Mother's education and family relations protect children from dental caries experience: a salutogenic approach

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Abstract: The objective of this study was to identify dental caries-protective factors among 5-year-old children using the salutogenic theory. A cross-sectional study was conducted in a small-sized municipality in the Southeast region of Brazil, with a representative sample of 247 children registered in preschool and their respective mothers. The data were collected through questionnaires administered to the mothers about the socioeconomic, behavioral, and biological aspects of the mother and children. Additionally, the collections included validated instruments concerning psychosocial aspects, such as a sense of coherence, resilience, family cohesion and religiosity, and intraoral examinations of the children through the decayed-missing-filled primary teeth (dmft) index. All examinations were performed by a trained and calibrated examiner. The non-adjusted and adjusted odds ratios (OR) and their respective confidence intervals (CI) were estimated using multiple logistic regression with a hierarchical model. Among the examined children, 41.7% were caries-free. In the final model, the chances of the absence of dental caries experience (dmft = 0) were greater in children with mothers who had higher education levels (> 8 years of study) (OR = 2.55 [95%CIi:1.42–4.59]) and those who lived in an environment of high family cohesion (OR = 3.66 [95%CI: 1.19–11.29]). The results indicated that mothers' level of education and family relationships are protective factors against dental caries in 5-year-old children, which overlapped with behavioral and biological factors.

Keywords: Dental Caries; Child, Preschool; Protective Factors; Socioeconomic Factors.

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Introduction

Dental caries is still a major public health challenge in many countries, despite a worldwide decline in recent decades. Simultaneously, high prevalence rates were observed in 5-year-old children,[1] with a slight increase in these rates in some countries.[2] The investigation of the factors involved in the determination of dental caries is still predominantly based on the approach towards disease risk factors at both the individual and contextual levels.[3]

In contrast to the risk factor approach, the Salutogenic Theory, proposed by Aaron Antonovsky,[4] focuses on healthy resources and the

understanding of the development and maintenance of health.[5,6] Salutogenesis allows one to understand how individuals confront challenges and stay healthy,[7] characterized by the study of the origins and assets that promote health,[8] and can be an effective approach to reduce inequalities in oral health[9] through interventions that sustain health in adverse conditions.

In an expanded conception of health, the absence of disease is considered one of the factors contributing to health.[10] Through the paradigm of health promotion, an attempt has been made to overcome the dichotomy between health and disease by understanding that it is necessary to think about health to promote health. Health promotion factors are different from those that modify the risk of specific diseases; therefore, the perspective shifts to identifying potential protective factors,[5,7] which refer to the influences that can modify, improve, or attenuate personal responses to specific health risks.[4]

Health trajectories are built and modified over an individual's lifetime, considering a positive health continuum.[11] Although individual trajectories vary, general patterns can be predicted for populations and communities based on social and economic factors, environmental exposure, and experience.[12] Eriksson et al.[13] propose that salutogenesis is an umbrella concept that encompasses resources, skills, and abilities, both at the individual and collective levels, which are intrinsically associated with the genesis of health.

Thus, in a salutogenic proposal, oral health in childhood should have a broader approach and consider factors related to the family environment, emphasizing the social and emotional context in which the health behaviors of the individuals are developed and maintained.[14] Psychosocial aspects should be considered in the evaluation of health conditions, such as sense of coherence, which is the subjective tendency with which the individual understands, handles, and attributes meaning to everyday experiences; resilience, which is defined as the accumulation of resources that enable the healthy development of an individual possible even when exposed to risks; family cohesion, whose concept refers to the variation between separation

and connection among family members and how this dynamic influences habits, behaviors, and beliefs; and religiosity, whose relationship with health has been studied recently.[4,15] However, there are few studies in the literature that deal with these factors from a salutogenic perspective.[6].

Understanding the mechanisms behind different behaviors and attitudes is necessary to better evaluate the oral health condition of individuals. There is a relevant scientific basis for the risk factors for dental caries, even when taking into account the course of life of the subjects;[16] however, there are still essential gaps concerning the factors responsible for improving oral health. This knowledge can help dentistry professionals in advising individuals or groups in a healthy direction. Therefore, the present study aimed to identify dental caries-protective factors among 5-year-old children from the perspective of the salutogenic theory.

Methodology

This cross-sectional study evaluated 5-year-old children registered in the preschools of a small-sized municipality in the north region of Minas Gerais, in the southeast region of Brazil, in 2018/2019. The adopted age was established by the World Health Organization (WHO) as adequate to represent the population of preschool children in oral health epidemiological studies.[17]

Reference population
The municipality of São Francisco is located in the semi-arid region of Brazil, approximately 600 km from the capital city of Belo Horizonte. The population is 56,423 predominantly urban inhabitants with a Human Development Index (HDI) of 0.680, which is considered medium human development.[18]

Sampling
Between 2018 and 2019, the municipality presented 443 5-year-old children registered in regular elementary schools within the urban zone, distributed in five municipal schools and one private school. The sample size was calculated to estimate a minimal population parameter for a prevalence of

47.8% in 5-year-old children who were free of dental caries, as determined in a previous population-based study[19], with a 95% confidence interval (CI) and a 5% standard error. The calculations showed the need for a sample of 206 participants (children and mothers). The sample was increase by 20% to compensate for possible losses and refusals to participate (children who did not allow the epidemiological exam to be conducted or mothers who did not fill out the free informed consent form and/or the questionnaire), resulting in 247 participants.

Examiner calibration, pilot study, and data collection

The calibration/training process for the epidemiological examination was conducted by a "Gold Standard" examiner with prior experience in epidemiological surveys. The Kappa coefficient agreement calculation was used, achieving an inter-examiner agreement of 0.92 and an intra-examiner agreement of 0.87 and demonstrating a good understanding and reproducibility of the exams by the examiner.

After calibration, the pilot study was conducted with 20 mothers/children waiting for dental care in the pediatric clinic at the Federal University of Minas Gerais (Universidade Federal de Minas Gerais - UFMG) School of Dentistry to evaluate the applicability of the questionnaires.

The data for the main study were collected through questionnaires, which were based on a prior study,[20] delivered to the mothers. Questionnaires were sent to the mothers through the children's schools. Previously, mothers participated in a meeting with the researcher responsible for data collection to guide the research procedures. At this meeting, the mother's schooling was verified. For mothers who were unable to attend meetings, schooling was checked through children's school records. All the mothers were able to read. They answered the forms at home and returned them to their children's schools. The questionnaires addressed socioeconomic (family structure and living conditions), biological (general health and oral health of the child from the beginning years of life), and behavioral (mother's and child's hygiene habits) conditions. With regard to psychosocial factors, previously validated instruments for the Portuguese language, referent to the sense of coherence,[21] resilience,[15] family cohesion,[22] and religiosity[23] were used for data collection.

Epidemiological examinations of the children was performed to evaluate their dental condition according to the codes and criteria defined by the WHO[17] to obtain the decayed-missing-filled primary teeth (dmft) index. The exams were conducted in the school courtyard, with a plane mouth mirror and WHO probe (CPI probe), under natural light, in a knee-to-knee position, using complete personal protective equipment (gloves, mask, cap, glasses, and apron).

Study variable

The outcome variable was the absence of dental caries experience (dmft = 0). The independent variables were grouped according to the proposed theoretical model for the analysis, based on the referential adopted for this study[3,4,6,12,14,15,16] and categorized according to the salutogenic theory, in which the best condition is that of the interest in the data analysis (Figure). At the third level of the model, named "Family structure," are socioeconomic factors related to the general conditions of the family's life. At the second level, called "Relations with life and with the others," psychosocial factors are related to how the family (especially the mother) handles itself concerning everyday situations and social relations established with their surroundings. In the end, at the first level, called "Child Care", are the biological and behavioral factors related to the medical history and the healthcare that the child receives (nutritional and oral hygiene). The levels of the model are interconnected: the first level directly impacts the oral health of the child, and the third level, distal, acts more indirectly. In contrast, the second level directly impacts both the first and third levels, demonstrating that psychosocial factors interfere with the personal choices of childcare and the conditions of family life.

Family structure - Socioeconomic factors

The socioeconomic factors included: household income (up to US$374.00 and greater than US$374.00[1]),

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[1] US$1.00=R$4.013 (Brazilian Real), at the time of data collection (Year 2019)
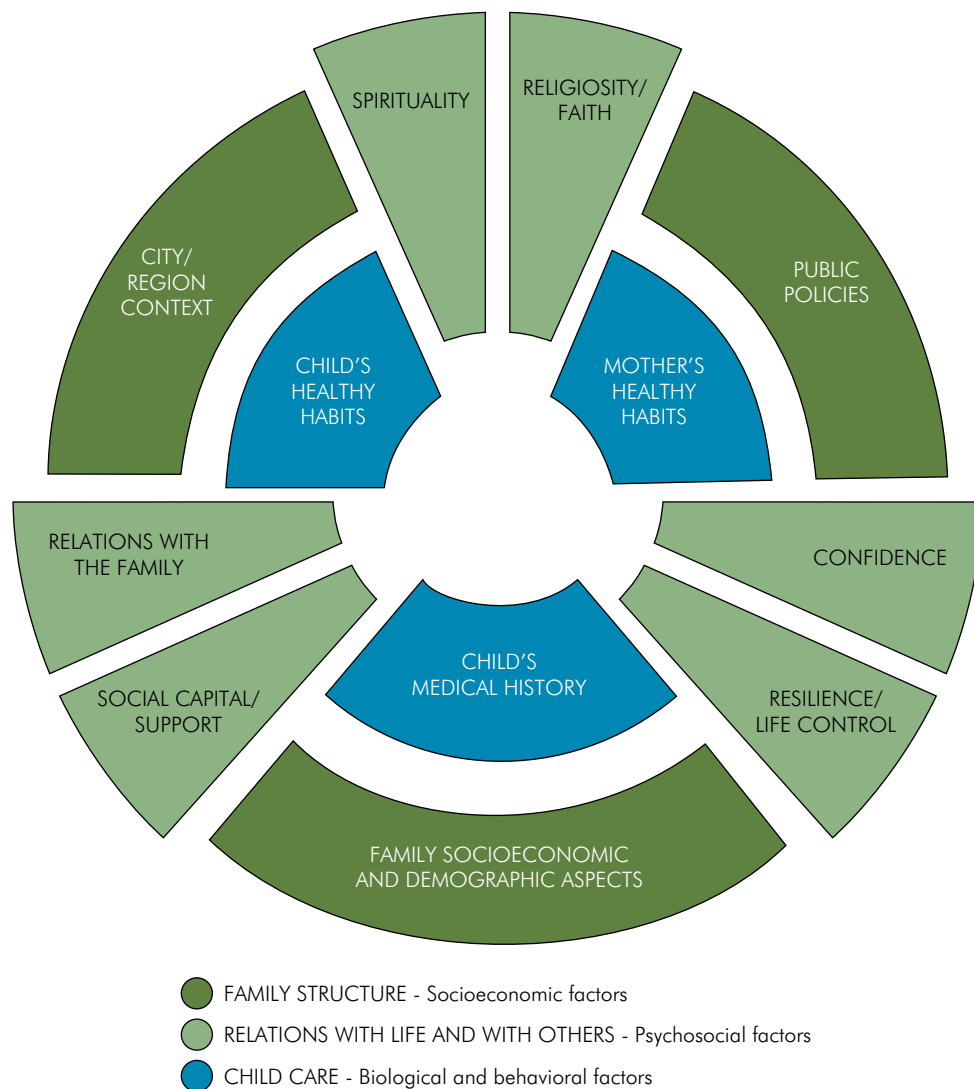
Figure. Hierarchized model proposed for the determination of the absence of dental caries experience in 5-year-old children.

mother's level of education (up to 8 years of study and greater than 8 years), mother has remunerated work (no and yes), indoor bathroom (no and yes), adequate residence (no and yes), mother's age when the child was born (up to 18 years and over 18 years), marital status (not married and married or living together), and the number of siblings (two or more siblings and up to one sibling). The adequate residence variable (no and yes) was investigated based on criteria from the Brazilian Institute of Geography and Statistics (IBGE), in which the residences were equipped with a general network of water supply, a general network of sewage and septic tanks, garbage collection by cleaning service, and up to two dormitory residents.

Relations with life and with others - Psychosocial factors

Psychosocial factors included: participation in groups (no and yes), sense of coherence (low and high), resilience (low and high), family cohesion (low, moderate, and high), organizational religiosity (low and high), non-organizational religiosity (low and high), and intrinsic religiosity (low and high).

Child care - Biological and behavioral factors

Biological factors included sex of the child (female or male), mother's self-reported skin color (non-white or white), and type of delivery (cesarean or vaginal).

Behavioral factors included:

a. Mothers' oral hygiene habits included frequency of toothbrushing (sometimes and every day), use of toothpaste (no and yes), and nightly oral hygiene (no and yes).
b. The child's dietary habits included breastfeeding (complementary/artificial and exclusive) and sugar addition to the baby bottle (yes and no).
c. Non-nutritive sucking habits: use of pacifier (yes or no) and finger sucking (yes or no).
d. Children's oral hygiene habits included children performing oral hygiene (no one/without supervision and with supervision), frequency of daily tooth brushing (less than two times and two times or more), frequency with which the child sleeps without brushing his/her teeth (sometimes/frequently/always and never/rarely), and use of dental floss (no and yes).

The categorization of the variables considered a greater chance of the absence of dental caries experience (dmft=0). The median for the dichotomization of the variables obtained from the validated instruments was calculated using a *Likert* scale.

Data analysis

The variable dental caries experience was dichotomized to create the outcome variable: absence of dental caries experience (dmft = 0).

For the analysis of factors associated with the absence of caries experience, the hierarchized logistic regression model was used, proposed by Victora et al.,[24] which considers proximal and distal factors associated with the outcome. The model suggests that distal factors influence proximal factors, measure their effects, and control for possible confusion factors.

Model 1 included the variables at the distal level (socioeconomic factors), and the variables that reached a value of p < 0.25 were maintained in model 2. Variables at the intermediate level (psychosocial factors) were included with the variables maintained in Model 1. The variables that reached a value of p < 0.25 were maintained in model 3. The variables at the proximal level (biological and behavioral factors) were included

together with those maintained in Model 2. The final model contained only variables with p < 0.05.[25] Crude and adjusted odds ratios (OR) with their respective 95% confidence intervals (CI) were calculated. All analyses were performed using the *Statistical Package for the Social Sciences* package (IBM, New York, USA) version 23.0.

Ethics approval and consent to participate

This study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the Research Ethics Committee of the School of Dentistry, Universidade Federal de Minas Gerais (UFMG) (protocol number 2.650.009/2018). Written consent was obtained from all mothers of the preschool children enrolled in the study. An informed consent form was delivered to the mothers at a meeting with the researcher responsible for data collection at the children's school. For those mothers who were unable to attend the meeting, the consent form was sent through children for mothers to sign.

Results

Of the 247 children evaluated in this study, 41.7% were free of dental caries experience (dmft = 0). The frequency distribution of the socioeconomic, psychosocial, biological, and behavioral factors are presented in Table 1.

The results of hierarchical logistic regression analysis are presented in Table 2. According to Model 3, including all of the hierarchized levels, it was possible to observe that at the most distal level, those that were most associated with the absence of dental caries experience were as follows: children from families with a higher income and whose mothers had a higher level of education. At the intermediate level, the chances of being free of dental caries were greater among children whose mothers presented with high resilience and moderate and high family cohesion. At the most proximal level, no variables remained associated with the absence of dental caries experience.

The final model is presented in Table 3, containing the variables associated with the

Table 1. Frequency distribution of socioeconomic, psychosocial, biological, and behavioral factors among 5-year-old children.

Variable	n	%
Socioeconomic factors		
Household income		
Up to US$374.00	187	75.7
More than US$374.00	37	15.0
No information	23	9.3
Mother's level of education		
Up to 8 years	98	39.7
More than 8 years	142	57.5
No information	7	2.8
Mother's remunerated work		
No	130	52.6
Yes	95	38.5
No information	22	8.9
Indoor bathroom		
No	49	19.8
Yes	197	79.8
No information	1	0.4
Adequate residence		
No	104	42.1
Yes	121	49.0
No information	22	8.9
Mother's age when the child was born		
Up to 18 years	48	19.4
Over 18 years	182	73.7
No information	17	6.9
Marital status		
Not married	94	38.1
Married or living together	148	59.9
No information	5	2.0
Number of siblings		
Two or more siblings	102	41.3
Up to one sibling	140	56.7
No information	5	2.0
Psychological factors		
Participation in groups		
No	123	49.8
Yes	97	39.3
No information	27	10.9
Sense of coherence		
Weak	114	46.2

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	n	%
Strong	110	44.5
No information	23	9.3
Resilience		
Low	113	45.7
High	110	44.5
No information	24	9.7
Family cohesion		
Low cohesion	37	15.0
Moderate cohesion	165	10.9
High cohesion	27	66.8
No information	18	7.3
Organizational religiosity		
Low	168	68.0
High	56	22.7
No information	23	9.3
Non-organizational religiosity		
Low	157	63.6
High	66	26.7
No information	24	9.7
Intrinsic religiosity		
Low	78	31.6
High	142	57.5
No information	27	10.9
Biological and behavioral factors		
Child's sex		
Female	125	50.6
Male	122	49.4
Mother's self-reported skin color		
Non-white	205	83.0
White	42	17.0
Type of delivery		
Cesarean	113	45.7
Vaginal	127	51.4
No information	7	2.8
Mother's frequency of toothbrushing		
Sometimes	42	17.0
Everyday	197	79.8
No information	8	3.2
Mother's use of toothpaste		
No	82	33.2
Yes	161	65.2
No information	4	1.6

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Mother's nightly oral hygiene		
No	58	23.5
Yes	185	74.9
No information	4	1.6
Breastfeeding		
Complementary/artificial	121	49.0
Exclusive	120	48.6
No information	6	2.4
Sugar addition in the baby bottle		
Yes	84	34.0
No	157	63.6
No information	6	2.4
Use of pacifier		
Yes	67	27.1
No	173	70.0
No information	7	2.8
Finger sucking		
Yes	21	8.5
No	218	88.3
No information	8	3.2
Child performing oral hygiene		
No one/Without supervision	56	22.7
With supervision	189	76.5
No information	2	0.8
Frequency of child's daily toothbrushing		
< 2 times a day	42	17.0
≥ 2 times a day	200	81.0
No information	5	2.0
Frequency with which the child sleeps without brushing his/her teeth		
Sometimes/Frequently/Always	151	61.1
Never/Rarely	91	36.8
No information	5	2.0
Use of dental floss		
No	145	58.7
Yes	97	39.3
No information	5	2.0

absence of dental caries experience after adjusting for variables of hierarchically superior levels, in which the Hosmer-Lemeshow test indicated a good adaptation of the final model (p = 0.473).

Children whose mothers had more than 8 years of study [OR = 2.55 (95%CI: 1.42–4.59]) and who live in an environment with a high family cohesion [OR = 3.66 (95%CI: 1.19 –11.29)] have a greater chance of belonging to the group of caries-free children. Considering the 95% CI and the frequency of caries-free experience among the groups with a level of education of greater than 8 years, the test power value was 99.4%.

Discussion

This study, with a representative sample of 5-year-old children, showed that the children of mothers with a higher level of education and living in a highly cohesive family environment have a higher chance of being free of dental caries experience, as compared to children of mothers with a lower level of education and whose families have low or moderate family cohesion. This is an original study conducted in a city that presents medium human development[18] and is located in a region of high social vulnerability, with a salutogenic approach in a representative sample, considering socioeconomic, psychosocial, biological, and behavioral aspects in their analysis.

The investigation of factors associated with the absence of dental caries represents one of the coefficients that contribute to health and a way of discussing oral health.[11] The identification of protective factors using a salutogenic approach allows us to understand the origin of health and health disparities.[8,9,13] This approach focuses on studying variables that can generate, promote, and maintain oral health, as opposed to the traditional focus on risk factors for the development of diseases.

From a socioeconomic standpoint, it is clear from the literature that these factors directly affect health and disease processes[3,26,27] and should be considered in public health research and actions. Therefore, the findings reaffirm the extent to which a mother's level of education represents a fundamental axis in guaranteeing the health of 5-year-old children, as it prevails even if one considers other family psychosocial, biological, and behavioral questions in this process.[27]

Table 2. Results of hierarchized multiple logistic regression analysis of the factors associated with the absence of dental caries experience in 5-year-old children.

Variables	% without caries	Crude OR (95%CI)	p-value	Adjusted OR (95%CI) Model 1	p-value	Adjusted OR (95%CI) Model 2	p-value	Adjusted OR (95%CI) Model 3	p-value
Socioeconomic factors									
Household income									
Up to US$374.00	35.8	1		1		1		1	
Greater than US$374.00	70.3	4.23 (1.97-9.10)	<0.001	2.44 (0.97-6.17)	0.059	2,91 (1,20-7,07)	0,018	3,02 (1,02-8,95)	0,046
Mother's level of education									
Up to 8 years	24.5	1		1		1		1	
More than 8 years	52.8	3.45 (1.96-6.08)	<0.001	2.21 (1.03-4.77)	0.043	2,10 (0,97-4,52)	0,059	2,78 (0,98-7,87)	0,053
Mother's remunerated work									
No	50.5	1		1					
Yes	33.8	0.50 (0.29-0.86)	0.012	0.92 (0.44-1.89)	0.811				
Indoor bathroom									
No	40.8	1		1					
Yes	41.6	1.03 (0.55-1.95)	0.918	0.62 (0.25-1.56)	0.303				
Adequate residence									
No	32.7	1		1					
Yes	50.4	2.09 (1.22-3.60)	0.008	1.39 (0.67-2.87)	0.378				
Mother's age when child was born									
Up to 18 years	29.2	1		1					
Over 18 years	45.6	2.04 (1.02-4.05)	0.043	1.60 (0.64-3.99)	0.318				
Marital status									
Single	38.3	1		1					
Married/living together	43.9	1.26 (0.74-2.14)	0.388	1.60 (0.64-3.99)	0.857				
Number of siblings									
Two or more siblings	33.3	1		1					
Up to one sibling	49.3	1.94 (1.15-3.30)	0.014	1.29 (0.63-2.65)	0.486				

Continue

Continuation

	%	OR (95%CI)	p	OR (95%CI)	p	OR (95%CI)	p
Psychosocial factors							
Participation in groups							
No	44.7	1	0,327	1	0.208	1	0.356
Yes	38.1	0.76 (0.44-1.31)		0.63 (0.31-1.30)		0.36 (0.28-1.57)	
Sense of coherence							
Weak	47.4	1	0.331	1	0,69		
Strong	40.9	0.77 (0.45-1.31)		1.15 (0.58-2.27)			
Resilience							
Low	39.8	1	0.324	1	0,163	1	0.043
High	46.4	1.31 (0.77-2.22)		1.63 (0.82-3.26)		2.45 (1.03-5.81)	
Family cohesion							
Low cohesion	27.0	1		1			
Moderate cohesion	44.2	2.14 (0.97-4.71)	0.058	2.48 (0.93-6.58)	0,069	5.61 (1.24-24.38)	0.021
High cohesion	63.0	4.60 (1.58-13.33)	0.005	6.40 (1.35-30.30)	0,019	29.36 (3.68-234.40)	0.011
Organizational religiosity							
Low	44.6	1	0.484	1	0,379		
High	39.3	0.80 (0.43-1.49)		0.66 (0.26-1.66)			
Non-organizational religiosity							
Low	43.9	1	0.834	1	0,361		
High	42.4	0.94 (0.53-1.68)		1.46 (0.65-3.26)			
Instrinsic religiosity							
Low	47.4	1	0.400	1	0,170	1	0.646
High	41.5	0.79 (0.45-1.37)		0.61 (0.30-1.24)		0.82 (0.36-1.89)	
Biological and behavioral factors							
Child's sex							
Female	43.2	1	0.629			1	0.564
Male	40.2	0.88 (0.53-1.46)				0.79 (0.35-1.77)	
Mother's self-reported skin color							
Non-white	38.5	1	0.028			1	0.060
White	57.1	2.13 (1.09-4.17)				2.66 (0.96-7.36)	

Continue

Continuation

Variable	%	OR (95%CI)	p	OR (95%CI)	p
Type of delivery					
Cesarean	47.8	1	0.151	1	0.548
Vaginal	38.6	0.69 (0.41-1.15)		0.77 (0.34-1.77)	
Mother's frequency of toothbrushing					
Sometimes	33.3	1	0.220	1	0.212
Everyday	43.7	1.55 (0.77-3.12)		0.42 (0.11-1.63)	
Mother's use of toothpaste					
No	36.6	1	0.262	1	0.681
Yes	44.1	1.37 (0.79-2.36)		0.83 (0.34-2.04)	
Mother's nightly oral hygiene					
No	43.1	1	0.842	1	0.788
Yes	41.6	0.94 (0.52-1.71)		0.86 (0.29-2.57)	
Breastfeeding					
Complementary/artificial	46.3	1	0.168	1	0.297
Exclusive	37.5	0.70 (0.42-1.17)		1.64 (0.65-4.17)	
Sugar addition in the baby bottle					
Yes	45.2	1	0.444	1	0.324
No	40.1	0.81 (0.47-1.39)		0.64 (0.26-1.56)	
Use of pacifier					
Yes	52.2	1	0.049	1	0.872
No	38.2	0.56 (0.32-1.00)		0.93 (0.37-2.34)	
Finger sucking					
Yes	38.1	1	0.686	1	0.294
No	42.7	1.21 (0.48-3.04)		2.27 (0.49-10.46)	
Child performing oral hygiene					
No one/Without supervision	44.6	1	0.653	1	0.866
With supervision	41.3	0.87 (0.48-1.59)		0.91 (0.32-2.60)	

Continue

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	%	OR (95%CI)	p-value	OR (95%CI)	p-value
Frequency of child's daily toothbrushing					
< 2 times a day	38.1	1	0.599	1	0.777
≥ 2 times a day	42.5	1.20 (0.61-2.38)		0.84 (0.26-2.74)	
Frequency with which the child sleeps without brushing his/her teeth					
Sometimes/Frequently/Always	39.1	1	0.360	1	0.081
Never/Rarely	45.1	1.28 (0.75-2.17)		2.27 (0.90-5.69)	
Use of dental floss					
No	44.8	1	0.303	1	0.076
Yes	38.1	0.76 (0.45-1.29)		0.42 (0.16-1.09)	

Table 3. Final result of the factors associated with the absence of dental caries experience among 5-year-old children.

Variables	OR (95%CI)	p-value
Level of Education		
Up to 8 years	1	
More than 8 years	2.55 (1.42-4.59)	0.002
Family cohesion		
Low cohesion	1	
Moderate cohesion	1.85 (0.85-4.15)	0.138
High cohesion	3.66 (1.19-11.29)	0.024

However, the salutogenic theory has not been explored in depth with regard to the oral health of children. Most studies within this approach analyze the sense of coherence and locus of parental control,[5] which have been associated with a greater impact on children's oral health-related quality of life[1] and seem to act as protective factors for dental caries in children.[6,28] Nevertheless, the present study did not find an association between mothers' sense of coherence and the absence of dental caries in their children. This can be explained by the context of the high social vulnerability of the evaluated children, in which socioeconomic aspects, such as the mother's level of education, prevail over other factors.

Other psychosocial variables such as resilience, family cohesion, and mothers' religiosity were evaluated in this study. This demonstrates the mother's capacity to take care of her children as a protective factor that mitigates the impact of an unfavorable environment in the period of a child's development, in which they are most vulnerable.[26] Among the variables, only high family cohesion remained associated with the absence of dental caries in 5-year-old children, which allows one to infer that healthy behavior can be developed through greater support offered by families who present high family cohesion.[3,14]

Regarding the biological and behavioral factors considered proximal, according to the results from the hierarchical model, no direct association was found with the absence of dental caries experience in children. There is evidence that low birth weight, the order of birth among the siblings, dietetic habits,

and inadequate living conditions may be related to caries disease; however, they do not appear to be protective factors in this study.[29-32] Similarly, the factors related to the medical and dental history of the child, including behaviors considered protective, such as adequate oral hygiene, did not show an impact on the absence of dental caries when adjusted in the hierarchized multiple logistic regression model. It is important to highlight that there is still no consensus in the literature about the protective effect of factors such as breastfeeding, tooth brushing, and the use of dental floss,[29,31,33,34] and the available evidence is based on low-quality studies.

The findings of this study suggest that social factors are determinants in the absence of dental caries, overlapping biological and behavioral factors. There is a need for further investigation about the mechanisms that may shape these interactions and why behavioral factors, specifically, did not have a protective effect on the absence of dental caries experience in children.

Some limitations of this research have been considered inherent to the adopted study design. Cross-sectional studies are susceptible to memory biases, and many answers may not be as credible as expected since some information refers to behaviors and situations lived in the past.

Conclusions

From the perspective of the salutogenic theory, upon analyzing socioeconomic, psychosocial, biological, and behavioral factors, only the mother's level of education and family cohesion were associated with the absence of dental caries experience in 5-year-old children. This approach, which focuses on protective factors, should be considered in the qualification of health care directed toward children in early childhood and adopted in clinical practice and oral health promotion services to guarantee the quality of children's oral health. The results presented herein can provide a basis for the development of strategies for risk stratification and care protocols. It is necessary for there to be integration among the actions of the diverse levels of the health system and an intersectoriality among social and public health

policies to promote healthy environments, favor healthy choices, and thus diminish the inequality of oral health among children.

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