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Relationship between the Sense of Coherence, Social Resources and Oral Health Behaviors among Senegalese Secondary School Students in Rural Areas

Serigne Ndame Dieng[1*], Amadou Dieng[1], Mbathio Diop[1], Ibrahima Cissokho[1], Meissa Diouf[2], Aida Kanouté[1], Massamba Diouf[1], Mouhamadou Cheikh Mbacké Lô[1], Daouda Faye[1]

[1]Public Health Service-Institute of Odontology and Stomatology-Faculty of Medicine, Pharmacy and Odontostomatology-Cheikh Anta Diop University, Dakar, Senegal
[2]National School for Health and Social Development, Dakar, Senegal
Email: *serignendame.dieng@ucad.edu.sn, adieng00@gmail.com, diopmbathio@yahoo.fr, brahimcisso@gmail.com, dioufmeissa1@gmail.com, aida.kanoute@ucad.edu.sn, massamba.diouf@ucad.edu.sn, cheikhlo54@yahoo.fr, daouda_faye2004@yahoo.fr

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Abstract

Background: In Senegal, school environment is a source of stress, which sense of coherence (SOC) and social resources can help to alleviate and enable school pupils to adopt positive oral health behaviors (OHB). The study aims to determine the relationship between social resources, sense of coherence and oral health behavior of high school pupils. Method: A cross-sectional study was carried out on 302 High school students in the municipality of Notto-diobass, in the Thiès region, Senegal. The sense of coherence was assessed by the 13-item SOC-scale; social resources and oral health behavior by Likert scales. A structural equation model estimated the relationships between social resources, sense of coherence and oral health behaviors with correlation coefficient and p-values. Results: The mean scores for sense of coherence (46.9 ± 5), social support (8.7 ± 1.9), and oral health behavior (16 ± 2.7) were average. The students' oral health behaviors score was correlated with sense of coherence ($r = 0.20$; $p = 0.0004$) and social support ($r = 0.21$; $p = 0.0002$). The structural equation model showed correlation between social support and sense of coherence ($r = 0.65$; $p < 0.0001$), and significant relationship between sense of coherence and oral health behaviors ($r = 0.18$; $p = 0.042$). Conclusion: The adoption of positive oral health behaviors by secondary school pupils is determined by their sense of coherence and social resources. Then, sense of coherence is important for promoting oral health in schools.

Keywords

Sens of Coherence, Social Support, Oral Health Behaviors, School Pupils, Senegal

1. Introduction

School is a complex social, physical and psychosocial environment. School children spend more than 40% of their waking time at school [1] [2] exposed to various interactions and educational requirements. On the other hand, schools are a privileged place to implement health promotion actions that contribute to reducing social inequalities in health [3] [4]. In dentistry, promoting good oral health in schools involves interventions to improve student behaviors with regard to fluoride toothpaste and diet control [5]. The scientific literature has demonstrated the effectiveness of oral health promotion programs in schools. Indeed, an umbrella study showed that oral health education interventions had a positive impact on reducing plaque and improving students' knowledge, attitudes and practices of oral hygiene [6]. The results of an evaluation study of an oral health promotion intervention in a primary school in a socioeconomic disadvantaged area in Granada, Spain, revealed that after 18 months of intervention, improvement in oral hygiene and eating habits, respectively, 3.4 times and 4 times higher in the intervention group compared to control group [7]. These conclusions highlight the role of public health actions in educational settings in managing stress related to the school environment, thus contributing to improving the health and well-being of students. It also suggests that salutogenesis appears to be a particularly appropriate approach for the school environment. Salutogenesis focuses on the correlations between health, stress and adaptation, and emphasizes the role of psychosocial determinants in maintaining human well-being [8]. It implies the need to promote the resources and capacities of populations for maintaining or improving their health [9] [10]. It is operationalized by the sense of coherence (SOC) and the resources of general resistance. The sense of coherence is the individual's ability to use existing resources to overcome difficulties and life stressors in order to adopt healthy behaviors and stay healthy [8] [11]. It helps to understand a stressful event; give it meaning and manage it [12] [13]. The strengthening of SOC is optimal when the individual's environment provides various resources, especially social ones, contributing to his or her capacity for adaptation [14] [15]. Some studies suggest that social resources, such as social support, reinforce the sense of coherence [16] [17]. A study of Japanese students showed that social resources such as cognitive and structural social capital positively influence the sense of coherence [18]. Social resources may refer to social interactions in which individuals share resources and a sense of strong social support that promotes self-confidence and control over one's life [19].

In rural areas, the social environment is usually precarious and is manifested by

material and economic inadequacies, but social resources are important. Thus, these as the sense of coherence can be a springboard for rural students to cope with the often-demanding school psychosocial environment and adopt health-promoting behaviors. The SOC helps to cope with adversities encountered in school life [20]. Previous studies have reported that school children who had a high sense of coherence had positive oral health behaviors [21] [22], healthier eating habits, brushing their teeth and regular dental visits [23]. Studies conducted in Africa show different results. In Egypt, a study on the role of sense of coherence on the relationship between school bullying and adolescents' oral health shows that SOC the impact of bullying victimization on toothbrushing frequency. The higher SOC reduces school-related stress and depression and increases the feeling of well-being, which results in the adoption of more favorable toothbrushing habits [24]. In West Africa, studies examining the relationship between the sense of coherence and oral health in children have been conducted in Nigeria. None of them showed a significant relationship [25] [26].

In Senegal, no studies on salutogenesis and oral health have been conducted in schools. The rural areas are vulnerable; the national agency for demographic statistics reports a high level of poverty in rural households [27], with implications for children's school life. There is currently no study on the ability of students to cope with the adversities of the school environment and develop oral health promotional activities. The investigation of this problem in the rural context of Senegal would provide data to support political decision. The objective of this work is to determine the relationship between social resources, sense of coherence and oral health behaviors of senegalese secondary school students Notto-Diobass municipality, a rural area.

2. Method

2.1. Framework of Study

The study was carried out at the Notto-Diobass secondary school in the homonymous commune. This is located in the department of Thiès, Senegal. It is a rural municipality with 55,967 inhabitants in 67 villages. More than half of the population (51.5%) is male. Food agriculture is the dominant economic activity, accounting for 96% of the population [28]-[30]. The provision of health care is quite low; Consisting of four health stations and no oral care delivery services. In 2021, the Notto-Diobass secondary school had a total of 1149 students including 807 at secondary level, 342 at intermediate level. It is composed of five classes at the second level; five of the First level and four of the Final level.

2.2. Type and Study Population

An analytical cross-sectional study was conducted on a population of secondary school students. The students selected were those registered administratively, who attended classes and for whom parents had given their free and informed consent. Students who had a condition or disease that could make it difficult or impossible

to complete the questionnaire were not included.

2.3. Sample Size and Sampling

Sample size was determined from the Slovin formula ($n = N/1 + Ne^2$) [31]; n being the sample size; N, the total population and e, the risk of error. The choice of this formula is justified in the fact that no oral health indicator is known in this municipality, but the size of the study population is with 801 students in the Lycée. The adoption of a 5% threshold is in line with a recognized methodological standard in epidemiological science to ensure a balance between scientific rigour and pragmatic research constraints [32]. Thus, by integrating the values of the formula parameters ($n = 801/1 + 801 \times 0.05^2$), the sample size found was 346 secondary school pupils. A two-stage sampling was carried out. Initially, half of the classes per level were selected by drawing lots. After the drawing, three classes of Second, three of First and two of Terminal were selected. In a second step, taking into account the number of subjects required, an allocation proportional to the size of each class was made to determine the samples of selected classes. By drawing lots, from the lists of students in each class selected, the names of the pupils to be investigated were identified.

2.4. Study Variables

The study variables were of three orders: the dependent variable which is the oral health behaviors (OHB), the main independent variables which are social resources and sense of coherence, and the complementary independent variables which are socio-demographic and economic characteristics.

Oral health behaviors: it consists of the practice of oral hygiene, eating habits and use of oral care. Oral hygiene refers to the methods used to clean teeth and mouth, and the frequency or timing of use. Eating habits are based on the intake of meals and the frequency of intake of sugary foods and/or beverages. The use of oral care reflects real contact with a source of care whether it is modern or traditional; the use of self-medication is taken into account. The OHB is evaluated by a lickert scale of nine items divided between oral hygiene practices (3 items), eating habits (3 items) and use of oral care (3 items). In each section, the items are coded from 0 to 3; with a possible OHB score ranging from 0 to 9; 0 for unfavourable behaviors and 9 for favourable behaviors. The Cronbach's α was 0.78.

Sense of coherence (SOC): this is one of the main independent variables. The SOC scale estimates 13 items divided into three dimensions from an individual point of view: understanding (4 items) which evaluates the ability to understand the situation/problem and have control over it; The ability to handle (4 items) is the ability to use both internal and external resources to manage a situation (problem); and the meaning (4 items) reflects the ability to feel motivated to change behavior. Each item is scored on a Likert scale from 1 to 5. The sum of the scores for the total SOC ranges between 13 and 65. A score above the average score indicates a strong SOC. The SOC questionnaire showed high metrological qualities (validity and re-

liability) [33] with a Cronbach's α was 0.76.

Social resources: they are made up of social support and social interactions. Social support (SS) is the support and assistance given in need. It is estimated by questions about the number of people to be counted on in case of problems, the interest that the entourage has in their situation and the possibility of obtaining help from their neighbors if necessary [34]. It is measured by a 5-point lickert scale ranging from 0 to 4: 0 corresponds to low social support and 4 to high social support. Social interactions (SI) assess the frequency of contact and exchange with people in our immediate environment, including extended family members, friends and neighbors, as well as participation in collective activities. The scale-revisited social network Lubben was used. It is composed of 12 items and estimated by a 5-point lickert scale ranging from 0 to 4: 0 corresponds to low social interaction and 4 to high social interaction [35]. Cronbach's α was 0.71 for the social support and 0.71 for the social interaction scales.

Demographic and economic characteristics of students: the demographic variables are defined by the gender and age of the student. The sex variable is dichotomous (Girl/Boy) and age, estimated in year, is a quantitative variable. The socio-economic data correspond to the type of schooling (non-formal, Francophone, Quranic, Franco-Arab) and the occupational status of the head of household (Inactive, Worker, Intermediate occupation, Manager); as well as the social and family conditions. The levels of appreciation of family social conditions are: good, medium or difficult.

2.5. Data Collection

Data were collected in the period from June 15 to October 30, 2021 by a field survey and face-to-face using a questionnaire conducted by a trained investigator. A pre-test of the questionnaire was carried out on 20 students selected from a school in the municipality. It was used to assess the understanding of the questionnaire and make it more accessible. Interviews were held in the secondary school in front of one or more teachers; or at the homes of some pupils in front of their parents.

2.6. Analysis Plan

Data was entered into Excel and analyzed by SATA software version 17. First, a descriptive analysis of the sample was carried out, indicating the percentages for qualitative variables and means (m) with standard deviation (sd) and medians with interquartile range (ir). Then, bivariate analyses were made, after verifying, through the Shapiro test, the normality of the distribution of the variable SOC, social resources and OHB. Student, ANOVA, Kruskal-Wallis, Wilcoxon or Pearson correlation tests were used to examine associations between SOC or OHB scores and social resources and socioeconomic characteristics. A structural equation model (SEM) was used to test the correlation chains between the variables that are significant in bivariate analysis. The correlation coefficient (r) will be given, and a significance threshold of p-value (p) < 0.05 has been set. The model adjustment was assessed by

the comparative adjustment index (CFI), incremental adjustment index (IFI) and mean quadratic approximation error (RMSEA) with CFI and IFI values greater than 0.95 and RMSEA values less than 0.05 adopted as acceptable threshold values for fitness indices. Furthermore, since there is no missing or incomplete data, we have not performed a sensitivity analysis on the SEM model.

2.7. Ethical Considerations

The authorities of the secondary school, teachers and parents of pupils were kept informed about the study before its start. The authorities of the secondary school had signed an administrative authorization for the organization of study in the school. Free and informed consent was signed by the parents of the selected pupils.

3. Results

3.1. Characteristics of the Sample

Out of the 346 students in the sample, 302 were surveyed, which is 87% response rate. More than half of the sample were girls (54.3%). Average age was 19.2 1.5; the median age is 19 years and an interquartile range of 2 years. Less than half of heads of households (44.7%) had completed Franco-Arab studies, 20.9% of formal Francophone studies, 48.1% were workers and 15.2% executives. The social living conditions of households were good for 59.6% of school pupils (Table 1).

Table 1. Description of sample characteristics.

Variables	N (302)	%
Sex		
Girl	164	54.3%
Boy	138	45.7%
Head of household's type of education		
No education	48	15.9%
Koran	56	18.5%
French-arabic	135	44.7%
French	63	20.9%
Professional status of head of household		
Inactive	46	15.2%
Manual worker	145	48.1%
Intermediate profession	65	21.5%
Executive	46	15.2%
Social living conditions Household		
Difficult	17	5.6%
Average	105	34.8%
Good	180	59.6%

3.2. Social Resources, Sense of Coherence and Oral Health Behaviors Means Scores

The mean social support score was 8.7 ± 1.8 and the median score was 9 with an interquartile range of 2. Almost two-thirds (59%) of the students had a score higher than the average score. For social interaction, the mean score was 7.6 ± 1.6 and the median score was 8 with an interquartile range of 3; slightly more than half (54.4%) had a score higher than the average score. The mean SOC score was 46.9 ± 5 and the median score was 47.5 with interquartile range of 8. More than half (58%) of the school pupils had a strong SOC.

The average oral health behaviors score is 16 ± 2.7 with a median score of 16 with an interquartile range of 4. More than half of the pupils (56%) had a score higher than the average score (Table 2).

Table 2. Distribution of secondary school pupils' social resources, sense of coherence and oral health behaviour.

Variables	m ± sd	Median	Interquartile range	min - max
Age	19.2 ± 1.5	19	3	15 - 24
Sens of coherence	46.9 ± 5	47.2	8	30 - 58
Social support	8.7 ± 1.8	9	2	2 - 12
Social interaction	7.6 ± 1.6	8	3	4 - 12
Oral health behavior	16 ± 2.7	16	4	9 - 23

3.3. Relationship OHB, SOC, Social Resources and Independent Variables

For the purposes of the bivariate analysis, a Shapiro-Wilk test was performed and allowed to reject the normality hypothesis of the SOC score distribution ($p < 0.005$) and show that the OHB score distribution is normal ($p < 0.456$).

The results showed that the SOC score was significantly different according to the levels of living conditions in households ($p < 0.0001$) (Table 3); it was significantly correlated with social support ($r = 0.29$; $p < 0.0001$) and not with social interaction ($r = 0.10$; $p < 0.0791$) (Table 4). The average OHB score of school pupils was significantly different according to gender ($p = 0.0467$); the type of education ($p < 0.0012$) and the occupation of the head of household ($p < 0.0325$); and the social conditions of life in households ($p < 0.0001$) (Table 3).

Table 3. Relationship between SOC, OHB and sample characteristics of secondary school pupils.

Variables	SOC		OHB	
	n	p	m ± sd	p
Sex				
Girl	164	0.480	16.3 ± 0.2	0.046
Boy	138		15.6 ± 0.2	

Continued

Head of household's type of education				
No education	48	0.894	15.1 ± 2.5	0.0012
Koran	56		15.2 ± 2.6	
French-arabic	135		16.8 ± 3	
French	63		16.2 ± 2.6	
Professional status of head of household				
Inactive	46	0.765	16.9 ± 3.1	0.0325
Manual worker	145		15.7 ± 2.5	
Intermediate profession	65		15.9 ± 2.9	
Executive	46		17.1 ± 2.8	
Social living conditions Household				
Difficult	15	0.0001	12.9 ± 2.1	0.0000
Average	105		15.5 ± 2.5	
Good	180		16.5 ± 2.7	

It was positively correlated with the sense of coherence (r = 0.20; p = 0.0004) and social support (r = 0.21; p = 0.0002). It was not correlated with social interaction (r = 0.08; p = 0.1467) and age of the students (r = −0.01: p < 0.8212). In other words, pupils' oral health behaviors are positive if their SOC level is high, their social support strong and their family social conditions good (Table 4).

Table 4. Correlation between SOC, OHB and social resources of school pupils.

Variables	SOC		OHB	
	r	p	r	p
Age	−0.006	0.9214	−0.01	0.8212
Sens of coherence	-	-	0.20	0.0004
Social support	0.29	0.0001	0.21	0.0002
Social interaction	0.10	0.0791	0.08	0.1467

The variables SOC, social support and social living conditions, which were significantly correlated with OHB in bivariate analysis, are used in multivariate in an SEM model. The result shows a highly significant correlation between the SOC and social living conditions (r = 0.92; p < 0.0001) and social support (r = 0.64; p < 0.0001); and a correlation between the OHB and the SOC (r = 0.18; p < 0.042), social living conditions (r = 0.57; p < 0.0001) and social support (r = 0.21; p < 0.031) on the other hand. A decrease in the strength of the correlation between SOC and OHB (r = 0.21 and p < 0.001 to r = 0.18 and p < 0.042) after taking into account the variables social living conditions and social support was noted (Figure 1). Model fit is good with IFI = 0.97, CFI = 0.98 and RMSEA = 0.02.

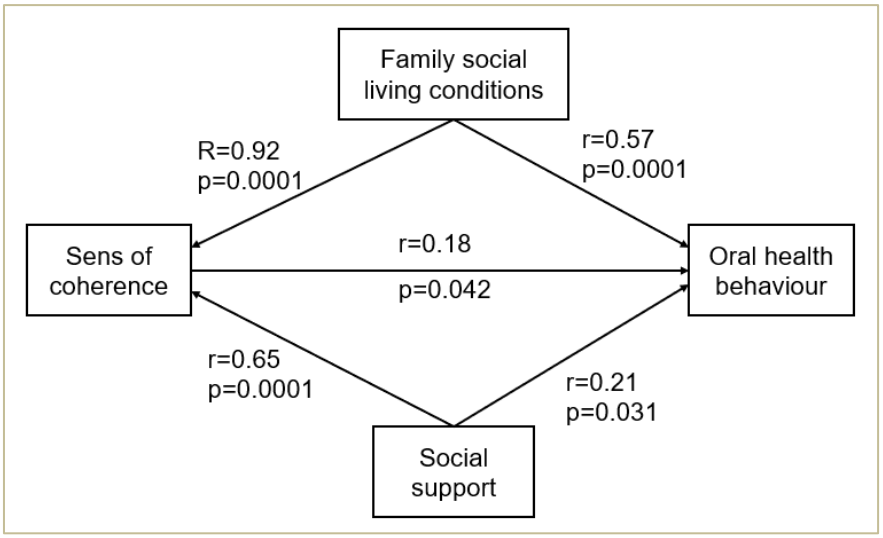

Figure 1. Analysis of variable interactions using the structural equation model.

4. Discussion

This study showed, mainly, that social resources such as family living conditions and social support, are significantly associated with school pupils' sense of coherence, whereas the study did not show a significant relationship to social interaction. The multivariate analysis showed a strong correlation between SOC, social support, family social conditions and OHB, however, the relationship between SOC and OHB is weak. Specifically, social resources reinforce the sense of coherence and promote good oral health behaviors that are also influenced by SOC even if its influence is negatively moderated by social resources.

Analysis of the results highlights the strong relationship between SOC and social support as well as family living conditions. In other words, the average SOC score of school pupils increases with the increase in social support and/or the level of improvement in family living conditions. Secondary school pupils' social resources, whether they are social support or family living conditions that is a proxy for the material or economic resources of the household, could be considered as part of the general resistance resources. According to Antonovsky, these resources determine the level of SOC which in turn mitigates potential life's adversities [36]. Therefore, social resources could be considered a key factor that could help individuals perceive their lives in the pursuit of positive health [37]. Thus, the strength of students' SOC depends on the availability of their social and family resources. These observations are understandable because social support strengthens the confidence and courage of pupils to face life's difficulties [38] and the demands of the school environment. Moreover, better family living conditions mean that the household has sufficient material and economic resources. School pupils from such homes, aware of the availability of general resistance resources, are better equipped on a psychosocial level. These findings support the conclusions of the study by Quansah F et al, in Ghana, on the relationship between monetary resources, subjective social status and student SOC [39].

The results of the study show a significant relationship between SOC and oral health behaviors of the school pupils. In a randomized cluster trial, Nammontri et al reported a significant impact of increased SOC on improved health behaviors related to quality of life [21]. SOC influences health promotion in three ways: by regulating emotions in the face of stressors, by choosing health-promoting behaviors and by direct physiological impact of the central neuro-immune pathway and endocrine system [40]. The SOC thus enables individuals to identify and use their resources necessary for their power to act or empowerment [41]. A high SOC promotes informed decision-making and increases the likelihood of appropriate oral health behaviors [42]. In addition, the school environment is stressful, and this can have potential consequences on students' vulnerability to disease [3]. However, pupils who have a high sense of conherence manage to control the sources of stress and reduce its consequences for their health. Previous studies have reported on the relationship between SOC and oral health behaviors. Lalani et al showed that a strong SOC is essential for the adoption of favourable OHB and the acquisition of adequate knowledge [43]. Nagpal *et al.*'s study showed that SOC had a positive impact on oral health behaviors of school pupils by influencing dental visits and brushing. They suggest that positive oral health behaviors may be the mediators by which SOC promotes gum health [44]. However, after adjustment with social resources, the analysis of the results by the structural equation model revealed a weakening of the correlation between SOC and OHB. This may suggest a moderating effect of social resources on the relationship between SOC and OHB. Specifically, the presence of social resources weakens the strength of the direct effect of SOC on OHB. In addition, significant relationships were established between the social resources and OHB. The effect of the student SOC is less powerful than that of social resources on the OHB. This may be explained by the fact that SOC is an age-related process, formed at a young age and stabilized around age 30 [45]; As a result, it should be low among pupils. In contrast, in the rural world context, social resources, including social support, are important. People seem to draw on social resources to build a personality that can influence how they deal with health. In other words, the ability to cope with life's difficulties and the stress that comes with them, and to promote one's own health is more important if social resources are abundant, especially if there is strong social support [46]. A study in Australia of rural students concluded that the adoption of oral health-enhancing eating habits in households with high socio-economic resources [47] is a positive sign. Social support would moderate the consequences of low schooling and lack of vocational training widely observed in rural Senegal. Thus, school pupils with strong social resources have a strong SOC and positive OHB.

In short, the relationship between social resources, sense of coherence and oral health behaviors of rural secondary school pupils suggests opportunities for school-based health promotion initiatives based on the concept of WHO's schools promoting health whose participation of school pupils is essential [48] and should take advantage of local resources including social capital of the population.

The study showed some methodological strengths and limitations. One of the strengths of this study is the use of appropriate means and methods for data collection. The 13-item SOC questionnaire used showed high metrological qualities. A systematic review in 2005 reported α values ranging from 0.70 to 0.92 [49]. A pre-test of the questionnaire was carried out on 20 students selected in a school in the commune for its good understanding. However, a bias of social desirability was potential and is one of the study's limitations. It is true that when collecting data for reporting purposes, participants tend to answer certain questions in a way that gives them a good image of themselves. However, aware of this, the investigator always reformulates to minimize this bias.

5. Conclusion

The relationship between secondary school pupils' SOC, social resources and OHB was established by the results. The adoption of health behaviors that are conducive to oral health among rural Senegalese school pupils is strongly influenced by the social resources available and a high level of coherence. The SOC establishes a positive direct relationship with the OHB in the school environment. However, in rural areas the relationship with social resources seems stronger. The latter moderates the direct effect of SOC on OHB. Thus, the exploration of the salutogenic model in rural schools suggests two main proposals. The first is based on the health-promoting school principal which must emphasize the school environment, and the skills of the school components can be relevant to health promotion activities that aim at strengthening school pupils' SOC levels. The other proposal is that the actions to be developed should be oriented towards the exploitation of important social resources. Local authorities must use the health model or policy tool to strengthen oral health.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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