which result in the body not using the insulin effectively (WHO 2010a). The management of Type 2 diabetes can be done conservatively through exercise, regulation of dietary intake, medication and sometimes insulin. Whereas, people affected by the more serious form, Type 1 diabetes, require daily insulin injections to survive and avert complications (International Diabetes Federation

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2009a). People with diabetes may die prematurely from diabetic complications such as cardiovascular diseases, foot ulceration, renal complications, nerve disorders and retinopathy (WHO 2010).

According to the WHO (2010b), diabetes is a non-communicable disease that affects people and their families on a deep and personal level. A study that examined the psychological impact of women (n=42) living with diabetes (Penckofer et al 2007) found that they often struggle to adapt with the changes in their health situation. Moreover patients with diabetic complications often experience a lower quality of life and perceive their daily treatments as a major burden in their lives (Huang et al 2007).

An earlier study done by Wild et al (2004) estimated that the number of people with diabetes is expected to rise to 366 million by the year 2030 thus predicting a worldwide diabetic epidemic. For instance in countries such as England, Sweden, Israel, Sudan and Hong Kong diabetes is among the most common diseases in the country. It has been estimated that diabetes accounts for almost 10 % of the total health expenditure in many countries (Roglic et al 2005). The International Diabetes Federation (2006) estimated that there was a 5.5% increase in the number of deaths caused by diabetes in the year 2010 compared to rates in 2007 thus indicating that diabetes is a serious long term public health issue for most countries. Given the high rates of morbidity and the trends suggest that these numbers are set to rise several studies have examined the importance and the nature of self management. Khunti et al (2012) randomised control trial involving 731 participants demonstrated that a six hour health education session delivered by trained professional educators had benefits that lasted for three years. A meta-analysis of 34 randomised control trials concluded that nurse-led diabetes self-management education on blood glucose control and cardiovascular risk factors remained effective in follow-up periods of one to six months. The benefits of self-management are clearly very evident. However, what is less clear from these studies is the role that the attributes of salutogenesis and particularly a sense of coherence may have the self-management of diabetes. The next section explains what these terms mean.

Salutogenesis and sense of coherence

The term salutogenesis was coined by the Israeli American sociologist Aaron Antonovsky. Antonovsky (1987) describes the 'salutogenic orientation' as a movement away from traditional pathogenic perspectives which focus on illness, towards an alternative way to better understand factors that keep people healthy or keep them moving towards health. While trying to understand what it is that keeps people healthy, Antonovsky's main question was: why do some people, despite stressful situations in their lives, manage to stay healthy and others do not? (Lindstrom and Eriksson 2007).

The Sense of Coherence (SOC) concept was developed as an answer to this salutogenic question (Lindstrom and Eriksson 2007) and was defined as a way of helping people to view the world as 'making sense cognitively, instrumentally and emotionally' (Antonovsky 1996, p.15).
A sense of coherence involves three key components:
• Meaningfulness (wanting to cope),
• Comprehensibility (understanding the challenge)
• Manageability (believing in the availability of coping resources)
(Antonovsky 1996)

In order to measure the SOC in different groups and to test his hypothesis of whether a high SOC can induce better health, Antonovsky developed the SOC scale (Antonovosky1987). Empirical testing shows the scale to be valid and reliable when measuring SOC (Lundberg and Nystrom 1995, Lindstrom and Eriksson 2005, Feldt et al 2007). The patient is asked various questions to assess their beliefs, attitudes, actions relating to managing their lives, how they comprehend their life, and the meaning they give to their life. Questions are answered using a seven point likert scale (never to very often). Examples of the types of questions are provided below (but see Antonovsky (1987) for the full scale).

Sense of coherence and diabetes
As discussed earlier, diabetes is a chronic illness that can cause serious complications. Patients are therefore required to make lifestyle changes to successfully manage their illness

Table 1: Examples of the questions exploring the key elements of SOC

Meaningfulness	Do you have the feeling that you don't really care about what goes on around you? Very seldom or never (1-7)
	Until now your life has had no clear goals or purpose at all?(1-7) very clear goals and purpose?
	Doing the things you do every day is a: source of deep pleasure and satisfaction? (1-7) a source of pain and boredom.
Comprehensibility	Has it happened in the past that you were surprised by the behaviour of people whom you thought you knew well? Never happened (1-7) always happened.
	Do you have the feeling that you are in an unfamiliar situation and don't know what to do? Very often (1-7) very seldom
	Do you have very mixed-up feelings and ideas? Very often (1-7) very seldom
Manageability	Has it happened that people whom you counted on disappointed you? Never happened (1-7) always happened.
	Do you feel you are being treated fairly? Very often (1-7) very seldom
	Many people even those with a strong character – sometimes feel like sad sacks (losers) in certain situations. How often have you felt this way in the past? Never (1-7) very often

(Nagelkerk et al 2006). They say one of the most common barriers to managing diabetes is inadequacy in coping skills, while one of the most effective strategies of diabetes self care is having a positive attitude. Thus it is essential for diabetic patients to be positively motivated to live at ease with their disease (Olshansky et al 2008). Hence a key aspect of managing diabetes is about the psychological state of the patient and not only about medication and diet. The ability to accept the disease, maintain a positive outlook and cope with lifestyle changes is necessary for effective diabetes management.

Unfortunately most policies on diabetes in countries do not encompass the elements of SOC in the prevention and management of diabetes. Their approach focuses primarily on controlling risk factors and interventions which are more about preventing diseases (pathogenic orientation) than promoting health (salutogenic orientation).

Antonovsky (1996) argues that the SOC scale is applicable to all fields of health care and a number of studies have looked at SOC in relation to diabetes. A cross sectional study of 4821 middle aged Swedish women with diabetes (Agardh et al 2003) found that a low SOC score was associated with type 2 diabetes. A later prospective study by Kouvonen et al (2008) using a sample of 5,827 male employers found that a low SOC can predict diabetes and that a high SOC was an important factor for tackling the high rates of diabetes. Furthermore, He and Shiu's (2005) descriptive correlational study of 202 Chinese diabetic patients report that diabetic patients with a high SOC perceive less diabetes-specific stress and suggest the SOC construct has a health promoting aspect for people with diabetes.

A number of systematic reviews of studies on SOC or diabetes have been conducted. Fisher et al (2007) examined healthy coping in diabetes management but did not include the SOC constructs as an aspect of coping. They found that emotional and psychological factors are important in diabetes management. Two other systematic reviews examined the correlation respectively between

Table 2: List of selected databases and search locations

Database	Properties
CINHAL (Cumulative Index of Nursing and Allied health Literature)	Covers studies in nursing, allied health and biomedicine and includes more than 900 journals.
MEDLINE	Covers over 4600 journals in biomedicine and health. Coverage includes journal articles, letters, editorials, and case studies on biomedicine, nursing, allied health, public health, health policy development and biological and physical sciences.
EMBASE (Excerpta Medica Database)	It is a major biomedical and pharmaceutical database indexing over 3,500 international journals. The database holds biomedical, clinical and pharmaceutical literature from more than 7,000 peer- reviewed journals.
HMIC (Health Management Information Consortium)	It covers UK and overseas health management and social care. Coverage includes official publications, journal articles and grey literature on: health service policy, management and administration, hospitals, nursing, primary care and public health.
PsycINFO	World-wide English language coverage of psychological, social behavioural and health sciences literature. The database includes material of relevance to psychologists and professionals in related fields such as psychiatry, management, social science, medicine, and social work
IBSS (International Bibliography of the Social Sciences)	Online resource for social science and interdisciplinary research. Major areas of coverage include: Health, human behaviour, psychology, sociology and social sciences.
ISI web of knowledge	Three large databases compiled to provide world-wide coverage of Science, Social Science, and Arts and Humanities literature for current journals.
Cochrane Library of systematic reviews	Includes systematic reviews from the Cochrane Collaboration and individual clinical trials. It contains different types of high-quality, independent evidence to inform healthcare decision-making
Social Care online	It is the UK's most extensive free database of social care information. It covers research briefings, reports, government documents, journal articles, events and websites.
OpenSIGLE	System for Information on Grey Literature in Europe. It covers pure and applied science and technology, economics, other sciences and humanities.
CSA Social Services Abstracts	The database provides bibliographic coverage of current research focused on social work, human services, and related areas, including social welfare, social policy, and community development.
DARE	It contains 15,000 abstracts of systematic reviews including over 6,000 quality assessed reviews and details of all Cochrane reviews and protocols.
CSA Sociological Abstracts	The database provides international literature in sociology and related disciplines in the social and behavioural sciences. It provides abstracts of journal articles, citations to book reviews, dissertations, and conference papers.

Table 3 Search Words

Key Words	Subject Heading Terms
Diabetes Mellitus	Hypoglycemia Hyperglycemia Glucose Intolerance Insulin Resistance Hyperinsulinism
Sense of Coherence	Salutogenic Salutogenesis
Management	Control Prevention

Table 4 Example of Search Strings

1	Sense of Coherence
2	Subject Heading: Diabetes Mellitus
3	1 and 2
4	Salutogen*
5	4 and 2
6	Subject Heading: Glucose Intolerance
7	Subject Heading: Insulin Resistance
8	Subject Heading:Hypoglycemia
9	Subject Heading:Hyperglycemia
10	Subject Heading:Hyperinsulinism
11	6 OR 7 OR 8 OR 9 OR 10
12	1 and 11
13	4 and 11
14	Prevention OR Control OR Management
15	3 and 14
16	5 and 14
17	(MH "Diabetes Mellitus/CO/PC")
18	17 AND 1
19	17 AND 4

SOC and health and SOC and quality of life (Lindstrom and Eriksson 2006b; Lindstrom and Eriksson 2007). Their systematic reviews concluded that SOC contributes to the development and maintenance of people's health and that the higher the SOC, the better the quality of life.

Given diabetes is reaching epidemic levels, its long term nature and correlating costs to healthcare it seems highly relevant to address a gap in knowledge in relation to self management of diabetes and SOC. The question guiding this study therefore was,

'In adults with type 1 and type 2 diabetes, does a high Sense of Coherence in comparison with a low Sense of Coherence contribute to an improved self-management of diabetes?'

Methods

In order to ensure that the best available evidence was retrieved, a list of words derived from the research question and related subject heading terms were used as search words for the database search (see Table 2 for the databases used, table 3 for the search terms and table 4 for search strings). Search limiters were restrained to English, French and Arabic languages as these were the languages spoken by the authors, date of publication after 1979 as that was when the SOC was first conceived, and human patients.

The first search was undertaken between the 24th of July and the 4th of August 2010, where 263 articles were retrieved. After adjusting for duplicate articles and excluding articles irrelevant to the research question, only 20 articles remained.

A manual search checking the references of the 20 papers, resulted in finding a further 19, totalling 39 articles.

The next stage involved a further refinement of the methods. More focused exclusion and inclusion criteria were established to select articles that were most likely to answer the research question, see Table 5 for inclusion and ex-
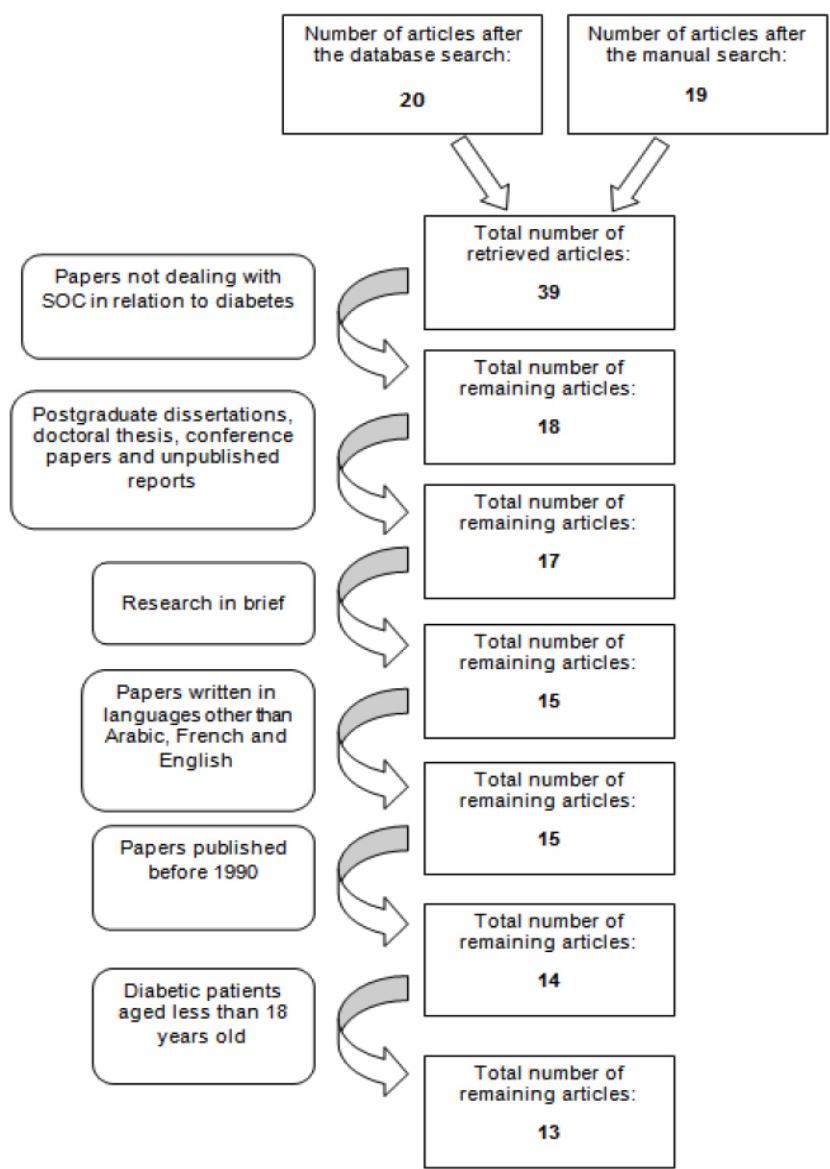
Table 3 Search Words

Papers dealing with SOC in relation to diabetes	Papers not dealing with SOC in relation to diabetes
Papers published in any country	Postgraduate dissertations, doctoral thesis, conference papers and unpublished reports
Papers written in Arabic, French and English	Research in brief
Papers published after 1979	Papers written in languages other than Arabic, French and English
The population is adults (18 years and above)	Papers published before 1990
	The population includes diabetic patients aged under18 years old

reading were found not to meet the inclusion criteria.

An in depth appraisal of the eight included studies to assess quality and risk of bias was carried out using critical appraisal tools, Crombie (1996), the Critical Appraisal Skills Programme (CASP) tool (Public Health Resource Unit 2006) and Bluff and Cluett (2006).

Each paper was critiqued separately that is a linear analysis. Throughout the in depth critical appraisal, there was a thorough critique of the different research paradigms, methods, approaches and decisions that were made in conducting the studies. The representativeness of the samples, sample size, inclusion and exclusion criteria used, validity and reliability of the data collection tools, biases and confounding factors, statistical tests used for data analysis and internal validity and generalisability of the findings were discussed in detail. This allowed judgment of the research quality of each of the eight papers and of their suitability to inform public health and health care practice. An appropriate consideration of research ethics was also considered throughout. Following this the findings were synthesised to provide a narrative concise account (a horizontal analysis of the eight linear analyses). A summary and analysis of each study is provided in

Figure 2.8: Exclusion of articles using the exclusion criteria

clusion criteria. Figure 2.8 describes the audit trail of selecting the studies to be included in the review.

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After using the inclusion and exclusion criteria 13 out of 39 articles remained. Five appeared to be relevant but after full text

Table 6 Summary of studies

Author, Title & Journal	Summary	Key finding of analytical review
Wikblad and Montin (1992) Coping with a chronic disease. The Diabetes Educator	**Aim:** Analyzing the question of coping with diabetes from a salutogenic health approach. **Design:** Mixed method between qualitative and quantitative **Sample:** 55 patients (mean age of 36 years) with insulin-dependent diabetes **Data collection:** Interviews **Analysis method:** Classification of the answers into qualitatively distinct categories **Key finding**s: Indication of the importance of coping for the patient's well being.	• Coping strategies were not significantly related to HbA1c levels • Patients who had different coping strategies had higher self esteem and subjective good health • Diabetic patients have their own individual strategies for coping with their disease
Lundman and Norberg (1993) The significance of a sense of coherence for subjective health in persons with insulin-dependent diabetes. Journal of Advanced Nursing	**Aim:** Analysis of the correlation between SOC and subjective health in diabetes **Design:** Cross sectional study **Sample:** A subgroup of 20 insulin-dependent diabetic patients (mean age of 40 years) **Data collection:** Interviews and measurement of glycated hemoglobin **Analysis method:** Measurement of SOC scores, coping strategies and metabolic control **Key findings:** SOC seemed to be an important factor for successful emotional coping with the demands of diabetes.	• No correlation between SOC and metabolic control • Weak correlation between SOC and problems related to the management of the disease • No correlation between SOC and positive experiences of the disease, problems in daily life and worries about long term complications • Negative correlation between SOC and tedium
Richardson et al (2000) Persons with insulin-dependent diabetes mellitus: acceptance and coping ability. Journal of Advanced Nursing	**Aim:** Examining SOC in relation to the duration and complications of diabetes. **Design:** Cross sectional study **Sample:** 107 insulin-dependent diabetic subjects (mean age: 43) **Data collection:** Questionnaires and patients' medical records **Analysis method:** Statistical analysis **Key findings:** A significant correlation between a high SOC and high coping ability was identified.	• Older male patients have a higher SOC than younger female patients • Patients who have a high SOC have a high degree of acceptance of the disease • Patients with higher levels of education have better coping abilities, higher acceptance of their disease and better metabolic control • There is no significant correlation between SOC and HbA1c • No correlation between SOC and HbA1c • The higher the estimation of health the higher the SOC scores and the lower HbA1c levels • Positive correlation between low levels of HbA1c and high levels of patient activity in managing diabetes and emotional acceptance of diabetes
Sanden-Eriksson (2000) Coping with type-2 diabetes: the role of sense of coherence compared with active management. Journal of Advanced Nursing	**Aim:** analysis of the relationship between SOC and treatment results in patients with type 2 diabetes **Design:** Cross sectional study **Sample:** 174 patients with newly diagnosed type 2 diabetes **Data collection:** Questionnaire and measurement of glycolysed haemoglobin **Analysis method:** Statistical analysis using t-test and descriptive statistics **Key findings:** A positive correlation between SOC and self-assessed health was revealed	• No correlation between SOC and HbA1c • The higher the estimation of health the higher the SOC scores and the lower HbA1c levels • Positive correlation between low levels of HbA1c and high levels of patient activity in managing diabetes and emotional acceptance of diabetes

Shiu (2003) Sense of coherence amongst Hong Kong Chinese adults with insulin-treated type 2 diabetes. International Journal of Nursing Studies	**Aim**: Examining the relationship between SOC, fear of hypoglycemia and metabolic control **Design**: Cross sectional descriptive study **Sample**: 72 insulin-treated type 2 diabetic patients (mean age: 51.6) **Data collection**: Questionnaire, measurement of glycosylated hemoglobin and a 12-item information sheet. **Analysis method**: Descriptive statistics, multiple linear regression and partial correlation **Key finding**s: SOC contributes to a lower fear of hypoglycemia	• The sample has an average SOC score • The higher the SOC the lower the fear of hypoglycaemia and thus better emotional adjustment to insulin treatment • No significant correlation between SOC and difficulties in managing diabetes • No significant correlation between SOC and HbA1c • No significant correlation between SOC and self-care practices
Cohen and Kanter (2004) Relation between SOC and glycemic control between type 1 and type 2 diabetes. Behavioral Medicine	**Aim**: Examining the relation between glycemic control and SOC **Design**: Case control study **Sample**: 67 individuals with type 1 and type 2 diabetes and a control group of 29 healthy individuals **Data collection**: Questionnaires and measurement of glycosylated hemoglobin **Analysis method**: Path analysis produced by serial regression analysis **Key finding**s: Possible role of SOC in the psychological and physical well being of diabetic patients	• SOC has an indirect effect on glycemic control mediated via adherence to self care behaviours • SOC is related to lower psychological distress and better adherence to self-care behaviours • Adherence to self care behaviours does not mediate the effect of psychological distress on glycemic control • The better adherence to self care behaviours the better the glycemic control
Leksell et al (2005) Sense of coherence and power among people with blindness caused by diabetes. Diabetes Research and Clinical Practice	**Aim**: Analysing the correlation between a strong SOC and self-perceived health, burden of diabetes, glycemic control and self-care among blind diabetic patients was analysed. **Design**: Case control study **Sample**: 39 blind subjects aged between 19 and 65 years old **Data collection**: Semi-structured interviews and patients' hospital records **Analysis method**: Statistical analysis using Student's t-test and X2 test **Key finding**s: Importance of increasing the SOC to assist diabetic blind patients in different self-care situations.	• Subjects with the combination of strong SOC and power were more satisfied with their health and less burdened by their diabetes • The combination of strong SOC and power was more common among blind non-diabetic subjects than among those with diabetes-related blindness • The correlation between the combination of strong SOC and power and glycemic control is not statistically significant • Almost all the visually blind diabetic subjects experienced problems with self care
Abdelgadir et al (2009) Health related quality of life and sense of coherence in Sudanese diabetic subjects with lower limb amputation'. Tohoku Journal of Experimental Medicine	**Aim**: Investigating the influence of lower limb amputation on health-related quality of life and SOC **Design**: Cross sectional study **Sample**: 60 diabetic subjects with lower limb amputation (mean age: 57.4). Another 60 diabetic patients without lower limb amputation as a reference group (mean age: 52.8) **Data collection**: Questionnaires **Analysis method**: Statistical analysis using student's t-test and X2 test **Key finding**s: Diabetic subjects with lower limb amputation had a lower quality of life and a decreased SOC.	• The health related quality of life for the iabet ic subjects with lower limb amputation was found to be low compared to diabetic reference subjects • Better family satisfaction surrounding the diabetic subjects with lower limb amputation • SOC was related to a better quality of life but was decreased when more general symptoms were present

Table 7 Evaluation of the studies in terms of internal validity, reliability and generalisability/transferability

Authors	Internal Validity	Reliability	Generalisability/ Transferability
Wikblad and Montin (1992)	Poor internal validity due to the presence of biases and lack of control for confounding factors	The study demonstrates good reliability of the measurements used	The findings are not likely to be transferable to the total population of Sweden or beyond because the sample was drawn from one hospital and there is no indication that the characteristics of the sample match the ones of the target population
Lundman and Norberg (1993)	Poor internal validity due to the presence of biases and lack of control for confounding factors	The study demonstrates good reliability of the measurements used	The findings are not likely to be generalized to the population of Sweden or beyond due to a small sample size and possibility of selection bias
Cohen and Kanter (2004)	The study demonstrates good internal validity but has some biases (recall bias, measurement bias)	The study demonstrates good reliability of the measurements used	The findings are not likely to be generalized to the population of Haifa (Israel) or beyond due to convenience sampling and the control group not being selected in the same way as the cases
-Sanden-Eriksson (2000)	Poor validity due to the presence of biases and lack of control for confounding factors	Poor reliability. Not all of the adopted measurements are proven to be reliable	The findings are not likely to be generalized to the population of Stockholm county (Sweden) or beyond due to a low response rate
Leksell et al (2005)	Poor validity due to the presence of biases and lack of control for confounding factors	Poor reliability. Not all of the adopted measurements are proven to be reliable	It is not clear whether the findings can be generalised to the population of Sweden or beyond because there is no description of the target population and there are differences between the cases and the control group
Shiu (2003)	The study demonstrates good validity but has some biases (recall bias, measurement bias)	The study demonstrates good reliability of the scales used	The findings are not likely to be generalized to the population of Hong Kong or beyond due to convenience sampling and the fact that some of the inclusion criteria may be biased
Richardson et al (2000)	Poor validity due to the presence of biases and lack of control for confounding factors	The study demonstrates good reliability of the measurements used	The findings are not likely to be generalized to the population of Stockholm (Sweden) or beyond because the sample was recruited from one hospital and there is no indication that the characteristics of the sample match the ones of the target population
Abdelgadir et al (2009)	The study demonstrates good validity but has some biases (recall bias, measurement bias)	The study demonstrates good reliability of the measurements used	It is not certain whether the findings can be generalized to the population of Sudan or beyond because there is no description of the target population and there are differences between the cases and the control group

Table 6.

Synthesis of findings

The quality of the studies was evaluated using the principles of reliability, internal validity and generalisability/transferability because they are essential criteria for demonstrating the rigour and trustworthiness of quantitative and qualitative research (Roberts et al 2006, Tuckett 2005). As a result findings are likely to be generalisable to individuals who share the same characteristics as the study population but are unlikely to be generalisable to the total population of the countries or the cities where the studies were conducted. As for the internal validity of the studies' findings, they are limited by biases and confounding factors even though some papers demonstrate a higher internal validity than others (see table 7)

A few other limitations that need to be taken into account when making inferences from the studies and that may affect their suitability to inform diabetes self-management. For instance the SOC scale and nearly all the other questionnaires used are self-report questionnaires, which are usually subject to social desirability bias; a phenomenon that occurs when the respondents provide answers which they think are appropriate or socially acceptable (Fisher 1993). Therefore the findings may be somehow misleading especially since the studies did not compensate for social desirability bias. Moreover most of the papers are not recent which affects their applicability to the current public health practice in the countries where the studies were conducted. Also the main focus in two studies was on the management of lower limb am-

putation and blindness caused by diabetes.

A high SOC was found to be related to lower psychological distress, lower fear of hypoglycaemia, high degree of acceptance of the disease and better quality of life. No correlation was found between SOC in regard to the difficulties related to diabetes management. There were some contradictions in the findings, some found that a high SOC is correlated with a better adherence to self care behaviours (Cohen and Kanter 2004) whilst others (Shiu 2003) did not.

Discussion

The review findings need to be viewed with caution. The key words in hindsight should have included self-care/self-management which might have yielded more studies than we found.

Whilst the findings have produced further insights into the links between SOC and diabetes the utility of assessing diabetic patients with SOC is yet to be established. The findings do reveal that a high SOC leads to successful emotional coping with the demands of type 1 and type 2 diabetes, which is also highlighted in other studies (Nagelkerk et al 2006 and Peyrot et al 2005) where negative experiences were found to be key barriers to improved self-management and positive attitudes were described as effective strategies in self-management.

The findings do not enable a clear understanding of whether a high SOC can contribute to an improved self-management of diabetes. Usually effective self-management of diabetes would induce low HbA1c levels (Schilling et al 2009, Hein-

rich et al 2010) but none of the studies demonstrated a significant correlation between HbA1c and high SOC. This is in accordance with the findings of a randomized trial (Gregg et al 2007) and a systematic review (Ismail et al 2004) both of which found that acceptance of the disease and psychological care helped patients better manage their diabetes but did not necessarily improve their blood glucose concentrations. This contrasts with Fisher et al's (2007) systematic review on healthy coping and diabetes management which discovered that psychological and emotional factors can influence metabolic control.

Conclusions

It remains unclear to what extent a high SOC can improve diabetes self-management especially given that a correlation between SOC and metabolic control was not found. However, the review suggests that a high SOC may improve the psychological well being of diabetic patients but its contribution to the holistic well being of these patients, that is emotional, social and biological aspects remains unclear.

The SOC questionnaire may provide practitioners an alternative tool to understand non-compliance, depression, anxiety, sense of hopelessness that can accompany life time illnesses. Whilst this study has not been able to confidently establish the value of SOC in relation diabetes self-care, this does not in itself mean that it has no value, it is just that the evidence does not exist at this time. Therefore further testing of the questionnaire is necessary. It may however, assist in moving practitioners focusing on from assisting patients adjust to the

physical and practicalities of living with diabetes to focusing on the psychological and emotional aspects.

Recommendations

There is clearly a need for more robust research to further investigate the contribution of SOC to diabetes self-management. Also most of the existing literature on SOC and diabetes is based on a cross-sectional design and thus conducting longitudinal studies could be more informative. Longitudinal studies may allow a better understanding of the long term contribution of SOC scale and it attributes to patients' self care practices and psychological well being. They may also enable a clearer understanding of the stability of the SOC score in the management of a chronic condition such as diabetes.

Moreover the available literature is predominantly quantitative which is contradictory given the very qualitative elements of SOC. Hence qualitative research is needed to examine patient views and perceptions on how a high SOC can improve their daily management of diabetes. Research which looks into health professionals' knowledge of SOC and its potential value to diabetes education and health promotion may also be fruitful in identifying advances in health care practice in the management of long-term conditions. Particularly as Furler et al (2008) state that health professionals largely focus on education and advice giving when supporting patients to manage their diabetes and pay less attention to the psychological and emotional well being of the patients. Knowledge and application of SOC may help practitioners focus on other aspects of

patients' lives and help them live more comfortably with their life-long illness.

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