







Parental oral health literacy influences preschool children's utilization of dental services

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Abstract: Parental behavior towards their children's oral health is strongly influenced by parent's Oral Health Literacy (OHL) level. This study evaluated the impact of parental OHL on preschool children's utilization of dental services. A cross-sectional study was conducted with parents of 419 children aged 3 to 5 years who answered a self-administered questionnaire about their perception of their children's oral health and whether their children had already been to a dental visit. Parental OHL level was assessed by the validated version of the Oral Health Literacy Adult Questionnaire (OHL-AQ) translated into Brazilian Portuguese. Univariate and multivariate Poisson regression analyses with robust variance were used for the data analysis ($\alpha = 0.05$). Most children had already been to a dental visit (73%). Overall, 31.7% of the parents or guardians reported that their children had experienced dental pain or dental caries. Parental OHL level was classified by tercile as low, medium, and high. The final model showed independent associations between children who had already been to a dental visit and higher parental OHL level (PR = 1.16; 95%CI = 1.00-1.35) when compared to the lowest OHL level, higher parental educational level (PR = 1.39; 95%CI = 1.03-1.87) when compared to lower educational level, the report of children's pain and dental caries (PR = 1.22; 95%CI = 1.09-1.36) and married parents or parents in a common-law marriage (PR = 1.17; 95%CI = 1.03-1.93). The prevalence of children who had already been to a dental visit was higher among those parents with a higher OHL level when compared to those with a lower OHL level.

Keywords: Health Literacy; Dental Care for Children.

Introduction

In Brazil, dental healthcare is provided universally and free of charge by the Brazilian Public Health System.¹ Although there is a recommendation for dental care during the first years of life because it is important for maintenance of oral health,² a significant share of the population does not use oral healthcare services in early childhood.^{3,4} Several reasons can be associated with not seeking dental healthcare in the first years of life, such as low socioeconomic status,^{5,6} low parental educational level,⁵ lack of guidance during prenatal care,⁷ absence of

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painful symptoms,⁵ absence of perceptions of clinical changes such as caries, pain, or dental trauma,^{6,8} or children's behavioral problems.⁹

Parental oral health literacy (OHL) is likely to influence decisions about taking one's children to dental care. It is widely known that an individual's OHL level impacts not only their ability to read and understand written texts and to efficiently communicate information related to oral health, but also to access and use health systems.¹⁰ Low OHL levels influence, for instance, an individual's self-perception of dental treatment needs, frequency of dental treatment visits, and the difficulty in understanding and processing information related to preventive care,¹¹ leading to a higher risk of oral health problems.¹² A systematic review on OHL has indicated that most adults are classified as having a low OHL level, and only a small share of adults around the world have an appropriate OHL level for maintaining their oral health.¹³ Furthermore, several studies have highlighted the influence of OHL level on individual's health outcomes^{10,12} and on their children's health.¹⁴

Most attitudes towards children's oral health are taken by their parents or caregivers.^{15,16} Although parental behavior towards children's oral health is strongly influenced by parental OHL level,¹⁴ it remains unclear whether it interferes with the decision to seek dental care for their children. This is very important because dental follow-up in childhood can facilitate the maintenance of good levels of oral health throughout life. Besides, the long-term routine dental attendance improves children's quality of life.¹⁷ The hypothesis of this study is that parents' higher OHL influences their decision to take their children for their first dental visit. Thus, this study aimed to evaluate the impact of parental OHL on the use of dental services by Brazilian preschoolers.

Methodology

Ethical aspects

This study was approved by the Human Research Ethics Committee of the Health Sciences Center of the Federal University of Paraná (CAAE: 29188620.3.0000.0102) and also by the Local Department

of Health (CAAE: 291777620.3.3001.0101) of Curitiba, Brazil, in compliance with CNS Resolution 466/12 and with the Declaration of Helsinki.

Participants and study design

A cross-sectional observational study was conducted with Brazilian parents or guardians of children aged 3 to 5 years in Curitiba, Brazil, enrolled in local schools.

The sample size was calculated by the *OpenEpi* software with free access using the formula for estimating proportions. A prevalence of 75% of children who had already been to a dental visit was considered based on a pilot study. A significance level ($1-\alpha$) of 95% was considered. To compensate for the clustering effect, the sample ($n = 289$) was multiplied by 1.5, resulting in a minimum sample of 433. To make up the sample, preschools were drawn randomly on the "random.org" website, maintaining the proportion of students enrolled in each of the city's 10 administrative regions. Parents were recruited through invitations distributed to 28 preschools randomly selected among the 230 educational units in the city of Curitiba. All parents or legal guardians (2,582 parents/guardians) of children aged 3 to 5 from each randomly drawn school were invited to participate in the survey.

Data collection

A pilot study was performed with 71 preschool children from the same local education network to test the applicability and reliability of the self-administered and structured questionnaire, and to define the parameters for the sample size calculation. After analyzing the results of this pilot study, small changes were made to the graphical presentation of the questionnaire. Pilot study participants were not included in the final sample.

For data collection, parents or guardians received the self-administered questionnaire, with the option to answer a printed or online version, which was developed on Google Forms and distributed electronically via WhatsApp Messenger (WhatsApp Inc., Mountain View, USA). The questionnaire contained socioeconomic and dental care assessment questions.

Parental report of children's utilization of dental services, parental perception of children's oral health, and parental report of children's experience of dental pain and dental caries were obtained from specific questions on the questionnaire ("Has your child ever visited the dentist?", "How do you assess your child's oral health (teeth and gums)?", "Has your child ever had a toothache?", and "Has your child ever had or has tooth decay/cavities?"). Parents or guardians could answer "yes" if their child had already gone through the questioned experience or "no" if the child had not gone through the questioned experience.

The data were collected between October 2020 and February 2021.

Parental oral health literacy

To assess the parental OHL level, the validated version of the *Oral Health Literacy Adult Questionnaire* (OHL-AQ) translated into Brazilian Portuguese^{18,19} was used. The instrument consists of 17 questions, including four sections covering different abilities. The "reading comprehension" section includes three gap-filling multiple-choice questions. The parent was instructed to select one of the five possible choices to fill the blank space with the best alternative. The "numeracy" section included four questions about a written text box. The parent was asked to read an amoxicillin prescription and then answer an open-ended question and a multiple-choice question about the drug prescription. The "listening" section included two questions given by a new written text box about instruction for sodium fluoride mouth rinse. The parent should use listening skills to understand the instructions and then answer an open-ended and a multiple-choice question. However, considering the situation imposed by the COVID-19 pandemic, in this study, the listening session was converted into reading comprehension. The last section "decision-making" included five multiple-choice questions related to common oral health problems and medical history. All questions had one correct alternative and one "I don't know" alternative. The parent was instructed to select "I don't know" rather than guess when he/she did not know the answer. Correct answers

scored 1 point, while incorrect answers or "I don't know" scored zero. The total score was obtained from the sum of individual scores for each question ranging from 0 to 17 points.^{18, 20}

Statistical analysis

The data were analyzed using SPSS software (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, USA). The outcome variable, utilization of dental services, was dichotomized into "yes" for those children who had already been to a dental visit or "no" for those who had never had a dental visit. The OHL-AQ scores were grouped by terciles;¹⁸⁻²⁰ and the individuals in the first tercile were considered to have a low OHL (OHL-AQ ≤ 12), individuals in the second tercile were classified as medium OHL (OHL-AQ 13 and 14), and individuals in the third tercile were regarded as having high OHL (OHL-AQ ≥ 15 points).

Independent variables were categorized as follows: child's sex ("female" or "male"); parental educational level ("8 years or less" or "more than 8 years"); parental marital status (marriage or common-law marriage - "yes" or "no"); parental report of children's experience of dental pain or dental caries ("yes" or "no"); parental report of children's oral health ("very good or good", "regular," or "bad or very bad").

Associations between the outcome and each independent variable was assessed by univariate Poisson regression with robust variance. Variables with a p-value < 0.20 in the univariate model were included in the multiple Poisson regression model with robust variance. Only those variables with 5% significance were kept in the final model.

Results

Twenty-eight schools were selected following the proportion of the sampling process. Overall, 551 parents or guardians returned the informed consent form, confirming their willingness to participate in the survey. Foreign parents or guardians (3) who did not reply or who submitted an incomplete questionnaire (129) were excluded, which represented

24% of the questionnaires sent. The final sample included 419 participants. The prevalence of the utilization of dental services by children whose parents had low (n = 136, 65.4%) and high OHL (n = 137/80.3%) levels was used to calculate the power of the sample, which was 79.6% and assess the association between OHL level and the utilization of dental services .

A total of 173 (41.3%) and 246 (58.7%) responses were obtained for the printed and online questionnaires, respectively. Most of the participants were the child's mother or father (98.3%), and 89.5% of them had eight or more years of schooling. Most parents (61.6%) had a common-law marriage status (Table 1).

Most parents or guardians reported their children's oral health status as good or very good (81.6%). Most children had already been to a dental visit (73%). Overall, 31.7% of the parents or guardians reported that their children had experienced dental pain or dental caries. Parental OHL level

was classified as low for 32.5% and as high for 32.7% (Table 1).

Table 2 presents the univariate and multiple Poisson regression analyses for utilization of dental services by preschool children. The final model showed independent associations between children who had already had a dental visit and higher parental OHL level (PR = 1.16; 95%CI = 1.00-1.35) when compared to the lowest OHL level, the highest parental educational level (PR = 1.39; 95%CI = 1.03-1.87) when compared to the lowest educational level, the report of children's pain and dental caries (PR = 1.22; 95%CI = 1.09-1.36) and parental marital status - either married or common-law marriage (PR = 1.17; 95%CI = 1.03-1.93).

Discussion

The influence of caregivers' OHL on children's oral conditions, especially dental caries, is well

Table 1. Socioeconomic characteristics, oral health literacy, utilization of dental services by preschool children, and parental report of children's oral health; n = 419).

Variable	Categories	Frequency n (%)
Child's sex	Female	194 (46.3)
	Male	225 (53.7)
Parental educational level	More than 8 years	375 (89.5)
	8 years or less	44 (10.5)
Parental marital status (marriage or common-law marriage)	Yes	257 (61.6)
	No	159 (38.4)
Oral Health Literacy (OHL-AQ)	Low	136 (32.5)
	Medium	146 (34.8)
	High	137 (32.7)
Parental report of children's pain or dental caries	Yes	133 (31.7)
	No	286 (68.3)
Parental report of children's oral health	Good or very good	341 (81.6)
	Regular	63 (15.1)
	Bad or very bad	14 (3.3)
Utilization of dental services by preschool children	Yes	306 (73.0)
	No	113 (27.0)
Child's age (months)	Mean (SD)	54.0 (9.6)
Parental age (years)	Mean (SD)	32.7 (7.2)

Values lower than 419 are due to incomplete data (missing); OHL-AQ (Oral Health Literacy-Adult Questionnaire); SD (Standard Deviation); N (Absolute frequency).

Table 2. Univariate and multiple models for utilization of dental services by preschool children (n = 419).

Variable	Categories	FIRST DENTAL VISIT		Crude analysis			Adjusted analysis			
		Measurement scale	Yes	No	PR	95%CI	p-value*	PR	95%CI	p-value**
			M (SD) or n (%)	M (SD) or n (%)						
Child's age	Months	53.6 (9.5)	55.0 (9.7)	0.99	0.99–1.00	0.191	-			
Child's sex	Female	144 (74.2)	50 (25.8)	1			-			
	Male	162 (72.0)	63 (28.0)	0.97	0.86–1.09	0.608				
Parental educational level	More than 8 years	283 (75.5)	92 (24.5)	1.44	1.08–1.93	0.013	1.39	1.03–1.87	0.029	
	8 years or less	23 (52.3)	21 (47.7)	1			1			
Parental marital status (marriage or common-law marriage)	Yes	201 (78.2)	56 (21.8)	1.22	1.07–1.40	0.003	1.17	1.03–1.93	0.019	
	No	102 (64.2)	57 (35.8)	1			1			
Oral Health Literacy (OHL-AQ)	Low	89 (65.4)	47 (34.6)	1			1			
	Medium	107 (73.3)	39 (26.7)	1.12	0.96–1.31	0.156	1.11	0.95–1.29	0.182	
	High	110 (80.3)	27 (19.7)	1.23	1.06–1.42	0.007	1.16	1.00–1.35	0.044	
Parental report of children's pain or dental caries	Yes	108 (81.2)	25 (18.8)	1.17	1.05–1.31	0.005	1.22	1.09–1.36	< 0.001	
	No	198 (69.2)	88 (30.8)	1			1			
Parental report of children's oral health	Good or very good	248 (72.7)	93 (27.3)	1.13	0.76–1.68	0.541	-			
	Regular	48 (76.2)	15 (23.8)	1.19	0.78–1.79	0.421	-			
	Bad or very bad	9 (64.3)	5 (35.7)	1						

Values lower than 419 are due to incomplete data (missing). Highlighted values indicate statistical significance ($p < 0.05$). OHL-AQ (Oral Health Literacy–Adult Questionnaire); PR (Prevalence ratio); CI (Confidence interval); * Univariate Poisson regression with robust variance. ** Multiple Poisson regression with robust variance.

known,^{10,14,21} and so are its clinical consequences.²² However, it is still necessary to elucidate possible ways in which caregivers' OHL impacts their children's oral health outcomes, and thus improve the effectiveness in prevention and health education strategies. In this sense, the main contribution of this study is the indication that low parental OHL is also associated with lower use of dental services by preschoolers, even when adjusted for parents' educational level, parents' marital status, and parental reporting of children's dental pain or tooth decay.

A cohort study of young U.S. children found that emergency dental care expenditures were higher among children whose caregivers had lower health literacy.^{15,16} It has been suggested that the high expenses for dental emergencies

among those with low levels of health literacy could be a consequence of their lesser tendency to seek preventive care. Other studies had already observed that seeking dental healthcare can be associated with the presence of dental problems in children,^{23,24} clinical manifestation of dental caries,²² and the presence of dental pain.²⁴ Current studies continue to associate dental pain as the main reason for preschoolers' first dental visit.^{25,26} Our results corroborate these findings, showing that parental reports of dental pain or dental caries were associated with higher use of dental services. This raises some concern because dental caries remains the most prevalent chronic childhood disease,²⁷ thus indicating that the implementation of basic preventive measures still faces many challenges.

Therefore, encouraging parents to seek dental care before the onset of oral problems can have an important positive impact on children's oral health and may reduce restorative dental care visits and related expenditures during the first years of life.²⁸ In addition, there may be economic advantages for families and health systems as the incidence of diseases will be reduced.^{28,29} The improvement in caregivers' OHL levels can contribute to this goal. The American Dental Association (ADA) recognizes that by improving health literacy, patients will take better care of their health and, consequently, of their children.³⁰ It has been suggested that actions to improve OHL level should be applied as part of preventive planning to children, given that educational interventions aimed at improving the adult OHL level have the potential to improve children's oral health status.³¹

In addition, improving OHL levels can reduce the barriers to access health services.³² The results of this study show that the use of dental services was higher in children whose parents had higher OHL. Furthermore, improving parents' literacy can facilitate the development of optimal oral health knowledge and beliefs that support parent's positive behaviors towards their children's oral health.³³ This implies recognizing that efforts to encourage early preventive dental care should include actions aimed at parents with low OHL.

Other aspects were also associated with the use of dental services by children. Among parental factors, the higher parental educational level and more stable relationship between parents were associated with a higher prevalence of the utilization of dental services. It is widely acknowledged that parental factors may influence their seeking dental appointments, such as mother's educational level. However, there was a delay in the first dental visit, even among children whose mother had longer formal schooling.³⁴ Although the level of OHL and the level of education are closely related,^{35,36} there are different constructs and such peculiarities should be taken into account. Those children whose parents were in a stable relationship had a higher prevalence of dental care. Martin³⁷ states that divorced individuals had a lower level of OHL. Based on the assumption that the OHL level influences the prevalence of the

utilization of dental services, it is likely that parents who are in a stable relationship will take their children to the first dental visit more frequently when compared to parents who are not in a stable relationship. On the other hand, Gironda³⁸ and Gallagher³⁹ show that it is not only the presence of a spouse that influences self-healthcare, but the quality of the relationship and the functional support provided by the spouse. Low family income is another factor that influences the frequency of dental visits.³⁸ A family with parents in a stable relationship is more likely to have a higher income and that could influence their children's timing of the first dental visit.

This study has some limitations. The study design did not allow establishing a causal relationship between the studied variables and the outcome. Future longitudinal and interventional studies should be considered with the aim of advancing investigations on how to improve OHL levels. Despite the fact that OHL-AQ is an instrument that has been applied for a long time and can assess OHL more broadly, including different skills such as numeracy, reading comprehension, listening, and decision-making,^{18,40} in this study, the "listening" session of the OHL questionnaire was transformed into reading questions because of the conditions imposed by the COVID-19 pandemic, period in which the survey data were collected.

Conclusion

In conclusion, the higher prevalence of children who have never been to a dental visit was independently associated with the lower level of OHL of their caregivers.

Our findings suggest that it is important to take actions that increase the level of OHL of caregivers so as to increase the demand for dental care in the first years of life.

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