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The present study is one of a few that have used 'sense of coherence' (SOC) as a dependent variable in an explanatory model. After studying three different samples – 680 students, 180 parents and 315 couples – we conclude that family relational and psychopathological variables contribute significantly to the explanation of SOC (explained variance between 10–27 and 26–50 per cent). In total, we obtained an explained variance of between 42 and 64 per cent. This leads us to the conclusion that in all three samples, SOC is multifaceted and thereby is more than simply an opposite state to depression. Context may play an important part in the explanation of SOC.

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Introduction

Recently, the concept of resilience has been applied to mental and physical healthcare. To explain health we need to take into consideration both resilient and protective factors. Sense of coherence may be viewed as a part of resilience and is the essence of salutogenic theory. Many empirical studies have focused on sense of coherence (SOC) by relating SOC to health variables such as psychological wellbeing, social support, stress and adaptive coping strategies (Carmel & Bernstein, 1989; Gana, 2001; Gibson & Cook, 1996; Larsson & Kallenberg, 1996; Nilsson, Holmgren & Westman, 2000; Pallant & Lae, 2002; Wolff & Ratner 1999). However, few of these studies use sense of coherence as a dependent variable to help understand and explain the concept. This article focuses on sense of coherence as a dependent variable in order to explain the concept in terms of psychopathogenic and family relational variables.

Salutogenic theory

Aaron Antonovsky developed a theory and a research perspective that he called salutogenesis (Antonovsky, 1987). Rather than seeking the mechanisms underlying illness (pathogenesis), he tried to identify the origin of health (salutogenesis) (Antonovsky, 1979, 1987). The salutogenic model is based on the premise that stress and difficulties are integral elements of human existence. Antonovsky developed the sense of coherence concept as the hub of his theory (Antonovsky, 1979, 1987). Sense of coherence consists of three components: 'comprehensibility', 'manageability' and 'meaningfulness'

(Antonovsky, 1987). Comprehensibility refers to whether or not inner and outer stimuli make sense to us in terms of being coherent, ordered, cohesive, structured and clear. Manageability refers to the extent to which we feel resources are at our disposal to help meet the demands posed by the stimuli to which we are exposed. Meaningfulness refers to whether we can perceive life's difficulties as 'welcomed' challenges worthy of an investment of energy, engagement and dedication rather than as a burden that we would prefer to avoid. Meaningfulness is the motivational component of the concept. In summary, sense of coherence is defined as:

> a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (1) the stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable *(comprehensibility)*; (2) the resources are available to one to meet the demands posed by these stimuli *(manageability)*; and (3) these demands are challenges, worthy of investment and engagement *(meaningfulness)*. (Antonovsky, 1987: 19)

According to Antonovsky, a strong sense of coherence leads to improved health, but the dichotomous categorisation of wellness and illness is a flawed point of departure. Instead, wellness–illness should be viewed as a continuum (Antonovsky, 1987). As long as we possess the slightest spark of life, we also possess, in some sense, a degree of health. The salutogenic perspective means that we examine the location of each individual on this continuum at a specific time. At the same time, the concept of the continuum makes

it possible to view all people from a pathogenic perspective as partly ill, objects of constant exposure to biopsychosocial risk factors (Antonovsky, 1995). Salutogenesis focuses on health rather than pathology.

In a literature search in spring 2004, we used the PsycInfo database to find over 400 articles dealing with sense of coherence. We acquired these articles and identified those using a stepwise or hierarchical multivariate regression analysis with sense of coherence as a dependent variable. We found four articles with five non-clinical groups and one clinical group (Table 1). In a study that consisted of 74 women, Cohen (1997) studied which variables – sociodemographic or narcissistic – best explain sense of coherence. In a hierarchical square regression analysis, the demographic variables explained 16 per cent of the variance of sense of coherence. Narcissistic variables explained an additional 26 per cent. In all, this explains 42 per cent of the variation. Cohen (1997: 56) concludes, 'narcissistic elements make a more significant contribution to sense of coherence than the socio-demographic variables do'.

Strümpfer, Gouws and Viviers (1998) investigated the hypothesis that sense of coherence is simply a way of measuring the absence of the concept of negative affectivity. Negative affectivity is a dominant, broad, superordinate personality trait, and a persistent and consistent way of experiencing and reflecting negatively on oneself and one's environment, a concept, according to Strümpfer and associates (1998), that is similar to neuroticism. The researchers carried out stepwise multiple regression analyses on three different groups: students at a nursing college (n = 118), employees in the property investment division of a life insurance company (n = 88) and male life insurance consultants (n = 92). The findings showed that a considerable part, 36–56 per cent, of the variation in sense of coherence remained unexplained. Strümpfer and associates (1998) concluded that sense of coherence appears to represent a complex concept. A strong negative correlation between sense of coherence and negative affectivity does not necessarily mean that the sense of coherence scale only measures the absence of anxiety or neuroticism: 'They could also be interpreted as validation of the scale in salutogenic/fortigenic terms, if the low end of this supertrait is conceived – as by some researchers – to represent emotional stability' (Strümpfer et al., 1998: 474).

Bengtsson-Tops and Hansson (2001), the only study using a clinical group, examine the construct and predictive validity of sense of coherence. The independent variables measured stress and mental illness (Table 1). The Swedish sample included 120 schizophrenic patients living in the community. A stepwise multiple regression analysis explained 61 per cent of the variance in SOC. The variable 'mastery' explained 46 per cent of the variance in SOC. Mastery reflects an individual's sense of control over his or her own life.

The concept of mastery is close to two of the sense of coherence components (comprehensibility and manageability), so this result is not so surprising. Bengtsson-Tops and Hansson (2001) concluded that the results support the construct and predictive validity of sense of coherence.

Bigler, Neimeyer and Brown (2001) investigated the extent to which self-structure variables measure levels of psychological adaptability (Table 1). The subjects consisted of 133 students. The hierarchical multiple regression analysis explained 45 per cent of the variation of sense of coherence. Because that study's primary purpose did not include an investigation of sense of coherence, no direct conclusions were drawn from the results (Bigler et al., 2001).

In all four articles referred to above, there are a number of significant variables: nine variables that measure personality traits, three that measure stress variables, two that measure self-structure variables and one that measures a sociodemographic variable (see Table 1). Each of these variables significantly contributes to sense of coherence in various explanatory models. Between 42 and 64 per cent of variance was explained in SOC. We are not aware of any earlier publications that studied how different psychopathogenic and family relational variables explain sense of coherence.

Aims and research questions

Antonovsky (1987) has already given a theoretical explanation of the concept of sense of coherence. The present study aims to study the concept of SOC and its relationships with characteristics of family relations and aspects of psychopathology in a Swedish context. This is done by using an explanatory model (multiple stepwise regression analysis). By this means we are giving an empirical explanation of sense of coherence.

Antonovsky (1987) emphasises that sense of coherence is dynamic and should take into account stimuli from various environments. Different stimuli will have different levels of influence in different contexts, a situation that should be apparent in different explanatory models. One earlier study of the concept with the same independent variables, but in a different context, yielded different significant variables in the explanatory models (Table 1; Strümpfer et al., 1998). Consequently, the hypothesis would be that both family and psychopathological variables contribute in an explanatory model.

Questions addressed

- How much of SOC can be explained by psychopathogenic factors and how much can be explained by family relational variables?
- Do different groups and different contexts give different results in terms of explained variances?

Table 1. Summary of earlier studies with sense of coherence as a dependent variable.

Published study	Sample	Variable	Instrument/Specification of variable	Statistical model	R^2
Cohen (1997)	Females (n = 74, 47 divorced)	Socio-demographic	Number of children, type of family, religion, *economic situation*, age, education	Hierarchical square regression analysis	42%
		Personality trait	The Narcissistic Personality Inventory (7 components): authority, exhibitionism, superiority, *entitlement*, exploitation, *self-sufficiency* and vanity		
Strümpfer et al. (1998)	Nursing college students (n = 118, 2 males)	Personality trait	*Positive and Negative Affectivity Schedule*, McCrea & Costa Extraversion and McCrea & Costa Neuroticism	Stepwise multiple regression analysis	44%
	Employees in life insurance firm (n = 88, 38 males)	Personality trait	*Positive and Negative Affectivity Schedule*, McCrea & Costa Extraversion and *McCrea & Costa Neuroticism*	Stepwise multiple regression analysis	53%
	Male life insurance consultants (n = 92).	Personality trait	*Manifest Anxiety Scale – 10*, Centre for Epidemiological Studies' Depression Scale, *Emotional Stability Scale*, *Positive Affect Scale* and *Hope Scale*	Stepwise multiple regression analysis	64%
Bengtsson-Tops & Hansson (2001)	Schizophrenic patients (n = 120)	Mental illness and regulators of stress	*Pearlin's Mastery scale*, *Rosenberg's Self-esteem scale*, Brief Psychiatric Rating Scale, Interview Schedule for Social Interactions (4 components): Availability of Social integration & Attachment, Adequacy of *Social integration* & Attachment	Stepwise multiple regression analysis	61%
Bigler et al. (2001)	College students (n = 133)	Self-structure	*Self-concept differentiation scale (SCD)*, *Self-concept clarity scale (SCC)* and *Interaction SCD*SC*	Hierarchical multiple regression	45%

Note: Significant independent variables are italicised.

Subjects

The groups were secondary school students, parents and couples in therapy. These groups were chosen because they were large and had empirical similarities. They consisted of both clinical and non-clinical populations. The term clinical population refers to subject material that includes individuals in need of some kind of community care. The non-clinical population includes individuals who do not require community care.

1. The group of secondary school students were asked to respond to several self-assessment questionnaires that measured mental health and social environment (Andersson, Balldin & Rudnert, 1993). A total of 680 students (336 girls, 344 boys) aged 14 to 16 participated: 243 from Grade 7 (118 girls, 125 boys); 237 from Grade 8 (120 girls, 117 boys); and 200 students from Grade 9 (98 girls, 102 boys). Because of the age homogeneity of the group, the average age is not given. The students attended both urban and small town schools. This group can be considered non-clinical.

2. In the parents group, various families with no history of any family member involved in community care over the past five years responded to self-assessment questionnaires (Djurestad, Johansson & Sällberg-Haraldsson, 2000). The questionnaire measured both mental health and social environment. A total of 90 mothers and 90 fathers participated. The average age of mothers was 39.9 (sd 6.1). The average age of fathers was 42.5 (sd 6.8). On average, the families had 1.8 children (sd 0.95). The first-born child averaged 11.0 years of age (sd 4.3). A total of 158 children (78 girls, 80 boys) participated. This group can be considered non-clinical.

3. In the couples in therapy group, married couples or partners living together who received therapy between 1998 and 2000 responded to self-assessment questionnaires (Lundblad & Hansson, n.d.). During the first session, the questionnaire measured both mental health and social environment. The study included 315 couples (315 women/315 men; 195 married/120 cohabiting). The average age of the women was 36.9 (sd 8.2), for the men it was 39.1 (sd 8.2). These couples had an average of 2.2 (sd 1.4) children in their families. On average, the families consisted of 1.8 (sd 1.2) children under the age of 18 and 0.4 (sd 1.0) children over the age of 18. This group can be considered clinical.

These groups presented an opportunity to study sense of coherence in adolescents (secondary school students), adult parents (parents) and in adult couples with relationship problems (couples in therapy). Empirical similarities are measurement instruments that measured similar concepts and the two family groups both have children. All subjects in the three groups answered the measurement instruments.

Methods

The studies referred to above were not designed with this multi-study in mind and did not always use the same measurement instruments. However, similar instruments were used within the same measurement area. We carried out a pragmatic classification of measurement instruments based on two perspectives: the psychopathologic and the relational. Table 2 presents a complete list of measurement instruments and the studies from which they were obtained.

The dependent variable was 'sense of coherence'. SOC is a 29-item, 7-point semantic differential scale translated into Swedish. The score range is 29–203. Antonovsky developed the scale so that scientists and clinics would be able to measure a life-attitude in relation to stress-resistance and increase the stress-hardiness in people and thereby produce a salutogenic factor (Antonovsky, 1993). Several studies have tested the validity and reliability of the SOC instrument (Antonovsky, 1987; Hansson & Cederblad, 1995). Cronbach's alpha was on average 0.88 and test-retest was 0.80 over 6 months (Hansson & Olsson, 2001).

We used two instruments (independent variables) to measure the psychopathogenic symptoms of the individual. 'Youth self report' is a list of symptoms (Achenbach, 1991). The questionnaire consists of 112 statements/items on a 3-point semantic scale studying the occurrence of various symptoms over the past 6 months. The items are combined to form eight narrow-band syndromes (withdrawn, somatic complaints, anxious/depressed, social problems, thought problems, attention problems, delinquent behaviour and aggressive behaviour). Two broad-band dimensions, internalising and externalising, and a total problem score can also be formed. The total problem score range is 0–202. For the different narrow-band syndromes, Cronbach's alpha have been calculated to 0.51–0.72 in a sample of 'normal' Swedish adolescents (Broberg et al., 2001). Only the eight narrow-band syndromes are used in this article.

SCL-90 ('symptom checklist') is an established and widely used instrument. The SCL-90 describes a person's wellbeing over the previous 14-day period (Derogatis, 2004; Derogatis, Lipman & Covi, 1973). The instrument contains 90 items on a 5-point semantic scale. These 90 items are divided into nine primary subscales (somatisation, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism) and a total index (GSI, Global Severity Index). A high score seems to indicate a large psychosocial symptom disadvantage. The total score index range on GSI is 0–4. Fridell and

associates (2002) standardised the instrument for Swedish conditions and found a Cronbach's alpha between 0.75 and 0.91 for the different subscales. Only the nine primary subscales are used in this article.

We measured the family relational variables with four different instruments (independent variables). 'Family climate' is a self-assessment instrument that measures the emotional climate in a family (Hansson, 1989). From a list of 85 adjectives, respondents choose at least 15 that best describe their family. The climate is described based on four criteria: closeness, distance, spontaneity and chaos. The score range for the four criteria is 0–5.67. Cronbach's alpha is calculated to 0.98 for closeness, 0.91 for distance, 0.71 for spontaneity and 0.92 for chaos by Hansson (1989). This article uses all four criteria.

'Family relations scale' measures disturbances in family relations by using five factors: attribution, interests, isolation, chaos and enmeshment (Höök & Cederblad, 1992). The scale also gives a total score. The instrument contains 46 items on a 5-point semantic scale. The total score range is 0–92. Cronbach's alpha assigns a total score of 0.92 for women and 0.92 for men (Höök & Cederblad, 1992). This article uses only the total score.

'Dyadic adjustment scale' measures dyadic satisfaction in a relationship (Spanier, 1976). The scale contains 32 items with four subscales (dyadic consensus, dyadic satisfaction, dyadic cohesion and affectional expression) as well as a total score. The total score range is 0–151.

The total scale and the four subscales can be viewed as different aspects of 'marital satisfaction'; for the entire scale, Cronbach's alpha was measured at 0.79 (Hansson et al., 1994). This article uses only the total score.

'Questions about family members' measures 'expressed emotion' with 30 items (Hansson & Jarbin, 1997). The questionnaire describes a dyad; in other words, respondents answer with respect to their relationship with a specific family member. There are four subscales: perceived criticism, perceived emotional involvement, critical comments and emotional over-involvement. The score range is 0–5. Cronbach's alpha is calculated from 0.61 to 0.89 for the different subscales (Hansson & Jarbin, 1997). This article uses all four subscales.

Statistical analysis

To summarise and compare SOC, we calculated average value and standard deviation on SOC in the three different groups. We measured the differences between these results using the *t*-test (independent groups) to find out whether these average differences were significant. We used correlation analyses of the different variables to investigate the strength and direction of the correlation. The final step was to conduct a stepwise multiple regression analysis. Stepwise multiple regression is a form of multiple regression consisting of a series of multiple regression analyses where variables are arranged in a certain order by the explanatory model

Table 2. List of different groups and measurement instruments.

Measurement area	Instrument variable	Secondary school students	Parents	Couples in therapy
SOC	SOC	X	X	X
Psycho.	Withdrawn	X		
	Somatic complaints	X		
	Anxious/depressed	X		
	Social problems	X		
	Thought problems	X		
	Attention problems	X		
	Delinquent behaviour	X		
	Aggressive behaviour	X		
	Somatisation		X	X
	Obsessive-compulsive		X	X
	Interpersonal sensitivity		X	X
	Depression		X	X
	Anxiety		X	X
	Hostility		X	X
	Phobic anxiety		X	X
	Paranoid ideation		X	X
	Psychoticism		X	X
Family	Closeness	X	X	X
	Distance	X	X	X
	Spontaneous	X	X	X
	Chaos	X	X	X
	Family relation scale	X		
	Dyadic adjustment scale		X	X
	Perceived criticism		X	X
	Perceived emotional involvement		X	X
	Critical comments		X	X
	Emotional over-involvement		X	X

(Licht, 1995). As a result, only the independent variables significantly contribute to predicting the dependent variable. The independent variable with the strongest correlation is first stepped into the model. We used StatView 5.0 (e.g. see Löfgren & Näverskog, 1999) to analyse the data. Female and male subjects are studied together in spite of known gender differences in many areas. There were more similarities than differences in our sample when checked for sex differences.

Results

The mean value and distribution (standard deviation) of SOC for the listed groups were calculated: secondary school students 139.1 (sd = 22.5, n = 607), parents 155.9 (sd = 15.1, n = 178) and couples in therapy 135.7 (sd = 22.7, n = 628). Secondary school students had a significantly lower SOC than parents (t = −9.36, p < 0.0001), but a significantly higher SOC than couples in therapy (t = 2.64, p < 0.01). Parents had a significantly higher SOC than couples in therapy (t = 11.19, p < 0.001).

We calculated group correlations to show the relationship of variables in the different groups. Critical values of the correlation coefficients are on a 5 per cent level of significance for a two-tailed test r = 0.19 (df = 100) and on a 1 per cent level 0.25 (df = 100) (Ferguson, 1959). This means that for the groups in this article the correlation is significant if r ≥ 0.19.

In the secondary school students group, we found the expected correlations (Table 3). We found significant negative correlations between SOC and all psychopathologic variables. Correlations between the family relational variables and SOC were also significant. All were negative except between SOC and closeness, which was positive. We found 57 per cent of the

correlations between psychopathologic and family relational variables to be significant.

The parents group also showed the expected correlations (Table 4). The majority of correlations between SOC and the psychopathological variables were significantly negative. Most of the correlations between SOC and the family relational variables were also significant. We found 48 per cent of the correlations between psychopathological and family relational variables to be significant.

The couples in therapy group also demonstrated the expected correlations (Table 4). We found significant negative correlations between SOC and all psychopathologic variables. However, only three family relational variables (dyadic adjustment scale, critical comments and emotional over-involvement) correlated significantly with SOC. We found 37 per cent of the correlations between psychopathologic and family relational variables to be significant.

In summary, analysis of the different groups showed many significant correlations between the chosen variables and SOC. Therefore, it is probable that more than one variable helps explain SOC; we conducted a stepwise multiple regression (SMR) analysis to study this. Only those variables that significantly correlated to SOC are shown in the explanatory model (Table 5).

Of all the psychopathologic variables, those measuring depression came to the forefront (Table 5). In all three groups, depression was entered early. The secondary school students group entered four variables (anxious/depression, delinquent behaviour, attention problems and somatic complaints) and contributed a total of 42 per cent of the variation in SOC (Ad R^2 = 0.42). The variable measuring depression (anxious/depression) was entered first and contributed 36 per cent of the variation of SOC (Ad R^2 = 0.36). Only the variable that

Table 3. Correlation matrix; secondary school students (n = 298).

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Sense of coherence	–													
Psychopathological														
2. Withdrawn	**−0.50**	–												
3. Somatic complaints	**−0.50**	**0.31**	–											
4. Anxious/depressed	**−0.62**	**0.61**	**0.52**	–										
5. Social problems	**−0.38**	**0.53**	**0.25**	**0.57**	–									
6. Thought problems	**−0.31**	**0.26**	**0.36**	**0.44**	**0.25**	–								
7. Attention problems	**−0.54**	**0.37**	**0.41**	**0.57**	**0.54**	**0.39**	–							
8. Delinquent behaviour	**−0.36**	0.10	**0.37**	**0.25**	0.14	**0.21**	**0.39**	–						
9. Aggressive behaviour	**−0.36**	0.17	**0.32**	**0.43**	**0.32**	**0.37**	**0.57**	**0.53**	–					
Family relational														
10. Closeness	**0.46**	**−0.21**	**−0.22**	**−0.31**	−0.18	−0.16	**−0.31**	**−0.32**	**−0.38**	–				
11. Distance	**−0.33**	0.11	0.14	**0.20**	0.11	0.08	**0.26**	**0.19**	**0.24**	**−0.65**	–			
12. Spontaneous	**−0.24**	0.08	0.14	0.16	0.07	0.14	**0.24**	**0.19**	**0.29**	**−0.46**	0.18	–		
13. Chaos	**−0.39**	0.16	**0.22**	**0.24**	0.16	0.10	**0.22**	**0.20**	0.18	**−0.60**	**0.44**	0.18	–	
14. Family relation scale	**−0.48**	**0.22**	**0.24**	**0.24**	0.17	0.10	**0.34**	**0.37**	**0.28**	**−0.62**	**0.42**	**0.26**	**0.55**	–

Notes: Significant correlations are bold (r > 0.19, p < 0.05; r > 0.25, p < 0.01).

Table 4. Correlation matrix; parents (n = 178) and couples in therapy (n = 571).

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
1. SOC	–	**−0.39**	**−0.55**	**−0.66**	**−0.60**	**−0.51**	**−0.45**	**−0.42**	**−0.56**	**−0.56**	0.18	−0.10	−0.03	−0.18	***0.28***	−0.16	0.03	***−0.28***	***−0.22***
Psychopathological																			
2. Somatisation	**−0.28**	–	**0.61**	**0.51**	**0.62**	**0.74**	**0.45**	**0.51**	**0.47**	**0.57**	−0.15	0.12	−0.09	**0.19**	−0.16	0.07	−0.01	0.17	**0.27**
3. Obsessive-compulsive	**−0.37**	**0.42**	–	**0.67**	**0.75**	**0.76**	**0.51**	**0.50**	**0.59**	**0.69**	−0.17	0.13	−0.06	**0.22**	**−0.22**	**0.20**	0.13	**0.21**	**0.27**
4. Interpersonal sensitivity	**−0.42**	**0.45**	**0.61**	–	**0.65**	**0.62**	**0.56**	**0.57**	**0.73**	**0.71**	**−0.19**	0.16	−0.01	0.18	**−0.25**	**0.25**	0.04	**0.30**	**0.32**
5. Depression	**−0.50**	**0.52**	**0.65**	**0.70**	–	**0.78**	**0.50**	**0.48**	**0.54**	**0.67**	**−0.25**	**0.19**	−0.11	**0.27**	**−0.30**	0.17	0.02	**0.30**	**0.35**
6. Anxiety	**−0.38**	**0.60**	**0.61**	**0.64**	**0.73**	–	**0.51**	**0.61**	**0.57**	**0.71**	−0.16	0.09	−0.03	**0.22**	−0.17	0.12	0.09	0.17	**0.28**
7. Hostility	**−0.32**	**0.37**	**0.56**	**0.63**	**0.58**	**0.55**	–	**0.39**	**0.55**	**0.56**	**−0.21**	0.17	0.11	0.14	**−0.24**	0.13	−0.06	**0.37**	**0.23**
8. Phobic anxiety	−0.07	**0.23**	**0.30**	**0.38**	**0.33**	**0.35**	**0.37**	–	**0.52**	**0.56**	−0.04	0.07	−0.06	0.08	−0.09	0.08	0.02	0.11	0.17
9. Paranoid ideation	**−0.31**	**0.40**	**0.53**	**0.72**	**0.60**	**0.58**	**0.71**	**0.42**	–	**0.70**	−0.14	0.13	0.00	0.13	**−0.21**	**0.27**	0.03	**0.22**	**0.28**
10. Psychoticism	**−0.33**	**0.32**	**0.49**	**0.54**	**0.51**	**0.49**	**0.62**	**0.41**	**0.51**	–	−0.15	0.14	−0.02	0.15	**−0.23**	**0.21**	0.05	**0.20**	**0.29**
Family relational																			
11. Closeness	**0.38**	−0.07	**−0.19**	−0.17	**−0.21**	−0.13	−0.18	0.05	**−0.20**	0.02	–	**−0.63**	−0.03	**−0.54**	**0.49**	**−0.32**	0.12	**−0.46**	**−0.26**
12. Distance	**−0.23**	0.18	**0.21**	**0.20**	0.17	0.09	0.07	−0.09	0.17	0.07	**−0.28**	–	−0.15	**0.21**	**−0.49**	**0.28**	−0.17	**0.42**	**0.20**
13. Spontaneous	**−0.20**	0.10	0.12	0.04	0.05	0.11	0.14	0.00	0.11	−0.02	**−0.64**	0.19	–	−0.13	−0.01	−0.02	−0.04	0.09	0.00
14. Chaos	−0.14	0.05	0.17	0.11	**0.19**	0.10	0.04	−0.01	0.18	0.05	**−0.28**	0.10	**0.21**	–	**−0.32**	**0.24**	−0.03	**0.25**	**0.20**
15. Dyad. Adjust. Sc.	**0.36**	−0.16	**−0.31**	**−0.42**	**−0.39**	**−0.30**	**−0.28**	−0.11	**−0.32**	**−0.20**	**0.41**	**−0.20**	**−0.32**	−0.18	–	**−0.58**	**0.24**	**−0.70**	**−0.39**
16. Perceived criticism	**−0.38**	**0.24**	**0.31**	**0.32**	**0.27**	**0.37**	**0.27**	**0.19**	**0.35**	**0.26**	**−0.30**	**0.20**	**0.23**	0.01	**−0.42**	–	−0.02	**0.51**	**0.43**
17. Per. emot. involv.	0.06	−0.07	−0.09	−0.12	−0.11	−0.12	−0.02	−0.14	−0.07	−0.16	0.03	−0.05	−0.10	−0.05	**0.27**	−0.04	–	**−0.20**	−0.01
18. Critical comments	**−0.27**	**0.26**	**0.36**	**0.43**	**0.41**	**0.39**	**0.31**	0.15	**0.30**	**0.28**	**−0.31**	**0.22**	**0.26**	0.10	**−0.57**	**0.37**	−0.10	–	**−0.57**
19. Emotional overin.	**−0.29**	**0.20**	**0.21**	**0.31**	**0.32**	**0.29**	**0.29**	**0.22**	**0.35**	**0.28**	**−0.26**	0.16	0.12	0.12	**−0.20**	**0.36**	0.10	**0.42**	–

Notes: Significant correlations are bold (r > 0.19, p < 0.05; r > 0.25, p < 0.01). Dyad. Adjust. Sc. = Dyadic Adjustment Scale. Per. emot. involv. = Personal emotional involvment. Emotional overin. = Emotional over-involvement.

Table 5. Results from stepwise multiple regression. SOC dependent variable, others independent.

Group	Secondary school students		Parents		Couples in therapy	
Variable	Psychopathological	Family relational	Psychopathological	Family relational	Psychopathological	Family relational
Step 1 Ad R^2 F	**Anxious/Depressed** 0.36 323.74	**Family Rela. Scale** 0.23 95.02	**Depression** 0.26 64.71	**Perceived criticism** 0.18 40.85	**Interpersonal sen.** 0.45 502.45	**Critical comments** 0.07 22.81
Step 2 Ad R^2 F	**Delinquent behav.** 0.39 190.47	**Closeness** 0.27 59.81		**Closeness** 0.24 29.33	**Depression** 0.49 302.15	**Dyadic Adjust. Scale** 0.09 30.86
Step 3 Ad R^2 F	**Attention problems** 0.41 135.75			**Dyadic Adjust. Sc.** 0.27 29.33	**Paranoid ideation** 0.50 208.58	**Chaos** 0.10 22.71
Step 4 Ad R^2 F	**Somatic complaints** 0.42 106.69					
n	584	320	178	178	618	579

Notes: (F – to – enter 4, Con interval 0.95) **Secondary school students**. *Psychopathological*: Delinquent Behav. = Delinquent behaviour. *Family relational*: Fam. Rela. Scale = Family Relation Scale. **Parents**. *Family relational*: Dyad. Adjust. Sc. = Dyadic Adjustment Scale. **Couples in therapy**. *Psychopathological*: Interpersonal sen. = Interpersonal sensitivity. *Family relational*: Dyad. Adjust. Scale = Dyadic Adjustment Scale.

measures depression was entered to the parents group, and accounted for 26 per cent of the explained variance (Ad $R^2 = 0.26$). The depression variable was not entered until step 2 in the couples in therapy group. The interpersonal sensitivity variable was entered first and accounted for 45 per cent of the explained variance of SOC (Ad $R^2 = 0.45$). The depression variable contributed an additional 4 per cent. One more variable (paranoid ideation) was entered, resulting in a total explained variance of 50 per cent (Ad $R^2 = 0.50$). The psychopathogenic variables accounted for between 26 and 50 per cent of the explained variance.

Stepwise multiple regression with family relational independent variables

In the secondary school students group, first the family relation scale variable and closeness were entered (Table 5). In all, this resulted in 27 per cent explained variation in SOC. In the parents group, three variables were entered (perceived criticism, closeness and dyadic, adjustment scale) and contributed a total of 27 per cent of the variation in SOC (Ad $R^2 = 0.27$). The couples in therapy group gave an explanatory model of 10 per cent explained variance attributable to these variables: critical comments, dyadic adjustment scale and chaos. The family relational variables explained between 10 and 27 per cent of the variance.

Stepwise multiple regression with the significant psychopathological and family relational independent variables

When combining the variables into an explanatory model using only significant psychopathological and

family relational variables from earlier explanatory models, we obtained a larger final explained variance (Table 6). In the secondary school students group, five of six variables contributed significantly, yielding a total explained variance of 54 per cent. In the parents group, three of four variables contributed significantly to give a total explained variance of 37 per cent. In the couples in therapy group, four of the six variables contributed significantly to give a total explained variance of 50 per cent. In all, 37 to 54 per cent of the variation in SOC could be explained by psychopathological and family relational variables.

Discussion

Main findings

To our knowledge, this is the first study to show that family relational variables and psychopathological variables contribute to the explanation of sense of coherence. Earlier studies have shown in explanatory models that variables measuring sociodemography, personality traits, mental illness, regulators of stress and self-structure are interesting when trying to understand sense of coherence. The results showed that most of the variables used in this study across the three groups had expected correlations. Both psychopathological variables and family relational variables contributed significantly to sense of coherence. In all three groups (secondary school students, parents, couples in therapy), we could see that the same pattern, anxiety and depression explained most of the variance. In the couples in therapy group, a clinical group, different patterns were observed. A more relational variable from SCL-90, interpersonal sensitivity, was the first variable to be

Table 6. Results from stepwise multiple regression. SOC dependent, significant independent.

Group	Secondary school students	Parents	Couples in therapy
Step 1	**Anxious/Depressed**	**Depression**	**Interpersonal sensitivity**
Ad R^2	0.39	0.26	0.43
F	201.44	64.71	438.22
Step 2	**Family Relation Scale**	**Perceived criticism**	**Depression**
Ad R^2	0.50	0.34	0.48
F	156.91	46.20	267.61
Step 3	**Attention problems**	**Closeness**	**Paranoid ideation**
Ad R^2	0.52	0.37	0.49
F	114.89	36.00	183.71
Step 4	**Somatic complaints**		**Dyadic Adjustment Scale**
Ad R^2	0.54		0.50
F	91.85		140.69
Step 5	**Closeness**		
Ad R^2	0.54		
F	75.64		
n	314	178	572

Notes: (F – to – enter 4, Con interval 0.95) No.

entered into the explanation model of sense of coherence in this group. This result seems to point out the importance of context in studies like this.

Specific findings

Our study included three groups: adolescents (secondary school students), adult parents (parents) and adult parents with problem relationships (couples in therapy). The result showed different means in sense of coherence. The differences could be because of age or non-clinical or clinical groups, findings that are similar to other studies (Hansson & Olsson, 2001). The correlations between the chosen variables were similar in all groups. More or less all chosen variables were significant bivariated correlated with sense of coherence. Earlier studies have investigated similar correlations and obtained similar results (Hansson & Olsson, 2001; Langius, Björvell & Antonovsky, 1992). This points out the importance of using a multivariate explanatory model with sense of coherence as a dependent variable.

In the explanatory model, depression contributes significantly to explaining sense of coherence in all groups. This is no surprise. Earlier studies have demonstrated the similarities between a sense of coherence and concepts such as mood and depression (Korotkov 1993, 1994; Larsson & Kallenberg, 1999). Therefore we could have used these variables (anxious/depression) as covariates, but we wanted to point out their impact on the concept. Sense of context is based on three components: comprehensibility, manageability and meaningfulness (Antonovsky, 1987). Meaningfulness refers to whether the problems of life can be perceived as 'welcomed' challenges, challenges worthy of an investment of energy, engagement and dedication. Depression can be defined as a condition of sadness, often also including anxiety, lack of initiative and being tired of life. In other words, high meaningfulness is almost diametrically opposed to depression. Consequently, it is not surprising, but rather expected, that in all groups depression and anxiety have this significance for sense of coherence. However, even if its contribution was significant, it did not completely dominate. This opens the door for alternative explanations. In another study using a behavioural genetic design we found that genetic factors explained a third of the variance in the sense of coherence (unpublished data from the 'Twin Mother Study', Reiss et al., 2001).

Family relational variables also had a high explanatory value for sense of coherence. Comprehensibility refers to whether or not stimuli are perceived as information that is ordered, coherent, structured and clear, as opposed to chaotic, disordered, randomised, unexpected and inexplicable (Antonovsky, 1987). The way family relationships are perceived should be highly significant for this. Relationships and the behaviour of close relations can be described as cohesive, structured and clear, but even chaotic, disordered, randomised, unexpected and inexplicable. In other words, it seems to be descriptions of different ends of comprehensibility. Manageability refers to the extent to which we perceive that resources are at our disposal to help meet the demands posed by the stimuli to which we are exposed (Antonovsky, 1987). The demands that arise through various stimuli can be overcome by means of available resources in the form of relationships to the family and the behaviour of close relations. According to Antonovsky, there exists an association between sense of coherence and the family (Antonovsky & Sourani, 1990).

The results from the two non-clinical groups, secondary school students and parents, were consistent. Among the psychopathological variables, depression was entered first; the family relational variables contributed to about the same degree in explaining variance, as did the psychopathological variables. However, the analysis in the clinical group, couples in therapy, yielded different results. The two most important variables were interpersonal sensitivity and depression (psychopathological). It is possible to argue that interpersonal sensitivity is also relational. Interpersonal sensitivity measures whether an individual is overly observant of the behaviour of others and changes in the environment (Deogatis et al., 1973; Fridell et al., 2002). This could also be seen as yet another relational perspective of the family.

These results could be interpreted as an indication that different contexts contribute with different significant variables in an explanatory model of sense of coherence. Antonovsky's (1987) salutogenic theory represents a comprehensive idea. The concept 'sense of coherence' should respond to stimuli from both internal and external environments; the individual should have the resources to deal with these stimuli and perceive them as challenges. Different contexts produce different stimuli. This study shows that the explanation for sense of coherence may vary depending on context. Different variables dominate based on context, a tendency consistent with the concept that sense of coherence should respond to stimuli from various environments. Another study has noted that sense of coherence depends on context. Smith, Breslin and Beaton (2002) examined the stability of sense of coherence. They concluded and recommended caution if sense of coherence was to represent a stable global orientation within a causal context. To fully understand and explain sense of coherence, one must understand its context. Our results agree with this study and replicate their results in a Swedish context and with other variables and groups.

We merged the psychopathological and family relational variables. By doing so, we obtained an explained variance between 37 and 54 per cent in the model, which is comparable with earlier studies that explained variance of between 42 and 64 per cent. However, we have used different variables, suggesting that the concept 'sense of coherence' is multifaceted. This was also Antonovsky's purpose in constructing the measurement instrument intended to measure sense of coherence.

Methodological considerations

The present study explaining sense of coherence is structured by re-analysing three of our earlier groups based on new questions. This cannot be done without restrictions. Like most scientific studies, its empirical material limits this study. The groups presented in this article are based on three independent cross-sectional studies. One limitation of cross-sectional studies is that it is not possible to reach any credible conclusions about the relationship between cause and effect. Another limitation could be that this study is based only on self-assessments, which can be influenced by individual extreme responses or by social desirability. This could limit the ability to generalise. The reverse could also be true; in other words, the subjects made their assessments based on current norms within the context of conformity in which they find themselves. Consequently, it may not be possible to generalise the results to apply to extreme groups with severe chronic psychiatric diagnoses or to groups with a deviant social desirability. Yet another limitation may be that the studies on which this article is based may consist of different sized populations (n). Large populations usually yield more significant variables in this type of analysis. This may have affected the results and it is possible that type 2 errors could be made if n is large. In other words, a variable may appear significant, even though it is not. Therefore, we do not focus on the last entered variables in the explanatory models.

Conclusion

Sense of coherence is something more than just the opposite of depression in both normal and clinical groups. The same goes for children and adult samples. We can also conclude that relation variables such as family relations are important in understanding sense of coherence. All together we could not account for all aspects of sense of coherence. This means that sense of coherence is a multifaceted concept, just as Antonovsky intended when he constructed it. The concept is based on a holistic approach and may therefore be interesting as an output variable in many contexts. This leads us to the conclusion that sense of coherence covers a wide perspective of health.

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