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Association between sense of coherence and oral health-related quality of life among toddlers

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Objective: To assess the relationship between sense of coherence (SOC) and oral health-related quality of life (OHRQoL) among children aged one to three years. ***Participants:*** A cross-sectional study was conducted with 276 mother-child pairs randomly selected from the city of Diamantina, Brazil. ***Method:*** Information was obtained on socio-demographic factors. The short version of Antonovsky's sense of coherence scale (SOC 13) and the Early Childhood Oral Health Impact Scale (ECOHIS) were administered. The children were examined for dental caries. Statistical analysis involved descriptive statistics, the calculation of Spearman's correlation coefficients and adjusted Poisson regression models. ***Results:*** SOC was significantly associated with the child's OHRQoL in the multivariate analysis. Children of mothers with high SOC (PR 0.96; 95%CI 0.93,0.98; p=0.045) had a lower prevalence of a negative impact on OHRQoL. Children with severe dental caries had a greater prevalence of a negative impact on OHRQoL (PR 2.53; 95%CI 1.77,3.62; p<0.001). ***Conclusions:*** Maternal SOC could be a psychosocial determinant of the OHRQoL of children aged one to three years. Severe dental caries was associated with poorer quality of life.

Key words: *sense of coherence, infant, oral health related quality of life*

Introduction

In recent decades, public health research has increased focus on the social determinants of health and illness. Oral problems, such as dental caries and periodontal disease, have a multifactor etiology that is not only due to biological factors, but also environmental, social and cultural factors that influence the attitudes and behaviors with regard to oral health (Roncalli *et al*., 2015). This has led to the emergence of theoretical approaches that stress the social context and its interaction with biological and psychological factors (Watt, 2002). Addressing sense of coherence (SOC) is one such approach. Antonovsky introduced the theory of SOC as an important factor in how individuals deal with stressful situations (Antonovsky, 1987). SOC is the central construct of the salutogenic model - derived from the Latin *salus* for health and the Greek *genesis* for origin. According to this concept, wellbeing requires individuals to concentrate on their resources and abilities rather than their adverse health conditions (Antonovsky, 1993). The theory seeks to explain the relationship between stressors and both subjective and objective assessments of health (Savolainen *et al*., 2005). An individual's social, historical and cultural relationships as well as childhood experiences and genetic predisposition constitute the foundation for SOC, which is based on three components: comprehensibility, manageability and meaningfulness. It is hypothesized that a high SOC is a prerequisite for successfully coping with a stressful situation, thereby leading to improved wellbeing (Locker and Quiñonez, 2011).

Oral health-related quality of life (OHRQoL) measures have often been used in conjunction with clinical evaluations to establish oral health priorities (Locker and Quiñonez, 2011). Dental caries (Kramer *et al*., 2013; Ramos-Jorge *et al*., 2014), traumatic dental injury (Kramer *et al*., 2013) and socioeconomic factors (Ramos-Jorge *et al.,* 2014) have been associated with a negative impact on OHRQoL among preschool children.

Studies conducted in Brazil have demonstrated that SOC is an important psychosocial determinant of the oral health status of adolescents (Freire *et al*., 2001; 2002) and preschool children (Bonanato *et al*., 2009a). A study conducted in India demonstrated that three-to-five-year-old children of mothers with a high SOC had better OHRQoL (Khatri *et al*., 2014). Another study reports that mothers with a lower SOC are more likely to have children with tooth decay, dental pulp exposure and filled teeth (Bonanato *et al*., 2009a). However, little is known regarding the relationship between the psychosocial factors of mothers and the OHRQoL of their children. There have been no previous studies on the influence of SOC on the OHRQoL of children aged one to three years. Such knowledge could have important implications for the planning of general and oral health policies.

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Thus, the aim of the present study was to evaluate the association between SOC and the OHRQoL of children aged one to three years. It was hypothesized that children of mothers with a lower SOC have a greater negative impact on quality of life than children of mothers with a higher SOC.

Methods

This study received approval from the Human Research Ethics Committee of the Universidade Federal dos Vales dos Jequitinhonha e Mucuri, Brazil (Nº 19753013.7.0000.5108). All mothers provided written informed consent.

A cross-sectional study was conducted in the city of Diamantina, which is located in the northern portion of the state of Minas Gerais, Brazil. Children aged one to three years were randomly selected from a list of individuals who used public healthcare services (primary care units) in the city. The list was furnished by the Municipal Secretary of Health and contained 639 children in the target age group. Through a simple raffle of the code attributed to each child, 293 children were selected. For situations in which the child did not fit the eligibility criteria or the mothers refused to participate, a replacement raffle was performed.

The sample size was calculated using the formula for the estimate of the linear correlation between two quantitative variables (Hulley *et al*., 2013). Considering a bidirectional α of 0.05 and β of 0.20, 273 children would be needed to ensure that a correlation coefficient of 0.15 was significantly different from the null hypothesis. The hypothesis of this study was the existence of correlation between the assessment tools. To compensate for possible losses, 293 children aged one to three years were recruited for the study.

To be included in the study, the children could not have any systemic disease that required visits to the doctor one or more times every three months. The mothers needed to be literate and fluent in Brazilian Portuguese and be the main caregiver, spending at least 12 hours per day with the child.

Dentists visited the homes of the selected children and the mothers were asked to fill out the Brazilian version of the Early Childhood Oral Health Impact Scale (ECOHIS) validated by Martins-Júnior *et al*. (2012) for the evaluation of OHRQoL.

The ECOHIS questionnaire is composed of 13 items distributed among six domains: symptoms, function, psychology, self-image/social interaction (section), parental distress and family function (family impact section). Each item has five response options for recording how often an event has occurred in the child's lifetime. The total score ranges from 0 to 52, with higher scores denoting a greater oral health impact and poorer OHRQoL.

Sense of coherence was measured using the short version of the SOC scale (SOC-13), which consists of 13 items, each with five response options. The SOC-13 was validated for use on adolescent mothers in the state of Goiás (Brazil) by Freire *et al*. (2001) and was submitted to cross-cultural adaptation for use on the mothers of preschoolers in the state of Minas Gerais (Brazil) by Bonanato *et al*. (2009b). The final score ranges from 13 to 65, with higher values corresponding to a greater capacity of adaptation to stress. The mothers also filled out a form addressing socio-demographic information, such as schooling (years of study: 9 years, elementary and middle school; 12, high school; and >12, higher education), monthly household income (categorized based on the Brazilian minimum wage: >US$ 250 or ≤US$ 250), child's age and type of daycare center (none, private or public). The presence/absence of dental caries among the mothers was also recorded.

All mothers who filled out the socio-demographic questionnaire, ECOHIS and SOC-13 were invited to bring their children to the school of dentistry of the university for a clinical oral examination. Dental caries were detected using the International Caries Detection and Assessment System (ICDAS), the codes of which range from the first visual change in enamel (white spots) to an extensive cavity in dentin (including pulp involvement) (Pitts, 2004). The different stages of dental caries was categorized as initial (ICDAS codes 1 and 2), established (ICDAS codes 3 and 4) or severe (ICDAS codes 5 and 6) lesions. For the data analysis, each child received a code corresponding to the most advanced stage of dental caries. This evaluation was performed by two dentists who had undergone a training exercise, during which inter-examiner agreement in relation to gold-standard and intra-examiner agreement were determined using Kappa coefficients (0.86 and 0.83, respectively). The examination was conducted at the school of dentistry following prophylaxis performed by the dentist, with the aid of artificial light, a clinical mirror (PRISMA, São Paulo, SP, Brazil), probe (Golgran Ind. e Com. Ltda., São Paulo, SP, Brazil) and compressed air for drying the teeth.

Statistical analysis was performed using SPSS v21.0 (SPSS Inc, Chicago, USA). The frequencies of the variables were determined first. The independent variables were socio-demographic characteristics, SOC and dental caries. SOC was analyzed as a quantitative variable. The dependent variable was the impact on the quality of life of the child (total ECOHIS score). Spearman's correlation coefficients were calculated for mother's SOC and the ECOHIS scores (child impact section, family impact section and total scale). Poisson regression analysis with robust variance was conducted to determine the strength of associations between the mean total ECOHIS score and each independent variable. This analysis was conducted to exclude variables with $p>0.2$. Only explanatory variables with $p<0.05$ after adjustment were selected for the final models. In these analyses, the outcome was employed as a count outcome. Prevalence ratios (PR) and 95% confidence intervals (95%CI) were calculated.

Results

A total of 276 (94.2%) preschool children continued through to the end of the study. The main reason for losses was absence on the day of the examination. Mean age of the sample was 29.2 (SD 10.1) months and 52.2% were girls. The prevalence of impact on OHRQoL was 68.2% (ECOHIS ≥1). The mean SOC score was 47.2 (SD 7.8). There were negative correlations between SOC and impacts on the child's OHRQoL as evidenced by: the child impact section, Spearman's correlation coefficient $r=-0.25$ ($p=<0.001$); the family impact section, $r=-0.15$ ($p=0.012$); and total ECOHIS score, $r=-0.24$ ($p=<0.001$).

Table 1. Distribution and univariate analysis of associations between total ECOHIS score and children's characteristics, socioeconomic/demographic factors, dental caries and mother's sense of coherence

Covariables			PR (95%CI)	p-value
Mean age of child in months (SD)	29.1	(9.9)	1.00 (0.99-1.02)	0.608
Mother's schooling - n (%)				
>12 years	87	(33.9)	1	
>9 to 12 years	128	(49.8)	1.42 (0.98-2.06)	0.063
≤9 years	42	(16.3)	1.67 (1.02-2.73)	0.040
Household income - n (%)				
≥2 times the Brazilian minimum monthly wage	113	(44.0)	1	
<2 times the Brazilian minimum monthly wage	144	(56.0)	1.45 (1.04-2.02)	0.027
Type of daycare center - n (%)				
None	140	(54.5)	1	
Private	31	(12.1)	1.05 (0.66-1.67)	0.846
Public	86	(33.5)	0.72 (0.50-1.02)	0.067
Children's stage of dental caries - n (%)				
Caries free	88	(34.2)	1	
Initial lesion	58	(22.6)	1.18 (0.72-1.94)	0.504
Intermediate lesion	19	(7.4)	1.19 (0.59-2.42)	0.627
Severe lesion	92	(35.8)	2.69 (1.89-3.83)	<0.001
Dental caries - n (%)				
Absent	96	(37.4)	1	
Present	161	(62.6)	1.27 (0.90-1.80)	0.177
Mean SOC (SD)	47.3	(7.4)	0.94 (0.91-0.95)	0.039

The univariate analysis considering the characteristics of the preschool children and the demographic factors of dental caries demonstrated that a lower level of mother's schooling, lower income and severe carious lesions were associated with a negative impact on OHRQoL. Each additional point on the SOC score was associated with a lower negative impact on the children's OHRQoL (Table 1).

In the final multivariate model (Table 2), the prevalence of negative impact on OHRQoL was lower among children whose mothers had higher SOC scores (PR 0.96; 95%CI 0.93,0.98; p=0.047). Children with severe dental caries had a high prevalence of a negative impact on OHRQoL (PR 2.53; 95%CI 1.77,3.62; p<0.001).

Table 2. Final Poisson regression model for covariates associated with total ECOHIS score

Covariables	*PR (95%CI)*	*p-value*
Total SOC score	0.96 (0.93-0.98)	0.045
Child's dental caries stage		
Caries free	1	
Initial lesion	1.18 (0.72-1.94)	0.504
Intermediate lesion	1.10 (0.52-2.29)	0.804
Severe lesion	2.53 (1.77-3.62)	<0.001

Discussion

The present cross-sectional study demonstrated that a lower SOC of mothers of children aged one to three years was associated with a greater of a negative impact on OHRQoL, thereby confirming the hypothesis. To the best of our knowledge, no previous study has investigated this association in a sample of children in this age group.

Psychological factors and perceptions regarding oral health can affect the preventive dental care that children receive at home as well as the use of professional dental services (Filstrup *et al*., 2003). Thus, it is plausible that the SOC of mothers is an important psychosocial determinant of the oral health status of children (Bonanato *et al*., 2009a). This is particularly important for preschool children, who depend on their mothers for care.

The investigation of the association between SOC and oral health has been explored in the literature and many studies support the finding that higher SOC scores are associated with a healthier lifestyle (Bernabé *et al*., 2009; Freire *et al*,. 2001; 2002; Savolainen *et al*., 2005). However, few studies have investigated the association between SOC and OHRQoL. Among such studies, only one involved preschool children aged three to five years (Khatri *et al*., 2014). The present findings are in agreement with the studies cited (Khatri *et al*., 2014), as higher SOC scores were associated with a lower impact on the OHRQoL of the children. Similar findings are reported in studies involving adults (Boman *et al*., 2012; Savolainen *et al*., 2005).

Due to the interference of other risk factors working together in the present investigation, it is important to consider possible associations with confounding factors. Thus, untreated dental caries in different stages, socio-demographic and economic factors were identified as potentially confounding variables. Socio-demographic and economic factors, such as mother's schooling, are often associated with a negative impact on the quality of life of preschool children (Ramos-Jorge *et al*., 2014). However, these factors lost their significance in multivariate analysis in the present study.

There is a consensus in the literature regarding the impact of dental caries on the quality of life of preschool children (Kramer *et al.,* 2013; Ramos-Jorge *et al.,* 2014). Dental caries in young children is associated with pain, loss of appetite, chewing difficulty, weight loss, difficulty sleeping and changes in behavior (Oliveira *et al*., 2008; Ramos-Jorge *et al*., 2014). Thus, the fact that SOC remained in the final Poisson regression model independently of severe untreated dental caries makes

the present findings more consistent. This finding also demonstrates that SOC can affect the OHRQoL of the child due to other factors not related to dental caries. It is possible that socioeconomic factors and schooling lost their significance in the multivariate analysis due to multicollinearity.

Public oral health strategies directed at young children should prioritize the treatment of oral health problems associated with a negative impact on OHRQoL as well as educational programs for parents/caregivers. Since low levels of SOC are associated with dental caries (Bonanato *et al*., 2009a) and a negative impact on the OHRQoL of children, it is necessary to encourage mothers to care for the health of their children. Assessment tools that address determinant health factors indicate new paths for the practice of health promotion and underscore the need for multidisciplinary actions to improve oral health and quality of life. Thus, the administration of the SOC scale could be an important tool with regard to clinical decision making, as dentists should be aware that a low SOC can be associated with a negative impact on children's OHRQoL.

The present study has the limitations of a cross-sectional epidemiological study and it is therefore not possible to determine causality among the variables analyzed. Thus, longitudinal studies are needed to furnish more consistent information and assess the long-term effects of SOC and treatment on OHRQoL.

Strategies designed to improve the children's oral health should take into consideration the family environment. Maternal SOC proved to be an important psychosocial determinant of the OHRQoL of children aged one to three years.

Conclusion

Higher sense of coherence scores among mothers were associated with a lower impact on the OHRQoL of children aged one to three years. Severe dental caries was associated with a poorer quality of life.

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