Association between sense of coherence in adolescence and social benefits later in life: a 12-year follow-up study

Else Toft Würtz,1,3 Kirsten Fonager,1,2 Jens Tølbøll Mortensen1

ABSTRACT
Objectives: Local government concerns over expenditure on social and healthcare are growing. The aim of the present study was to explore the association between a weak ‘sense of coherence’ (SOC) in teens and their subsequent risk of receiving social and healthcare benefits during young adulthood, and to monitor how SOC developed during this period.

Design: Prospective cohort study.

Setting: North Denmark Region.

Participants: 773 Pupils from seventh and eighth forms who answered a questionnaire in 1998.

Outcome measures: Different social benefits (from the Danish DREAM database embracing disbursed public social benefits). Change in SOC score from 1998 to 2010.

Results: 722 had answered seven items of the original SOC-13 questionnaire (denoted by SOC-7). Girls with a weak SOC-7 (the lowest 1st quartile) in 1998 had a significantly increased risk of receiving unemployment benefits (RR 1.3 (1.1 to 1.6)), social assistance (RR 1.8 (1.3 to 2.5)) and sickness benefits (RR 1.5 (1.2 to 2.0)) compared with girls with a strong SOC-7. For boys, only minor protective and non-significant differences were found. The SOC answers from 1998 and 2010 were compared (n=394), SOC increased significantly and mostly in girls.

Conclusions: SOC-7 may serve as a predictor for social life event outcomes and hence facilitate an early identification and a selective approach to support teenage girls with a weak SOC. From adolescence to young adulthood, SOC-7 was of a relatively unstable nature.

INTRODUCTION
Supporting society’s youngest citizens has both social and economic rationales. As youth employment in the age group 15–29 years has increased rapidly from 6% in 2008 to 13% in 2010, it has contributed to local government concerns over social and healthcare expenditures.

Sense of coherence (SOC) was introduced in 1979 by Aaron Antonovsky as a salutogenic concept that captured the strength and determinants in health. The definition of SOC is:
A strong SOC indicates that a person will be likely to cope more successfully with stressful situations. A strong SOC has been found to predict good health and to be related to a high quality of life.³¹³²³³⁵ SOC also correlates with better school performance.⁶ Furthermore, SOC has been shown to have a negative correlation with anxiety and depression, a positive correlation with optimism and self-esteem, a moderate correlation with life events and to be connected with attitudes and behaviour.⁶³ Other researchers have already addressed interventions to promote SOC.¹⁰¹¹

The aim of the present study was to explore the association between a weak SOC in teens and their subsequent risk of receiving social and healthcare benefits during young adulthood and to monitor how SOC developed during this period.

METHODS

Baseline

In 1998, the Department of Clinical Epidemiology, Aalborg Hospital, Aarhus University Hospital, Denmark completed a study of teenagers’ use of over-the-counter painkillers.¹² The basic population consisted of pupils from seventh and eighth forms in the former North Jutland County in Denmark. Selected public schools from districts with low, middle and high medicine use,¹³ combined with rural and urban locations were invited to participate. Acceptance from 15 schools resulted in 1178 requests to fill in a self-administered questionnaire during a school lesson, corresponding to 12.7% of seventh and eighth form pupils in North Jutland County in 1998.¹⁴ Questions addressed issues about spare time, pain, use of painkillers, well-being, friends and selected SOC items. In 1998, the researchers selected seven of the original 13 SOC items from Antonovsky’s SOC-13 (hereafter denoted by SOC-7). The seven items were those considered that the pupils would be capably answering given their age (no 1, 4–6, 8–9 and 13 from the SOC-13). The SOC-7 items were translated by JTM and a few phrases diverged slightly from the later Danish translation.¹⁵ Answers were given on a 7-point Likert scale. The questionnaire also requested information on all public social benefits recorded on a weekly basis and can be linked to the individual recipient via the CPR number. The DREAM database contains pooled data from all relevant Danish ministries, all Danish municipalities and the national bureau of statistics (Statistics Denmark) since July 1991 and the database has been found suitable for public health research.¹⁶ The DREAM database has 110 different codes which cover benefits disbursed within any given week to a citizen whether he or she has received the benefit during a single day or the whole week. It is only possible to have one registration per week in a given benefit priority.

A personal letter with an internet address and a personal identification code was mailed to each follow-up participant and, if necessary, a reminder was mailed 1 month later. The internet-based questionnaire contained the SOC-13 questionnaire and 48 other questions considering self-reported health (SF12), medicine use, alcohol (Cage-C) and smoking habits, diet, physical activity, height, weight and education.

Ethical considerations

The study was conducted in accordance with the World Association’s Declaration of Helsinki. The participants and their parents signed a consent form and accepted participation in a later follow-up study. In 2010, the North Denmark Region approved and notified the Danish Data Protection Agency about the follow-up study.

Statistical analyses

Only participants who had answered all SOC-7 items in 1998 were included. The SOC scores were dichotomised into first (weak) and second-to-fourth quartile (strong) SOC. No ‘normal’ level of SOC was suggested by Antonovsky, and little agreement seems to exist on how to set SOC levels. Still, several studies have used the lowest 25% of the scores to characterise the weak group.⁵ DREAM data were extracted from the years 2000 to 2009 and categorised in primary and secondary groups as shown in table 1.

The risk of receiving different social benefits was analysed using two different categories: (1) Any social benefit received, (2) Long duration of social benefit (unemployment benefit >6 months, social assistance >3 months, and sickness benefit >3 months). Bivariate associations were tested with χ² statistics. The association between a weak SOC as a teen and the risk of receiving social benefits in young adulthood was assessed by relative risk (RR) estimates. However, since it was possible to receive more than one type of social benefits during the study period, restricted analyses were performed that compared participants with a specific benefit with participants receiving no benefit at all in the study period. The internal consistency reliability of the SOC scale items were measured with Cronbach’s α coefficient. In order to compare SOC in 1998 with SOC in 2010, the test–retest correlation was measured with Pearson’s correlation coefficient. Only participants who answered the SOC-7 items in 2010 were included. The statistical
significance level was set at \( p < 0.05 \) and CIs of 95% were reported. Analyses were completed in STATA V.9.2.

RESULTS

The baseline SOC-7 range and mean (SD) was 9–49, 36.2 (7.1), respectively, and were significantly higher in boys (18–49, 37.8 (6.4)) compared with girls (9–49, 35.0 (7.4)). The scale reliability coefficient of the SOC-7 items from 1998 was 0.77 (boys 0.73 and girls 0.79). Baseline data (table 2) were stratified according to answers to the SOC-7 items: Answering-seven items, first quartile and second–fourth quartiles.

<table>
<thead>
<tr>
<th>Primary group</th>
<th>Code</th>
<th>Social benefit</th>
<th>Secondary group</th>
<th>N=773</th>
<th>N (%)</th>
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<td>379 (49)</td>
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<td>Subsidised employment‡</td>
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<td>297–299</td>
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<td>B</td>
<td>730–736, 739</td>
<td>Social assistance*</td>
<td>Social assistance</td>
<td>161 (21)</td>
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<td></td>
<td>791</td>
<td>Vocational rehabilitation benefit</td>
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<tr>
<td>C</td>
<td>891–895</td>
<td>Sickness benefit‡</td>
<td>Sickness benefit</td>
<td>286 (37)</td>
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<tr>
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<td>761–762, 769</td>
<td>Light job§</td>
<td>Permanent health-related benefit</td>
<td>4 (0.5)</td>
<td></td>
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<tr>
<td></td>
<td>793</td>
<td>Disability pension</td>
<td></td>
<td></td>
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<tr>
<td>E</td>
<td>741–744, 746, 749</td>
<td>Unemployed after ‘flex job’¶</td>
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<td></td>
<td>771–773, 779</td>
<td>‘Flex job’¶</td>
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</table>

*Social benefit administered by the municipal social service department. Amount based on calculation of economic needs. Payment normally requires active job seeking through the Public Employment Service.
†Paid by the Public Employment Service to the employer of a long-term unemployed person.
‡Municipally administered benefit paid to a person or transferred to an employer if the employer pays a normal wage to a sick-listed employee.
§Jobs for citizens receiving disability pension. Jobs are on special terms as regards pay and working hours. Normally, only a few hours weekly.
¶Jobs created for persons with limited work capacity. Person receives a normal wage and the benefit is transferred to the employer. N: number in secondary group: a person may be present in several groups.

SOC and social benefits

Girls had more often received any kind of social benefit than boys (table 3). Compared with girls with a strong SOC-7, girls with a weak SOC-7 had a significantly

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increased RR of receiving unemployment benefits (RR 1.3; 95% CI 1.1 to 1.6), social assistance (RR 1.8; 95% CI 1.3 to 2.5) and sickness benefits (RR 1.5; 95% CI 1.2 to 2.0), but non-significant permanent health-related benefits (RR 6.6; 95% CI 0.7 to 62.8; table 3). Excluding participants receiving one of the other social benefits listed in table 1 did not change the estimates, except for the permanent health-related benefit which significantly exhibited an increased risk. Girls’ excess risk of receiving social benefits was increased even further in the long term (table 4). For boys, only minor non-significant protective differences were found between the SOC-7 groups.

SOC and self-rated health

Self-rated health was explored in 2010 by the question: ‘In general, would you say your health is...’ and answers were 9% ‘Excellent’, 48% ‘Very good’, 33% ‘Good’, 8% ‘Fair’ and 1% ‘Poor’ (n=432). Having a weak SOC-7 in 1998 significantly increased the risk that the participants would rate their health as fair or poor compared with excellent, very good or good (RR 1.99 (95% CI 1.03 to 3.86); n=409).

**Test–retest of SOC**

Pearson’s correlation coefficients were equal among boys and girls (0.31 and 0.30). This corresponds to an imperfect positive correlation between SOC-7 due to actual changes in the populations’ SOC-7 scores. Figure 1 shows the SOC-7 items from 1998 and 2010 scored as continuous variables (n=394). Notable changes were observed: 35% of the girls and 27% of the boys changed the SOC-7 group. The change from a weak 1998 to a strong 2010 SOC-7 was more prominent among boys (64%) than among girls (58%), whereas the girls accounted for the largest change from a high 1998 to a weak 2010 SOC-7 (27%) against the identical change in boys (21%).

**DISCUSSION**

A weak SOC-7 among girls in their teenage years increased their risk of becoming recipients of all the social benefits analysed in this study. All respondents had an increased risk of having a fair or poor self-rated health in 2010 if they had a weak SOC-7 in 1998. SOC-7
Table 3  Young adult’s risk of receiving any selected social benefits later in life (2000–2009) if having a weak sense of coherence (SOC-7) in 1998 (N=722)

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
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<th>Male</th>
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<tr>
<td></td>
<td>1st quartile</td>
<td>2nd–4th quartile</td>
<td>1st quartile</td>
<td>2nd–4th quartile</td>
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<tr>
<td>SOC N=125</td>
<td>N=275</td>
<td>RR (95% CI)</td>
<td>N=56</td>
<td>N=266</td>
<td>RR (95% CI)</td>
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<tr>
<td>Unemployment benefit (table 2: A)</td>
<td>57</td>
<td>43</td>
<td>1.32 (1.08 to 1.62)</td>
<td>1.37 (1.15 to 1.64)</td>
<td>43</td>
<td>53</td>
</tr>
<tr>
<td>Social assistance (table 2: B)</td>
<td>35</td>
<td>20</td>
<td>1.76 (1.26 to 2.46)</td>
<td>1.81 (1.36 to 2.41)</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>Sickness benefit (table 2: C)</td>
<td>49</td>
<td>32</td>
<td>1.53 (1.19 to 1.96)</td>
<td>1.52 (1.23 to 1.88)</td>
<td>43</td>
<td>36</td>
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<tr>
<td>Permanent health-related benefit (table 2: D+E)</td>
<td>2.4</td>
<td>0.4</td>
<td>6.60 (0.69 to 62.8)</td>
<td>10.27 (1.10 to 95.5)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Bold: p<0.05.
*Excluding participants receiving some of the other selected social benefits.
N, number; RR, relative risk.

Table 4  Young adult’s risk of receiving selected social benefits for at least 3 months* later in life (2000–2009) if having a weak sense of coherence (SOC-7) in 1998 (N=722)

<table>
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<tr>
<th></th>
<th>Female</th>
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<td></td>
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<td>SOC N=125</td>
<td>N=275</td>
<td>RR (95% CI)</td>
<td>N=56</td>
<td>N=266</td>
<td>RR† (95% CI)</td>
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<tr>
<td>Unemployment benefit (table 2: A)</td>
<td>39</td>
<td>21</td>
<td>1.89 (1.38 to 2.60)</td>
<td>1.89 (1.41 to 2.53)</td>
<td>11</td>
<td>26</td>
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<tr>
<td>Social assistance (table 2: B)</td>
<td>30</td>
<td>15</td>
<td>2.04 (1.38 to 3.00)</td>
<td>2.23 (1.53 to 3.23)</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Sickness benefit (table 2: C)</td>
<td>30</td>
<td>15</td>
<td>2.09 (1.41 to 3.09)</td>
<td>2.35 (1.64 to 3.37)</td>
<td>11</td>
<td>19</td>
</tr>
</tbody>
</table>

Bold: p<0.05.
*(A) Having received payment for more than 6 months in the period. (B) Having received payment for more than 3 months in the period. (C) Having received payment for more than 3 months in the period.
†Excluding participants receiving some of the other selected social benefits.
N, number; RR, relative risk.
appeared to be somewhat unstable with a significant increase during the study period, especially in females.

The 1998 response rate was 68% and we had no information on non-responders. The selected sample and low response rate may reduce our ability to make general conclusions on the basis of the estimations. Looking at SOC-7 non-responders, we found them to be similar in terms of living, spare time and health to those who had answered all the SOC-7 items. However, girls answering less than seven SOC-7 items more frequently received social assistance and sickness benefits later in life than those who answered all the SOC-7 questions, while the 30 boys received less sickness benefit later in life compared to those who answered all seven SOC items. Furthermore, selection bias regarding the participating schools could not be rejected, although urban and rural schools are present. The differences in scale reliability coefficients between boys and girls (0.73 and 0.79, respectively) at baseline support the common a priori belief that girls are more mature than boys in seventh and eighth forms given the more coherent answers, while the equal coefficients for SOC-13 in 2010 but not SOC-7 might rather point to a matter of selected questions.

A main strength of this study is the complete follow-up in DREAM data. The response rate for the follow-up questionnaire was 57%, considered low, but expectable in a 12-year follow-up study, with no further contact with the participants. However, we believe that the internet-based questionnaire was ideal for this young target group and would not expect an increased response using an ordinary hard copy format. The mean SOC in 2010 may have been overestimated because a large fraction of 2010 non-responders had a comparatively weak SOC-7 score in 1998. During the study period, the international financial crisis may have increased the need for social benefits in general. This may have entailed an underestimation of the association between a 'normal' risk of receiving social benefits later in life and having had a weak SOC-7.

The most favourable basis on which this study could have been compared with other studies would have been in 1998 to use the entire SOC-13 questionnaire which is applicable to children from 12 years.17 No other studies have been identified using the SOC-7 items used for the baseline study. Several studies have used all SOC-13 questions,17–19 or the modified children’s scale,20 21 for teenagers aged 11–16 years. The internal consistency reliability of the SOC scale was 0.81–0.87 in these studies. The present baseline study had a slightly lower Cronbach’s α of 0.77 for the selected SOC-7 items, which might be explained by our use of fewer items.5 Other studies have described a significantly higher SOC in boys than in girls as seen in the baseline data of this study.19 21 22

Longitudinal studies using SOC as a predictor of social benefits are few. A Finnish study using 16 items of SOC-29 predicted that having a one-point decrease in SOC would increase the risk for disability pension by 1.5.23 In another study, Finnish employees answered six items from SOC-29 and a weak SOC significantly predicted sickness absence in females.24

In a review of SOC and its association with health, Eriksson and Lindstrom concluded that SOC seems to be a health-promoting resource.25 This study supports this view because the respondents had an increased risk of rating their health as fair or poor if they had a weak SOC-7.

Our study had a low test–retest correlation coefficient (0.31) as evidenced by a significant change in SOC-7 over 12 years and by the fact that a large number of participants changed the SOC-7 group, which reflects the relatively unstable nature of SOC-7 in this age group.
Cross-sectional studies have attributed a change in the SOC score in different age groups to cohort effects, health selection or life experience. The follow-up design adopted in this study eliminated the cohort effect and health selection by demonstrating a true age effect. Moreover, our results confirm the findings from other longitudinal studies which have reported test–retest correlation coefficients between 0.42 and 0.77 with up to 10 years of follow-up. Additionally, SOC seems to be more stable in older age groups. The low correlation coefficient in our study is probably due to the comparatively young age of the study group. Previous cross-sectional studies of adolescents have reported negative associations between SOC and use of medicine, persistent depressive symptoms and generalised anxiety, and subjective health problems. This study found a significant association between a weak SOC-7 in adolescent girls and receiving social benefits in young adulthood. These findings may suggest that SOC may serve as a predictor for social life event outcomes and may hence facilitate an early identification and a selective approach to supporting teenage girls with a weak SOC. From adolescence to young adulthood, SOC-7 seemed to be relatively unstable.

CONCLUSION
This study found a significant association between a weak SOC-7 in adolescent girls and receiving social benefits in young adulthood. These findings may suggest that SOC may serve as a predictor for social life event outcomes and may hence facilitate an early identification and a selective approach to supporting teenage girls with a weak SOC. From adolescence to young adulthood, SOC-7 seemed to be relatively unstable.

Contributors ETW and KF participated in planning and accomplishing the follow-up study, statistics and manuscript revision. JTM was involved in planning and accomplishing the baseline study, was counsellor in the follow-up study and took part in manuscript revision.

Funding The authors would like to thank The North Denmark Region for their contribution with DREAM data. The research was supported by the Danish Data Protection Agency in 1998.

Competing interests None.

Ethics approval The study was approved by the former Scientific Ethical Committee for the counties of Viborg and North Jutland and the Danish Data Protection Agency in 1998.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

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