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Childhood psychopathology and sense of coherence at age 18: findings from the Finnish from a boy to a man study

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Abstract
Objective To examine associations between childhood psychopathology and family factors at age 8, and sense of coherence (SOC) at age 18.
Methods The sample includes 2,314 Finnish boys born 1981 with information about psychopathology from parents and teachers using Rutter scales, and self-reports of depressive symptoms using Child Depression Inventory (CDI), and self-reports of SOC at age 18.
Results Low parental education level and living in other than two biological parent family at age 8 were associated with low SOC 10 years later. Boys with internalizing symptoms based on parent/teacher reports, and depressive symptoms based on self-reports at age 8 were at risk for lower SOC at follow-up. Comorbidity of internalizing and conduct problems had the strongest association with low SOC.
Conclusion The study shows that internalizing symptoms, comorbid conduct and emotional problems, low parental education level and nonintact family at age 8 predict low SOC at age 18. Future research whether universal, selective or indicated early interventions targeted on risk factors of childhood mental health problems may result in promotion of well-being (including good SOC) in early adulthood is warranted.

Keywords Childhood · Longitudinal · Resilience · Psychopathology · Sense of coherence

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Introduction

Since Aaron Antonovsky [5] presented the construct of sense of coherence (SOC), it has been widely used in health and well-being research. Antonovsky's sense of coherence is, according to the theory, associated with the ability to solve (coping) and tackle problems (resiliency). However, SOC is not a coping strategy in itself, but individuals with a high SOC may be more inclined to adopt adaptive strategies flexibly, appropriate to the needs of the specific situation. The sense of coherence has been proposed as a psychological factor that predicts good health and positive adjustment; it reflects the way an individual is used to perceiving his/her life, world and environment. SOC is

defined as a personal orientation consisting of three dimensions: meaningfulness, manageability and comprehensibility [5, 7–9, 18]. Persons with high scores on all three are considered having a high SOC. They view the world as highly coherent, and are not avoidant to confront and challenge stressors. Those who score low on all components are considered as low in SOC. They regard the world as incoherent and hence are less able to master stressor challenges. Cross-sectional research has uncovered medium to strong correlations between a high SOC and a large variety of positive constructs such as optimism [28], quality of life [32], psychological adjustment [25], well being [21] and self-esteem, mental health and life satisfaction [40]. Equally consistent, low SOC has been related to negative psychological constructs such as anxiety and depression [11, 21, 35, 36, 40], and hostility [11].

Antonovsky [5] further claimed that SOC was fully developed when generalized resistance resources (GRR) was present. GRR include the characteristics of the person, a group or an environment that facilitate handling of tensions. The most important GRR involve childhood living conditions, ego strength, education, wealth, work-related factors, social support and cultural stability. Such resources lead to life experiences promoting the development of a strong versus weak SOC. Antonovsky [6] suggested three types of life experiences relevant to the development of a strong versus weak SOC: consistency, load balance, and participation in shaping outcome. (a) Consistency refers to the extent to which and there were order and structure rather than chaos in one's environment. Consistent experiences provide the basis for the comprehensibility component. (b) Load balance refers to the extent to which one suffered overload (or underload), in terms of appropriateness of the demands made upon one and one's resources. (c) Participation in shaping outcome refers to the extent to which one experienced to be an appropriately significant part in deciding her/his fate and was not an object and whims of others. Thus, those with inadequate financial resources (a GRR), may experience living and working conditions that are not conductive to the development of a strong SOC. In a retrospective study of men and women in their 60s, Sagy and Antonovsky [39] found that it was especially "participation in shaping outcome" which contributed to the development of SOC. However, the retrospective nature of this study should be kept in mind. Long-term prospective studies of the development of SOC is lacking, and is thus highly warranted.

According to Antonovsky [7], SOC remains fairly stable throughout life, but in such a way that a strong SOC usually is maintained, but weak SOC often deteriorates. There exists some empirical evidence for this theoretical claim [20, 33]. In one of the longest prospective studies of the development of SOC to date, a 5-year follow-up, Nilsson et al. [33] found that SOC was only stable for those with initially high levels of SOC. For others, individual conditions and societal changes influenced their SOC. Further, according to Antonovsky, SOC develops over time, and is fully developed about the age of 30. Because of lack of long-term prospective studies, empirical evidence for this claim is currently lacking. The large majority of SOC research has so far concentrated on adults [23]. Hence, long-term prospective studies on the reliability of SOC as a predictor or outcome of health in children are needed.

Previously, in our cross-sectional studies, we reported that low SOC among 18-year-old boys attending obligatory military call-up was strongly associated with perceived mental health problems, use of mental health services, excessive alcohol consumption, regular smoking and use of illegal drugs [34]. Low SOC also correlated strongly with suicidality [34]. Almost all those who reported suicidal acts had a SOC score in the lowest quartile, indicating low SOC, while none of the boys with a background of suicidal acts scored in the upper quartile on SOC scale. Low SOC was associated with all major ICD-10 psychiatric diagnoses (psychotic, mood, anxiety and substance use disorders) based on military health examinations [35]. Furthermore, low SOC correlated with a wide range of self-reports of mental health problems cross-sectionally, both internalizing and externalizing problems [36].

Despite mounting evidence of a link between mental health problems and low SOC in youths several important questions remain unanswered. First, no population based longitudinal study, including ours, has examined predictive associations between childhood mental health and adolescent SOC. Second, if associations between childhood mental health and later SOC is shown, an important question is what kind of combinations of mental health problems (i.e. comorbidity) predicts most strongly SOC outcome. Third, previous studies have shown that poor childhood living conditions, childhood family conflicts and high-risk environments [15, 29, 47, 48] are associated with lower SOC. However, we do not know if this association remains significant when controlled with the effect of concurrent mental health problems in childhood.

The focus of the present study is to study SOC as outcome. Specifically, our interest is to study the predictive associations between mental health problems and family variables at age 8 for level of SOC as outcome 10 years later. Furthermore, our interest is to shed some light on what kind of mental health problems and what kind of combinations among them is most strongly associated with level of SOC. Based on Antonovsky's original theory [5], we hypothesized that available indicators in the present birth cohort sample for possible poor GRR in childhood (e.g. child mental health, learning problems, lower parental SES and broken family) may be associated

with level of SOC in transition phase from adolescence to early adulthood.

Subjects and methods

Subjects

This investigation is part of the nation-wide "From a Boy to a Man" study, a 10-year follow-up study of the Epidemiological Child Psychiatric Study in Finland [4, 42–45]. The research plan was approved by the Joint Commission on Ethics of Turku University and Turku University Central Hospital. The first assessment was conducted in October and November 1989, and the follow-up assessment 10 years later at the time of call-up of this age group of young men, between September and November 1999. The participation of subjects in the study was voluntary. Informed consent was obtained from the children's parents at baseline, and from the adolescents themselves at follow-up.

The original study sample was drawn from the total population of Finnish children born during 1981 ($n = 60{,}007$). That original sample consisted of 6,017 children, equivalent to 10% of the total population. Of the 6,017 children, 5,813 (96.6%) took part in the study in 1989. Of these 5,813 children, 2,946 were boys. The 10% sample of the age cohort was drawn by selecting a representative sample of communities according to their degree of urbanization: urban, suburban or rural. In small communities, all the children born in 1981 belonged to the sample, while in the larger cities, a representative subsample of the area based on school districts was drawn from all the school districts. Details of the assessment at the age of 8 are given elsewhere [4].

Figure 1 shows the flow-chart of the study design. The 10-year follow-up sample included the same boys as had taken part in the study in 1989. Finnish men born in 1981

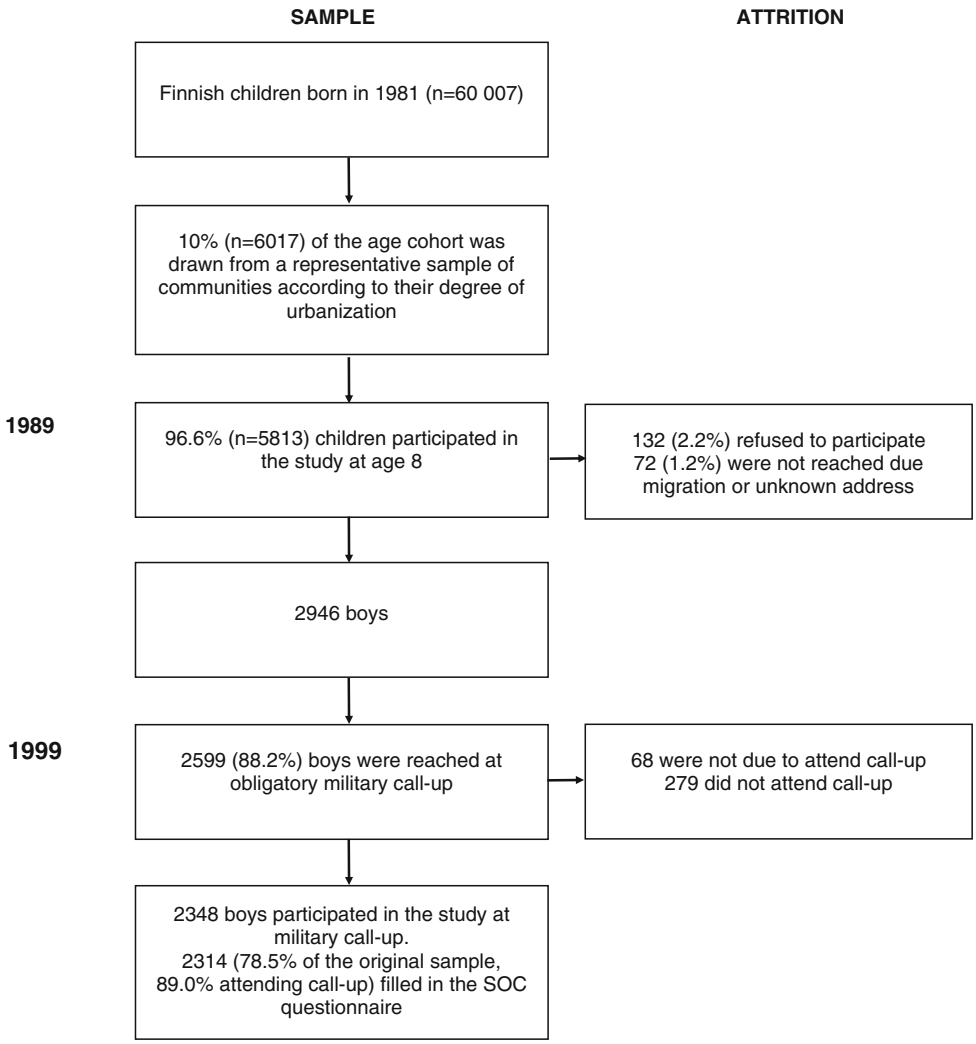

Fig. 1 Study sample and attrition

received their obligatory call-up notice in 1999. The call-up provided an opportunity to reach nearly all the boys in the age group. Of the original 2,946 boys, 2,878 were due to be called up. Two hundred and seventy-nine of them did not attend the call-up during the relevant period (most of these had already volunteered for military service and can be expected to have been in good health, four had a legal excuse, and 13 were illegally absent), so that 2,599 (88.2%) boys from the original sample were reached. Information about SOC was obtained from 2,314 boys (79% of the original target group and 90% of those who attended military call-up). At military call-up, the respondents returned the questionnaires in sealed envelopes to avoid reporting bias. From the adolescents' perspective, the reports, e.g. about perceived difficulties or behavioural problems thus did not affect decisions made by the military call-up authorities.

Methods

Mental health problems at age 8

Child behaviour at age 8 was assessed using information collected from three different sources: parents, teachers, and children. Data collection was organized through teachers. The teacher sent parent questionnaires via the child to the parents and the parents returned it in a sealed envelope to the teacher.

Parents and teachers evaluated psychopathology through the Rutter questionnaire, which is a validated child psychiatric instrument and widely used in child psychiatric research. The parent version of the Rutter scale consists of 31 items and the teacher version of 26 items rated on a scale of 0–2 [37, 38]. The parent and teacher questionnaires include three subscales, those of conduct, hyperkinetic and emotional symptom domains.

Children completed the Children's Depression Inventory (CDI) by self-report, which assesses depression symptoms in children [26]. The questionnaire consists of 27 items rated on a scale of 0–2. The question concerning suicide was excluded because it was assumed that the question might confuse 8-year old children. Thus, the Finnish version of the CDI consisted of 26 questions.

Parent and teacher information was combined to generate conduct, hyperkinetic and emotional scales [45]. The different childhood psychopathology domains (conduct, hyperkinetic, emotional and depressive) were studied separately as categorical and linear variables. To generate easily interpretable measures of psychopathology, results of the four mental health scales were categorized into below or above the 90th percentile. The sex-specific cut-off points were based on the distribution of scores in the baseline sample which was highly representative for 1981 born children [4].

To study comorbid psychopathology and SOC outcome, we collapsed the 16 combinations of four psychopathology domains into six groups to define clinically meaningful types according to our previous report [45]: (1) children who were negative (below the 90th percentile) on all four scales. This group was used as the reference group in the statistical analyses; (2) children who were positive on the conduct AND emotional OR CDI scales (Conduct-Emotional group), indicating that they had a high level of symptoms in conduct and emotional domains; (3) children who were positive on the Conduct scale and negative on Rutter parent/teacher emotional as well as CDI scales, the Conduct-only group; (4) children with hyperactivity problems, but without conduct problems, the Attention/Hyperactive group (including those with both hyperactivity and emotional problems); (5) Children with parent- or teacher-reported emotional problems who were negative on conduct and attention scales, the Emotional-only group; (6) children who reported high depressive symptoms but were screen-negative on all three scales based on parent/teacher reports, the "Invisible" group (i.e. depressiveness was not recognized by parents or teachers).

Additional data at age 8 were collected on the following: (1) parental education level: father's or mother's completion of at least 12 years of education (in Finland compulsory education consists of 9-year comprehensive school after which education can be continued in vocational school or in upper secondary school concentrating on theoretical subjects); (2) family structure: families were classified as intact (two-biological-parent families) or non-intact (others); (3) school performance: teachers reported if the child's academic performance was 1 = better than average, 2 = average, 3 = poor; alternatives 1 and 2 were pooled.

Outcome at age 18

SOC is a central concept of the Salutogenic Model of Health developed by Antonovsky [5, 7]. According to the theory SOC is developed and maintained in a social context. It is defined as personal disposition to orientate towards oneself and the external world, and it enables the individual to cope for managing the internal and/or external stressors of life. The 13-item Orientation to Life Questionnaire (SOC-13) assessing the three components of sense of coherence (meaningfulness, comprehensibility, and manageability) was used. The following are the example items: "Do you have the feeling that you do not really care about what goes on around you?" (meaningfulness), "Do you have the feeling that you are in an unfamiliar situation and don't know what do to?" (comprehensibility), and "Has it

happened that people whom you counted on have disappointed you?" (manageability). SOC-13 consists of thirteen questions with two anchoring phrases. Questions are rated between 1 and 7 on a Likert-type scale, and five of the 13 items are reverse-scored. The sum of all items provides a score ranging from 13 to 91. The higher the score the stronger the sense of coherence indicated. The reliability and validity of the scale have been established in many studies of young-adult and adult populations. In the present study the Cronbach alpha for the total SOC score was 0.86 (mean = 67, SD = 11, range = 23–91). According to a recent review that covered 124 published studies, the SOC scale is a valid, reliable and cross-culturally applicable instrument measuring how people remain well and manage stressful situations [18].

Statistical methods

Analysis of variance models and two-sample *t* tests were used to evaluate the differences in the mean values of the response variable in the categories of the explanatory variables. The univariate results were quantified by calculating the differences in mean values of the response variable between the categories of the explanatory variables. For multivariate analyses same kind of quantifications were calculated for adjusted mean values, where adjustment was done for all other variables which were included into the multivariate model. *P* values lower than 0.05 were considered to be statistically significant. Statistical analyses were performed using the SAS system for Windows, release 9.1.3/2003.

Results

Childhood family and psychopathology variables, and SOC at age 18

Table 1 shows associations between SOC-13 mean scores, and parental education level, family structure, and psychopathology at age 8, with higher scores reflecting a better SOC. The percentages of cases belonging to the lowest (SOC $\leq$ 59 points) and highest (SOC $\geq$ 76) quartile, based on the distribution of SOC-13 scores, are also presented in Table 1. High level of conduct or hyperactivity symptoms did not predict level of SOC while high level of emotional (mostly anxiety) and self-reported depressive symptoms

Table 1 Family and psychopathology variables at age 8 and SOC-13 Questionnaire mean scores and standard deviations at age 18

	Total *n*	Mean	SD	Difference of means	*P* value	Lowest quartile (SOC-13 $\leq$ 59)%	Highest quartile (SOC-13 $\geq$ 76)%
Parental education level							
Upper secondary	741	67.7	10.3	−1.1	0.017	19.8	24.6
Lower	1,339	66.5	11.1			24.4	22.0
Family structure							
Two biological parents	1,786	67.1	10.7	−1.4	0.038	22.4	22.9
Other	314	65.7	11.3			26.8	21.7
Conduct scale							
<90 percentile	1,908	66.9	10.7	−0.8	0.343	22.3	22.6
≥90 percentile	183	66.1	12.0			30.6	25.7
Hyperactivity scale							
<90 percentile	1,916	66.9	10.8	−1.1	0.189	22.4	23.0
≥90 percentile	161	65.8	11.4			29.8	21.2
Emotional scale							
<90 percentile	1,854	67.2	10.8	−2.9	<0.001	21.8	23.6
≥90 percentile	231	64.3	11.2			32.5	16.0
Depression scale							
<90 percentile	1,904	67.3	10.6	−4.2	<0.001	21.7	23.8
≥90 percentile	226	63.1	11.8			34.5	15.9
School achievement							
Good/moderate	1,824	66.8	10.7	−0.1	0.912	22.8	22.5
Poor	312	66.9	11.7			25.6	26.0

Percentage of subjects having good sense of coherence (highest quartile of SOC-13) and poor sense of coherence (lowest quartile of SOC-13) are shown

Table 2 Significant associations with family and psychopathology variables at age 8 and level of sense of coherence (SOC-13)

	Adjusted means	SD	Difference of adjusted means	*P* value
Parental education level				
Upper secondary	64.7	10.4	−0.9	<0.001
Lower	63.8	11.2		
Family structure				
Two biological parents	64.7	10.6	−0.9	<0.001
Other	63.8	11.0		
Emotional scale				
<90 percentile	65.5	10.8	−2.6	<0.001
≥90 percentile	62.9	11.1		
Depression scale				
<90 percentile	66.2	10.7	−3.9	<0.001
≥90 percentile	62.3	11.7		

Results of the multivariate analysis of variance models ($n = 2{,}018$)

In the comparisons of the categories of each explanatory variable the mean values and the differences between the mean values were adjusted with the other variables in the multivariate model

predicted low SOC. As shown in Table 1, 35% of those scoring above 90th percentile in emotional scale, and 33% of those scoring above 90th percentile in depressive scale had a SOC score within lowest quartile, indicating poor SOC. Furthermore, low parental education level and living in nonintact family predicted low SOC. When the psychopathology scales were analysed as linear variables the results remained same.

In multivariate analyses including all explanatory variables low parental education level, nonintact family structure, emotional and depressive symptoms independently predicted low SOC (Table 2). The results remained the same when the psychopathology scales were analysed as linear variables. In additional paired analyses between psychopathology scales (conduct, hyperactivity, emotional depression) and level of SOC no statistically significant interactions were found.

Childhood comorbid psychopathology, and SOC at age 18

Finally, to study the predictive associations between co-morbid psychopathology and SOC the children were categorized in five different psychopathology groups. As shown in Table 3 co-morbid conduct and emotional status at age 8 predicted low SOC at age 18. About 36% of these boys had a SOC score within lowest quartile. Furthermore, invisible group status, i.e. boys who reported high level of depressive symptoms but were not recognized having psychiatric problems according to parent/teacher reports were at risk for low SOC. About 31% of these invisible boys belonged to lowest quartile in SOC scale.

Discussion

The key findings of our study are that internalizing symptoms, conduct-emotional group status, low parental education level and nonintact family at age 8 predicted low SOC at age 18.

Internalizing problems based on external observants and self-reports at age 8 independently predicted low SOC at age 18. Phenomenologically, anxiety and depression bear resemblance with a SOC deficit. Achenbach [1–3] found an "anxious/depressed" factor derived from a variety of informants (self, parents, teachers) and across different settings (e.g. clinical or community samples) which includes symptoms such as "crying a lot, fear of doing or thinking bad things, the need to be perfect, to be nervous and fearful, guilty and self-conscious, worrying, feeling sad, or feel lonely and worthless". Similar items are included in the Children's Depression Inventory used in the present study. Certainly, on the common sense level, one would not expect a person with such self-perceptions to score high on meaningfulness, manageability and comprehensibility. The findings are similar with those of previous cross-sec- tional studies showing relationship between SOC and mood and anxiety disorders [18, 41]. However, our results indicate

Table 3 Significant associations with comorbid psychopathology groups at age 8 and the level of sense of coherence (SOC-13) at age 18

	Total	Mean	SD	*P* value	Difference of means	Lowest quartile (SOC-13 ≤ 59)%	Highest quartile (SOC-13 ≥ 76)%
Reference	1,495	67.5	10.5	<0.001		20.5	23.8
Conduct-Emotional	72	63.1	11.9		−4.4	36.1	16.7
Conduct only	107	67.6	11.5		+0.1	26.2	30.8
Attention	66	66.2	10.6		−1.3	27.3	18.2
Emotional	178	65.0	11.1		−2.5	29.2	16.9
Invisible	131	63.8	12.0		−3.7	31.3	17.6

Percentage of subjects having good sense of coherence (highest quartile of SOC-13) and poor sense of coherence (lowest quartile of SOC-13) are shown

that SOC in early adulthood is related to childhood internalizing problems. Furthermore, boys who reported high level of depressive symptoms but were not recognized having psychiatric symptoms by parent/teacher reports, i.e. invisible boys, were at risk for low SOC.

When the comorbid psychopathology was studied, combined conduct and emotional group status had the strongest risk for low SOC. Previously we have reported that combined conduct and emotional problems at age 8 had the worst outcomes and highest risk for subsequent psychiatric disorders and criminal offense in early adulthood [45]. Furthermore, comorbidity in general is associated with increased levels of impairment in functioning [31] and higher levels of psychosocial adversity [19]. The finding that these most troubled, "affectively and behaviourally dysregulated" boys show low SOC is rather expected. However, boys with high level of conduct problems but not concurrent emotional problems were not at risk for low SOC. Previously, we showed that this group had a higher risk for committing crimes at 10–15-year follow-up [45]. The different SOC outcomes for conduct-emotional and conduct-only groups is in line with previous studies showing that children with impulsive aggressiveness accompanied by high level of affect have a different outcome than children with planned aggression only [10, 24, 46].

Our last finding adding to existing literature is that poor parental education level and nonintact family predicted low SOC even when controlled with the effect of concurrent psychopathology. Both nonintact family and poor parental education should be considered as important GRR's, albeit not very conducive to the development of high SOC. For example, Dunn et al. [17] showed that children growing up in single parent and stepfamilies were at significant risk for adjustment problems. However, the study also uncovered that family structure could not explain most of the variance. Rather, it appeared that it was the social stresses, depressive symptoms, and financial problems with which their mothers had to cope, and the difficult relationships between child and parent, that chiefly accounted for the risk to the children's well-being.

The association between low SOC and socio-economic status is in accordance with other findings from the Nordic countries [16, 22, 27, 30, 47]. Furthermore, Conger et al. [13, 14] examined changes in parenting in response to acute income loss. They found that parents became more hostile and less nurturant after they suffered financial hardship, and these negative shifts in parenting contributed to increases in children's psychological symptoms over time.

Strengths and limitations

To our knowledge, there is no comparable prospective population-based study examining childhood predictors for later SOC. As such, the study has several strengths: nationwide sample, rather low-attrition rate, and combining information about childhood psychopathology based on validated and multi-informant measurements.

Unfortunately, we have no SOC or any related measures, e.g. self-esteem, happiness, affect balance [12] at baseline. Thus, the present study does not reveal whether those with internalizing problems at age 8 scoring low SOC 10 years later were already low on SOC at baseline. Our findings, thus uncover a long-term association between internalizing problems and SOC, but not whether an early association predicts long-term stability. The study also runs short in including other GRR's like prenatal conditions, somatic problems, degrees of economic hardship, parental mental illness, social tensions, intelligence and coping strategies of the person and his family known to predict long-term adversities including SOC [47, 49].

Clinical and research implications

Previous studies of adult populations have shown that high SOC-13 scores correlate positively with various aspects of health and well-being. Therefore, the findings showing predictive associations between childhood mental health and SOC in early adulthood has implications for early promotion of well-being. Early intervention programmes addressing risk and protective factors, and targeted at child populations at risk, especially from nonintact families with low-parental education level may promote resilience in early adulthood. Future research whether universal, selective or indicated early interventions targeted on risk factors of childhood mental health problems may result in promotion of well-being (including good SOC) in early adulthood is warranted. As SOC is so much associated with health further research on the strength of early predictors for long-term SOC are warranted.

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