

A Cross-sectional Study on Sense of Coherence and Its Relationship with Caries Experience and Socioeconomic Status in 11–16-year-old Schoolchildren

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ABSTRACT

Aim: To know the association of sense of coherence (SOC), caries experience, and socioeconomic status (SES) in 11–16-year-old schoolchildren.

Materials and methods: This cross-sectional study included a total of 595 schoolchildren aged 11–16 years, and informed consent was obtained. Demographic and socioeconomic data were collected through pro forma filled by the parents. Sense of coherence of children was recorded with SOC-13 item questionnaire given in both English and local language (Telugu). Caries experience was recorded with DMFT index by carrying out the intra-oral examination of children.

Results: In a total of 595 schoolchildren, 35% children have weak SOC, 34.9% have moderate SOC, and 29.9% have strong SOC. Caries experience was inversely associated with SOC (p value = 0.006) on analysis by ANOVA. On multivariate regression analysis, it was observed that for every one-unit increase in SOC, caries experience decreased by 0.11 unit. However, there was statistically no significant (p value = 0.09) relation between childhood SES and SOC. Age (p value = 0.08) and gender (p value = 0.19) are not associated with SOC.

Conclusion: Sense of coherence influences the caries experience irrespective of socioeconomic status, age, and gender of the child.

Clinical significance: Children having stronger SOC have increased likelihood to seek out preventive dental services, which helps in maintaining good oral health. SOC is structured mainly by the experiences during the early years of life. Therefore, SOC can be strengthened by interventions in the early life through school dental health programs.

Keywords: Caries experience, Cross-sectional study, Sense of coherence, Socioeconomic status.

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INTRODUCTION

Sense of coherence (SOC) is the fundamental concept of Antonovsky's salutogenic theory, which is directed toward the factors responsible for health rather than the illness. Salutogenesis concept elucidates why some individuals stay healthy, even after encountering highly stressful situations, while others suffer disease and illness.¹ It is learnt that a person with higher SOC is able to cope adequately and find appropriate solutions to challenges (mastery orientation), thereby stays healthy.²

SOC is a global orientation that explains the extent to which individual has a pervasive, dynamic feeling of confidence that: (i) the stimuli deriving from one's internal and external environments in his/her life are structured, predictable, and explicable; (ii) the resources are available to one to meet the demands raised by these stimuli; and (iii) these demands are challenges that deserve investment and engagement.¹ Sense of coherence influences the origin and healing of the disease through effective coping, by avoiding behaviors that adversely affect health, and adopting behaviors that promotes health.^{1,3}

It is also hypothesized that SOC is influenced by socioeconomic status (SES). Higher SES during the early years of life provides experiences that promote the development of strong SOC, whereas the reverse happen in lower SES.⁴ Thus, it is predictable that higher childhood SES is correlated positively with stronger adulthood SOC.^{5,6}

It is believed that stronger SOC predicts better oral health outcomes by possessing more number of teeth with low level of dental caries and periodontal disease.⁷ However, there is a paucity of literature regarding the association of SOC, oral health, and SES.

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Therefore, a study was carried out to understand the relationship of SOC, caries experience, and SES in 11–16-year-old schoolchildren.

MATERIALS AND METHODS

The cross-sectional study design has been approved by Institutional Review Board (VDC/IEC/2014-18). A total of 595 healthy schoolchildren aged 11–16 years were selected by stratified randomization method from 5 pre-selected schools of Bhimavaram town, West Godavari district of Andhra Pradesh. Informed consent was obtained from the parents and school authorities. Children who are undergoing orthodontic treatment, suffering from any systemic diseases, in need of special care, and with mixed dentition were excluded from the study.

Sample Size

Based on the pilot study, setting the confidence level at 95%, prevalence 49%, and precision 5%, the required sample size was calculated as 384 using the formula $n = (Z\alpha^2 \times p \cdot q) / d^2$. However, a higher sample size of 650 children was taken to permit for possible non-response, in which 55 children were excluded since they did not meet the inclusion criteria. Hence, the final sample comprised of 595 children.

Data Collection

Data were collected through a pro forma (given to parents), the SOC questionnaire, and intra-oral examination, which was carried out at the schools.

Parents of the participating children were given a pro forma for recording demographic data (name, age, sex, address and contact number), profession, level of education, and income to assess SES with Kuppuswamy socioeconomic criteria.⁸

SOC of children was recorded with abbreviated version of the SOC-13 item questionnaire that was developed by Antonovsky, which comprises of 13 components on a 7-point Likert-type scale with descriptive end points.¹ Question numbers 1, 3, 7, and 10 were negatively framed items; therefore, they were scored conversely so that a high score indicates strong SOC. The total score ranges from 13 to 91, and a higher score indicates stronger SOC.

Reliability of SOC questionnaire was evaluated with Cronbach's alpha coefficient formula, and the alpha coefficient obtained was 0.89, which is an acceptable reliability. Questionnaire for recording the sense of coherence was given in both English and local language (Telugu). Questions were explained to children and then they were allowed to answer.

Later, the schoolchildren were examined for caries experience by recording the DMFT index.⁹ Two examiners were calibrated for intra-oral examination at the schools. Kappa test findings for DMFT were 0.88 for intra-examiner, and 0.82 for inter-examiner, indicating an almost perfect consistent agreement.

Statistical Analysis

The association of sense of coherence with caries experience was analyzed using ANOVA. Multivariate analysis was performed to know the relationship of caries experience with SOC and SES. The total SOC was assessed as a categorical variable divided into tertiles as $t_1 < 33$ (weak), $t_2 = 33-66$ (moderate), and $t_3 > 66$ (strong). Chi-square test was done to analyze the relationship of SOC with SES, age, and gender.

RESULTS

Among 595 schoolchildren, 35% children have weak SOC, 34.9% moderate SOC, and 29.9% stronger SOC. Sense of coherence has shown inverse relation with the caries experience of an individual, i.e., higher the sense of coherence, lower the DMFT score. There was statistically significant difference between caries experience in individuals with different SOC (Table 1). On multivariate logistic regression analysis, for every one unit increase in SOC, caries experience decreased by 0.11 unit (Table 2).

There was no statistically significant relation between SOC and SES suggesting SOC was not influenced by the childhood SES (p value = 0.09) (Table 3). Statistically, SOC scores did not show any significant difference with age (p value = 0.08) (Table 4) as well as gender (p = 0.19) (Table 5).

Table 1: Association of sense of coherence with caries experience

SOC	DMFT	
	Mean	SD
Weak SOC ($t_1 < 33$)	1.94	2.04
Moderate SOC ($t_2 = 33-66$)	1.70	2.05
Strong SOC ($t_3 > 66$)	1.45	1.84
ANOVA	F	2.91
	P	0.05, S
<i>Post Hoc</i> Tukey	Weak vs moderate, $p = 0.446$	
	Moderate vs strong, $p = 0.427$	
	Weak vs strong, $p = 0.043, S$	

ANOVA and *Post Hoc* Tukey tests, S—significant; ANOVA—analysis of variance

DISCUSSION

The sense of coherence (SOC) is a principal conception of salutogenesis which explains the relationship between life stresses and health. The salutogenic theory emphasizes on healthy resources and contributes to the knowledge of maintenance of health.¹ Adolescents with strong SOC tend to have regular dental check-ups and higher toothbrushing frequency (twice daily or more often).¹⁰

In the present study, children with stronger SOC were associated with less caries experience. These findings were similar to the observations of Freire et al. in Brazilian population that adolescents with stronger SOC have less caries experience in anterior teeth than those with weaker SOC scores.¹⁰ Similar findings were observed in Finnish and Indian populations.^{7,11} Lower prevalence of dental caries in individuals with stronger SOC could be because of the fact that increased psychosocial ability promotes health.

The health-promoting role of SOC is through three different ways (i) by modulating emotional tension caused by the stressors; (ii) by adopting healthy behaviors; and (iii) by direct physiological response through the central pathways of the neuro-immune and endocrine systems.^{1,12} The lower caries experience was mainly accounted to the adoption of healthy dental behaviors such as regular dental check-ups, brushing teeth two or more times a day as well as having low sugar intake frequency.¹³⁻¹⁶ These perspectives toward oral health helps in improving oral hygiene, thereby reducing the caries experience.

SOC is a psychosocial factor that is influenced by various genetic, environmental, and social factors. Among various social factors, childhood SES was considered to play a vital role in the development of SOC. In the present study, SES of the children was assessed using Kuppuswamy socioeconomic status scale, which is a composite scoring system that includes education, head of the family's occupation, and monthly income of the family.⁸ The difference in SOC scores among five socioeconomic groups was found to be insignificant in the present study.

Ing and Reutter observed that SOC score of Canadian women was increased with an increase in the household income.¹⁷ Bernabe et al. reported that higher childhood SES has favorable association with stronger SOC in adulthood.⁶ This infers that SES shapes SOC, however in the present study, no such correlation was observed. This may be due to difference in the criteria used to categorize the

Table 2: Table representing the ordinal regression value by multivariate analysis with caries experience as dependable variable and sense of coherence as predictor

Model	Coefficients				
	Unstandardized coefficients		Standardized coefficients		p value
	B	Std. error	ODDS ratio	t	
Caries experience (Constant)	-1.24	0.38		-3.29	0.001
SOC	-0.08	0.03	-0.11	-2.75	0.006, S

Multivariate analysis, S—significant

Table 3: Relationship between sense of coherence and socioeconomic status

SES	Weak SOC ($t_1 < 33$)		Moderate SOC ($t_2 = 33-66$)		Strong SOC ($t_3 > 66$)		Total
	n	%	n	%	n	%	
Lower class	23	36.5	19	30.2	21	33.3	63
Upper lower class	36	29.8	54	44.6	31	25.6	121
Lower middle class	64	35.4	65	35.9	52	28.7	181
Upper middle class	46	32.4	43	30.3	53	37.3	142
Upper class	40	45.5	27	30.7	21	23.9	88
Total	209	35.1	208	35.0	178	29.9	595

$p = 0.09$, NS; $\chi^2 = 13.81$

Chi-square test, NS—not significant

Table 4: Age-wise comparison of sense of coherence

Age in years	Weak SOC ($t_1 < 33$)		Moderate SOC ($t_2 = 33-66$)		Strong SOC ($t_3 > 66$)		Total
	n	%	n	%	n	%	
11	7	26.9	13	50.0	6	23.1	26
12	22	32.8	17	25.4	28	41.8	67
13	74	36.6	66	32.7	62	30.7	202
14	76	34.2	84	37.8	62	27.9	222
15	26	35.1	28	37.8	20	27.0	74
16	4	100.0	0	0.0	0	0.0	4
Total	209	35.1	208	35.0	178	29.9	595

$p = 0.08$, NS; $\chi^2 = 16.72$

Chi-square test, NS—not significant

Table 5: Gender-wise comparison of sense of coherence

Gender	Weak SOC ($t_1 < 33$)		Moderate SOC ($t_2 = 33-66$)		Strong SOC ($t_3 > 66$)		Total
	n	%	n	%	n	%	
Male	93	32.6	110	38.6	82	28.8	285
Female	116	37.4	98	31.6	96	31.0	310

$p = 0.19$, NS; $\chi^2 = 3.28$

Chi-square test, NS—not significant

children's SES. A composite scoring system was used in the present study rather than household income alone.

In the current study, gender did not influence the SOC of children. Similar findings were observed in South African eighth-grade adolescents and Danish adults.^{18,19} Although there was no gender difference in SOC of adults, Thome and Hallberg, and Hendrikx et al. reported that males have a stronger SOC than females.^{20,21} Dorri et al. also observed that boys are having stronger

SOC than girls in Iranian population.²² The gender differences with SOC scores may be due to the differences in social roles played by males and females in diverse communities.

Another factor that was considered in the present study was age. Age of the children did not influence the SOC. Similar findings were reported by Margalit and Eysenck in Israel population.²³ On the contrary, in a study by Lindmark et al. in 20–80 years old adult Swedish population, it was reported that 20-year-olds are having

lower SOC scores than older age-groups.²⁴ However, in the present study, a narrow range of age-groups, 11 to 16 years old, were included, which might be the reason for non-influence of age on SOC.

Salutogenesis model states that individuals with strong SOC have increased likelihood to figure out the existing resources to cope with the demands. Thus, stronger the SOC, greater the chances to seek out preventive dental services, which helps in maintaining good oral health.^{2,25} Moreover, SOC is structured mainly by the experiences during the early years of life, such as participation in socially valued decision-making.^{1,12} Therefore, SOC can be strengthened by interventions in the early life through school dental health programs.

CONCLUSION

The psychosocial factor sense of coherence has association with caries experience; however, the childhood socioeconomic status did not influence the development of sense of coherence in children. Age and gender of children did not influence the sense of coherence.

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