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CLINICAL RESEARCH:

Assessing the Determinants of Oral Health-Related Quality of Life Among Male Costa Rican Students: Findings from a Cross-Sectional Study

Evaluación de los determinantes de la calidad de vida relacionada con la salud bucal entre estudiantes varones costarricenses: hallazgos de un estudio transversal

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ABSTRACT: To evaluate the association between socioeconomic, psychosocial, and lifestyle factors with Oral Health-Related Quality of Life (OHRQoL) in a sample of adolescent males from Colegio Técnico San Agustín de Cartago - Ciudad de los Niños (St. Augustine's Technical High School), located in the Cartago Province of Costa Rica. Data for this study were obtained from a descriptive, cross-sectional study conducted in 2019. The sample consisted of 394 adolescent males aged between 12 and 22 years. OHRQoL was assessed using the validated Spanish version of the Oral Health Impact Profile (OHIP-49). The following variables were considered: age, parental education, having a remunerated job, Health-Related Quality of Life (measured via the SF-36 questionnaire), self-esteem (Rosenberg scale), perceived stress (PSS-14), depression (CES-D), physical activity, history of dropping out of school, flossing and tooth-brushing habits, eating snacks between meals, medication intake for illness, having received oral health care instructions, history of dental visits due to pain, frequency of dental visits, history of childhood tooth decay, and access to dental health care during childhood. Qualitative variables were analyzed using the Student's t-test, while Pearson correlation was used for quantitative variables. Multivariable analysis was performed using linear regression. Statistical significance was set at $p<0.05$ using STATA 14®. Enhanced general health-related quality of life ($p<0.01$) and early childhood dental attendance ($p<0.01$)

were identified as factors associated with improved OHRQoL. Conversely, having had dental visits for pain ($p<0.01$), elevated depression symptomatology ($p<0.01$), and a history of childhood dental cavities ($p<0.01$) were all associated with worse OHRQoL. This study suggests a link between general and oral health. Experiences during childhood appear to set a standard for adolescence. Lastly, it is crucial to note the significant impact of mental health on the perception of oral health.

KEYWORDS: Oral-health related quality of life; OHIP; Health-related quality of life; SF-36 determinants; Oral health; Depression; Adolescents; Costa Rica.

RESUMEN: Evaluar las asociaciones entre la calidad de vida relacionada con la salud general, factores socioeconómicos, psicosociales y de estilo de vida con la Calidad de Vida Relacionada con la Salud Oral (CVRSO) en una muestra de adolescentes varones del Colegio Técnico San Agustín de Cartago - Ciudad de los niños. Para analizar los determinantes de la CVRSO, se utilizaron los datos de un estudio epidemiológico descriptivo transversal de tipo observacional. La edad de los participantes osciló entre los 12 y 22 años y los datos fueron recolectados durante 2019. El indicador de salud utilizado fue la CVRSO, la cual se aproximó mediante el instrumento OHIP-49 (Oral Health Impact Profile). Las variables independientes utilizadas fueron la edad, el SF-36 (cuestionario de calidad de vida relacionada con la salud general), el PSS-14 (Escala de Estrés Percibido), CES-D (Escala de Depresión), la escala de Rosemberg (Escala de Autoestima), escolaridad de los padres, haber tenido un trabajo remunerado, realizar deporte, toma de medicamentos, haber desertado la escuela en algún momento, visitas al odontólogo regularmente, haber visitado al odontólogo por dolor, haber recibido instrucciones de higiene oral, haber tenido caries durante la infancia, acceso a servicios de salud oral durante la infancia, haber recibido tratamiento por dolor dental, uso del hilo dental, la frecuencia de cepillado y consumo de meriendas entre comidas. Para los análisis bivariados se utilizaron las pruebas estadísticas T de Student y la correlación de Pearson. Para los análisis multivariados, se utilizó una regresión lineal ajustando por todas las variables significativas en el análisis bivariado. El umbral de significancia estadística utilizado fue de un 5% ($p<0.05$). El programa de estadística utilizado fue STATA versión 14®. Una mejor la calidad de vida relacionada con la salud general ($p<0,01$) y haber visitado los servicios odontológicos durante la infancia ($p<0,01$) se identificaron como factores que influyen positivamente en la CVRSO. Por el contrario, se observó que haber visitado al dentista por dolor ($p<0,01$), haber reportado sintomatología de depresión ($p<0,01$) y antecedentes de caries dentales infantiles ($p<0,01$), contribuyeron a una peor CVRSO. Este estudio sugiere un vínculo intrínseco entre la salud general y bucal. Las experiencias de salud durante la niñez parecen establecer un estándar para la adolescencia. Por último, es fundamental señalar el impacto significativo de la salud mental en la percepción de la salud bucal.

PALABRAS CLAVE: Calidad de vida relacionada con la salud; Calidad de vida relacionada con la salud bucal; OHIP-49; Determinantes de la salud; SF-36; Salud bucal; Depresión; Adolescentes, Costa Rica.

INTRODUCTION

Health is a multidimensional concept that is challenging to assess using health questionnaires. Existing indicators incorporate various elements, including biological, physical, psychological, and social dimensions (1). However, traditional epidemiological research tends to focus on morbidity, clinical variables, and biomarkers, primarily representing the biological or physical dimensions (2).

To address this issue, some researchers have proposed analyzing health using more subjective measures, such as Health-Related Quality of Life (HRQoL). HRQoL is frequently employed to identify a wide range of health-related problems and consequences that can affect individuals in their daily lives. It reflects the perceived impact of health on an individual's ability to lead a full life (3). HRQoL is a multidimensional construct based on the general state of physical and mental health as perceived by individuals. Studies concur that HRQoL encompasses physical, emotional and psychological dimensions, as well as the impact of health on social roles, and overall well-being (4).

Oral diseases represent a significant public health concern worldwide, affecting individuals across all age groups (5). Among the most prevalent oral health issues are dental decay and periodontal disease (6, 7). These conditions not only result in physical discomfort but also have economic (8), social, and psychological consequences, potentially impacting the overall quality of life (9). Indeed, the presence of active oral diseases directly impacts quality of life, leading to pain, aesthetic concerns, nutritional deficiencies, psychological distress, and functional limitations (9).

Oral health in adolescence is marked by significant changes, including the transition from temporary to permanent dentition (10), decrease in oral hygiene practices, establishment of habits and social behaviors that pose health risks, such as alcohol, tobacco consumption, and diet changes (11).

Psychosocial factors, including anxiety, depression, low self-esteem, can significantly impact adolescents' oral health, often leading to conditions such as bruxism and temporomandibular disorders (12). Poor oral health can in turn lead to physical pain, psychological discomfort, chewing difficulties, weight loss, insomnia, irritability, and low self-esteem. However, there is limited information available regarding the potential functional, emotional, and social consequences of these oral health issues on quality of life (13).

Although adolescence presents a window of opportunity to promote health, the numerous mental and psychological challenges adolescents face can potentially lead to a deterioration in their oral health during this period (14, 15).

Understanding the relationship between adolescents' quality of life and their oral health, along with the factors that influence this relationship, whether positively or negatively, is crucial for preventing the development and progression of pathologies that necessitate complex and costly treatments.

This study aims to evaluate the relationship between socioeconomic, psychosocial, and lifestyle factors and Oral Health-Related Quality of Life among adolescents from the San Agustín de Cartago Technical College - Ciudad de los Niños. It is hypothesized that these factors directly influence oral health and, consequently, the quality of life related to oral health in adolescents.

METHODS

SAMPLE

To analyze the determinants of Oral Health-Related Quality of Life (OHRQoL), data from an

observational cross-sectional study conducted in 2019 were used. The study included 394 male adolescents aged between 12 and 22 years from San Agustín Professional Technical College, also known as "Ciudad de los Niños" (Children's City), located in Agua Caliente de Cartago, Costa Rica. This institution attracts students from diverse social backgrounds across the country, with participants coming from all provinces of Costa Rica (16).

All students were invited to participate. After excluding those who refused, those who left the school during the data collection period, and those with missing data for the main variables used in this research, a total of 394 participants out of 480 (82%) were included in the final analysis.

ETHICS AND DATA

Written informed consent was obtained from the boarding school principal, who served as the general proxy and legal representative for all students. Additionally, each participants read and signed the informed consent form, including both minors and adults. Ethical approval for the study was granted by the Ethical Review Committee of the University of Costa Rica (CEC-UCR) (VI-5629-CEC-0008-2018) and was registered with the National Health Research Council (CONIS).

VARIABLES

DEPENDENT VARIABLE

Oral health-related quality of life (OHRQoL) was assessed using the OHIP-49 questionnaire, utilizing the standardized Spanish version validated for Latin American adolescents (17). The OHIP-49 questionnaire comprises 49 questions encompassing the following dimensions: i) Functional limitation: It assesses the extent to which oral health issues limit the performance of daily activities, such as having trouble pronouncing some words. ii) Physical pain: It measures the subjective feeling of discomfort, which varies in intensity and can impede individuals' daily activities. iii) Psychological discomfort: It considers the extent to which emotional problems interfere with work or daily activities. iv) Physical disability: It assesses permanent or temporary physical alterations, such as loss of oral function, which prevent or hinder the performance of daily activities. v) Psychological disability: It measures the impact of oral health problems on psychological function. vi) Social disability: It refers to the extent oral health problems interfere with social activities and the individual's ability to integrate into their surroundings or environment. vii) Handicap: It refers to being limited by oral health to perform daily activities, such as, going to work (17,18).

The participants are asked to indicate how often they experienced each specific impact in the last 4 weeks. Responses for each item are structured on a five-point Likert scale: never (0), hardly ever (1), occasionally (2), fairly often (3), and very often (4). Higher scores represent worse Oral Health-Related Quality of Life (OHRQoL) (18).

INDEPENDENT VARIABLES

SOCIODEMOGRAPHIC VARIABLES

All sociodemographic data were collected through a self-reported questionnaire, administered separately from the primary instrument's questionnaires. It includes age (as a continuous variable) ranging from 12 to 22 years. Parental education was extracted from the question, "Has at least one of your parents completed high school?" It was categorized as "yes" or "no". Employment status was categorized as "yes" or "no" to indicate whether the participant had a remunerated job. School dropout was defined as the abandonment of the educational system by students for more than 6 months, measured with the question, "Have you ever had to leave school for more than 6 months?" with response options "yes" or "no".

PSYCHOSOCIAL VARIABLES

The Rosenberg Self-esteem Scale (Rosenberg, 1965) aims to assess the feeling of satisfaction. It consists of ten Likert-type items ranging from 0 to 3 (0=strongly agree and 3=strongly disagree). Half of the items reflect positive self-esteem, while the other half reflect negative self-esteem. To calculate the score, the values of the negative items (1, 2, 4, 6, and 7) are inverted, and then all the items are summed. The questionnaire ranges from a score of 0 (worst self-esteem) to 30 (best self-esteem) (19-21).

The Perceived Stress Scale (PSS-14) was designed to measure the degree to which different life situations are perceived as stressful. It consists of 14 items that include direct questions about the stress levels experienced in the last month. The scale uses a Likert-type scale of 5 alternatives ranging from 0 (never) to 4 (very often). Scores on items 4, 5, 6, 7, 9, 10, and 13 are reversed. The scale scores range from 0 to 56, with higher scores indicating greater perceived stress (22, 23).

The Depression Scale of the Center for Epidemiological Studies (CES-D) assess different levels of depression based on symptoms. The questionnaire contains 35 items. Responses are classified as 0, 1, 2, 3, or 4 and added to obtain the total score on the instrument, where a higher score indicates greater severity of depressive symptoms (score ranges from 0 to 140). Four of the items are posed in the opposite direction (conditions of positive affect). These items are scored inversely so that the interpretation follows the same as for the others. In addition to the total score, a clinically significant depressive symptoms cutoff point is set at 16 points (24-26).

GENERAL HEALTH

General health is assessed here using Health-Related Quality of Life (HRQoL), measured by the SF-36 questionnaire. This questionnaire includes 36 items that assess both positive and negative aspects of general health, covering scales of physical function, physical role, bodily pain, general health, vitality, social function, emotional role, and mental health. Scores range from 0 to 100, with higher scores associated with better general health (27, 28).

HEALTH BEHAVIORS

Health behaviors data were collected through a self-reported questionnaire, administered separately from the primary instrument's questionnaires. It includes, physical activity (less than 5 times per week or more than 5 times per week), use of dental floss (yes / no), tooth brushing frequency (more than twice a day /1 or 2 times a day / less than once a day), eating snacks between meals (yes/ no / sometimes).

ACCESS TO HEALTH CARE

Variables regarding access to health care were used, as for sociodemographic and health behaviors variables, data were collected through a self-reported questionnaire, administered separately from the primary instrument's questionnaires including: Medication intake for illness (yes/no), receipt of instructions on oral health care (yes/no), visiting the dentist for pain (yes/no), regular visits to the dentist (yes/no), history of childhood tooth decay (yes/no), regular visits to the dentist during childhood (yes/no), previous treatment for dental pain (extraction, nerve treatment, filling, others).

STATISTICAL ANALYSES

Bivariate analyses were performed between the OHRQoL variable and each of the independent variables using Student's t-test or Pearson's correlation test, as the OHRQoL presented a normal distribution. A linear regression model was run between OHIP-49 and the different indepen-

dent variables. The statistical significance threshold was set at 5% ($p<0.05$) using STATA version 14®.

RESULTS

Table 1 shows the descriptive statistics in the sample, including the distribution of OHIP-49 scores. The total number of participants (N=394), the mean OHRQoL scores (30.9), standard deviation (28.2), minimum (0), and maximum (164) are presented. Participants had an average age of 15.3 years, ranging from 12 years to 22 years. The SF-36 variable, which reflects overall HRQoL, included 390 participants with an average score of 75.4. This variable had a minimum score of 29.1 and a maximum of 100. PSS-14 questionnaire presented a total number of participants (N=390) and an average of 23.3, with a minimum of 0 and a maximum of 44. Descriptive statistics for additional independent variables are also provided.

Table 2 presents the bivariate statistics between the OHIP-49 score and the independent variables. Age did not show a statistically significant relationship with the OHIP-49 score. However, the SF-36 score demonstrated a statistically significant relationship with the OHIP-49 score ($p<0.01$). This variable showed a correlation coefficient of -0.37, indicating that a higher SF-36 score is associated with better OHRQoL, as reflected by a decrease in the OHIP-49 score. The PSS-14, which measures perceived stress, showed a statistically significant relationship with the OHIP-49 ($p<0.01$). This variable presented a Pearson correlation coefficient of 0.21, indicating that lower stress levels are associated with higher quality of life. The CES-D scale demonstrated a statistically significant relationship between the OHIP-49 score and depression ($p<0.01$). This variable presented a positive Pearson correlation of 0.43, meaning that lower CES-D scores (indicating lower levels of depression) are associated with lower OHIP-49 scores (indicating better OHRQoL). Regarding the Rosenberg variable, which assesses perceived self-esteem, a statistically significant relationship was observed with the OHIP-49 score ($p<0.01$). Pearson's correlation of -0.25 indicates that lower scores on the questionnaire (indicating lower self-esteem) are associated with higher OHIP-49 scores (indicating worse quality of life). Use of dental floss, a significant association was observed ($p<0.05$): the average OHIP-49 score was 37.4 for those who do not use dental floss, compared to 28.4 for those who do. Taking medication due to illness was significantly associated with OHRQoL ($p<0.05$): individuals taking medication reported lower OHRQoL. The average OHIP-49 score for those taking medication was 37.2 compared to 28.8 for those not taking medication. Reporting a visit to the dentist for pain was significantly associated with OHRQoL ($p<0.01$). Declaring a history tooth decay during childhood presented a statistically significant relationship with OHRQoL ($p<0.01$). The average OHIP-49 score was 25.3 for those who did not have dental cavities during childhood, compared to 34.4 for those who did.

Table 3 shows the results of the multivariate analysis using linear regression. This analysis incorporated in a model all the variables that were statistically significant in the bivariate analysis. Additionally, using a stepwise method, we included variables that remained statistically significant, except for those variables that are suspected to be theoretically health determinants of OHRQoL. These were retained in the model, even if they were not statistically significant. The SF-36 variable was shown to be statistically significant ($p<0.01$) in its relationship with OHIP-49. The β coefficient for this variable was -0.33, indicating that for each point increase in SF-36, the OHIP-49 score decreases by 0.33 points, thereby improving OHRQoL. The CES-D Depression Scale was also statistically significant ($p<0.01$), with a β coefficient of 0.41. This indicates that as the CES-D score increases, the OHIP-49 score also increa-

ses. In other words, higher scores on the Depression Scale are associated with worse OHRQoL. Reporting having visited the dentist due to pain presented a statistically significant relationship with OHIP-49 ($p<0.01$). The β coefficient of 7.6 indicates that going to the dentist for pain increases the OHIP-49 score by an average of 7.6 points, which is associated with worse OHRQoL. Reporting dental cavities during childhood increases the OHIP-49 score by an average of 7.5 points, indicating a lower OHRQoL ($p<0.01$). Having gone to the dentist during childhood decreases the OHIP-49 score by 6.7 points, which is associated with better OHRQoL ($p=0.02$).

Table 1. Descriptive statistics of the sample (n=394).

Variable	Total	Mean [CI 95%]	SD	Minimum	Maximum
OHIP-49	394	30,9 [28,1-33,7]	30.26	0	174.38
Age	394	15,3 [15,1-15,5]	1.99	12	22
SF-36	390	75,4 [73,9-76,9]	15.45	29.1	100
PSS-14	390	23,3 [22,6-24,1]	7.51	0	44
CES-D	390	30,3 [28,2-32,4]	21.69	1	122
Rosenberg	393	20,6 [20,1-21,0]	4.75	6	30
	N	**%**			
At least one parent completed high school					
No	296	15%			
Yes	60	75%			
Missing	38	10%			
Having a paying job					
No	161	41%			
Yes	211	54%			
Missing	22	6%			
Physical activity					
Less than 5 times per week	151	38%			
More than 5 times per week	109	28%			
Missing	134	34%			
School dropout					
No	308	78%			
Yes	73	19%			
Missing	13	3%			
Use of dental floss					
No	67	17%			
Yes	228	58%			
Missing	99	25%			
Tooth brushing frequency					
More than twice a day	283	72%			
1 or 2 times a day	50	13%			
Less than once a day	44	11%			
Missing	17	4%			

Variable	Total	Mean [CI 95%]	SD	Minimum	Maximum
	N	%			
Eating snacks between meals					
No	37	9%			
Yes	172	44%			
Sometimes	154	39%			
Missing	31	8%			
Medication intake for illness					
No	307	78%			
Yes	67	17%			
Missing	20	5%			
Received instructions on oral health care					
No	39	10%			
Yes	330	84%			
Missing	24	6%			
Visited the dentist for pain					
No	195	49%			
Yes	175	44%			
Missing	24	6%			
Regular visits to the dentist					
No	26	7%			
Yes	357	91%			
Missing	11	3%			
Had cavities during childhood					
No	132	34%			
Yes	229	58%			
Missing	32	8%			
Visited the dentist during childhood					
No	129	33%			
Yes	222	56%			
Missing	43	11%			
Has received treatment for pain					
Extraction	44	11%			
Nerve treatment	33	8%			
Filling	93	24%			
Other	14	3.5%			
No	208	53%			
Missing	2	0.5%			

Table 2. Bivariate statistics between OHIP-49 score and different determinants (n=394).

Variable	Total	Mean	Spearman's cor*	p
Age	394	15,3 [15,1-15,5]	0.06	NS
SF-36	390	75,4 [73,9-76,9]	-0.37	<0,01
PSS-14	390	23,3 [22,6-24,1]	0.21	<0,01
CES-D	390	30,3 [28,2-32,4]	0.43	<0,01
Rosenberg	393	20,6 [20,1-21,0]	-0.25	<0,01
	N	**%**	**Mean of OHRQoL [CI 95%] ****	**p**
At least one parent completed high school				
No	60	17%	31,8 [24,6-38,9]	NS
Yes	296	83%	31,6 [28,4-34,8]	
Having a paying job				
No	161	43%	30,3 [25,6-35,1]	NS
Yes	211	57%	31,8 [28,2-35,5]	
Physical activity				
Less than 5 times per week	151	58%	30,5 [26,4-34,6]	NS
More than 5 times per week	109	42%	32,8 [26,7-39,0]	
School dropout				
No	308	78%	29,7 [26,6-32,8]	NS
Yes	73	19%	35,0 [28,0-42,0]	
Use of dental floss				
No	67	23%	37,4 [30,2 - 44,7]	<0,05
Yes	228	77%	28,4 [25,1 - 31,7]	
Tooth brushing frequency				
More than twice a day	283	75%	30,7 [27,4 - 34,0]	NS
1 or 2 times a day	50	13%	34,9 [26,9 - 42,9]	
Less than once a day	44	12%	30,0 [20,4 - 39,3]	
Eating snacks between meals				
No	37	10%	29,3 [18,0 - 40,6]	
Yes	172	47%	31,9 [27,8 - 36,0]	NS
Sometimes	154	43%	30,0 [25,7 - 34,4]	
Medication intake for illness				
No	307	82%	28,8 [25,7-31,8]	<0,05
Yes	67	18%	37,2 [30,1-44,3]	
Received instructions on oral health care				
No	39	11%	32,2 [23,1-41,2]	NS
Yes	330	89%	30,2 [27,2-33,2]	
Visited the dentist for pain				
No	195	52%	26,5 [22,8-30,2]	<0,01
Yes	175	48%	35,6 [31,3-39,9]	

Variable	Total	Mean	Spearman's cor*	p
	N	%	Mean of OHRQoL [CI 95%] **	p
Regular visits to the dentist				
No	26	6%	34,6 [21,1-48,1]	NS
Yes	357	94%	30,6 [27,8-33,5]	
Had cavities during childhood				
No	132	34%	25,3 [21,0 - 29,6]	<0,01
Yes	229	58%	34,4 [30,5 - 38,3]	
Visited the dentist during childhood				
No	129	36%	33,8 [28,3 - 39,3]	NS
Yes	222	64%	28,8 [25,3 - 32,2]	
Has received treatment for pain				
Extraction	44	23%	35,8 [26,5 - 45,2]	
Nerve treatment	33	18%	33,3 [22,6 - 43,9]	NS
Filling	93	51%	35,1 [29,1 - 41,1]	
Other	14	8%	41,8 [22,0 - 61,7]	

*For quantitative variables, Spearman's correlation test was used.
**For qualitative variables, Student's t-test was used.

Table 3. Multivariable statistics between OHIP-49 score and different determinants

Variables	Linear regression model	
	β [IC95%]	p
Age	0,75 [-0,57 - 2,08]	0.26
PSS-14	-0,20 [-0,59 - 0,20]	0.33
Rosenberg	-0,38 [-1,02 - 0,25]	0.24
SF-36	-0,33 [-0,53 - -0,12]	<0,01
CES-D	0,41 [0,25 - 0,57]	<0,01
Use of dental floss		
No	0	
Yes	-3,1 [-10,2 - 4,1]	0.40
Medication intake for illness		
No	0	
Yes	2,6 [-4,4 - 9,6]	0.46
Visited the dentist for pain		
No	0	
Yes	7,6 [2,1 - 13,1]	<0,01
History of childhood dental decay		
No	0	
Yes	7,5 [1,8 - 13,2]	<0,01
Visited the dentist during childhood		
No	0	
Yes	-6,7 [-12,6 - -0,8]	0.02

Model adjusted for variables that were statistically significant in bivariate statistics and for those that are epidemiologically suspected to be associated.

DISCUSSION

This study showed the primary determinants linked to Oral Health-Related Quality of Life (OHRQoL) among Costa Rican adolescent students. Enhanced general health-related quality of life and early childhood dental attendance were identified as factors improving OHRQoL. Conversely, reporting dental visits due to pain, elevated depression symptomatology, and a history of childhood dental cavities, all contributed to worse OHRQoL scores.

Previous studies have suggested that general health impacts oral health (29). More specifically, a population-based Costa Rican study showed an association between self-rated health and adult tooth loss (13). This is consistent with our findings, which demonstrate a link between the SF-36 questionnaire and the OHIP-49.

Parental education and paid work were not found to be associated with OHRQoL, likely due to the participants' similar socioeconomic backgrounds, as they all come from the same school. Regarding psychosocial variables, the literature indicates that factors such as anxiety, depression, low self-esteem, and psychosocial problems negatively affect oral health, often resulting in pathologies such as bruxism and temporomandibular disorders (12). This aligns with our findings, where higher perceived stress, lower self-esteem, and higher scores of depression symptoms were

associated with worse OHRQoL in bivariate analyses. However, in the fully adjusted model, only depression symptoms remained statistically significant. This may be due to the overlap in dimensions measured by the depression scale, the PSS-14, and the Rosenberg self-esteem scale.

History of caries during childhood showed statistical significance. Studies indicate that caries in childhood can alter function, nutrition, and development, leading to multiple painful episodes and functional nutritional deficiencies, which negatively impact quality of life (30). Having visited the dentist during childhood was also linked to OHRQoL. Care, protection, and education during childhood are considered to contribute to survival, growth, development, and learning, including aspects of health, nutrition, and hygiene, all of which impact quality of life (31). The variables regarding the timely access to oral health services are crucial for determining adolescent's OHRQoL. This is in line with the literature that prove the importance of sensitive periods of development that represent windows of opportunity to enhance and protect health all over the life course (14, 32, 33). In line with this evidence, a Costa Rican retrospective cohort study showed that social determinants early in life are associated with severe tooth loss in middle age (34).

The main limitations of this study include its cross-sectional design and retrospective data collection from childhood. While we found an association between the SF-36 and the OHIP-49, it is important to note that these two questionnaires share common dimensions that may explain the association. A future psychometric analysis could identify the relationships and potential collinearity between these measures. Additionally, several variables were not found to be statistically significant, which may be due to limited variance among the general characteristics of the students. For instance, existing scientific evidence suggests a positive relationship between habitual physical activity and perceived quality of life among adolescents (35). In our study, the average number of participants who engage in sports more than five times a week is similar to those who engage less frequently. This similarity may explain the lack of statistical significance. Additionally, very few participants reported not engaging in sports at all, which also did not show any statistical significance for this category. Similarly, oral health behaviors were not found to be associated in the final model, likely due to minimal variance among individuals. It is important to mention the exclusion of the sex variable, as the study population comprised only males. Notably, differences between men and women in self-perceived and mental health are well-documented (36, 37). Consequently, analyses are typically stratified by sex. The findings of this study cannot be extrapolated to women's perceived health and its impact on OHRQoL. Additionally, other variables such as alcohol and drug used were excluded due to the fact that the study was conducted within a school setting, where there may be reluctance among students to provide answers to these specific questions.

This study boasts several strengths. It encompasses a large sample of adolescents who completed multiple health questionnaires pertaining to both general and oral health. Methodologically, the study incorporated a wide array of variables, enabling extensive adjustments in the models and ensuring the reduction of potential confounding biases. Finally, this is the first study conducted in adolescents in Costa Rica to utilize both general and oral health questionnaires, thereby enabling the observation of relationships between them. The results obtained will pave the way for future research, validating a research protocol aimed at analyzing the relationship between various social aspects and oral as well as general health, and their collective impact on the perception of quality of life.

CONCLUSION

This study suggests that self-reporting depression symptoms, visiting the dentist due to pain, and reporting a history of dental caries during childhood have a negative impact on oral health-related quality of life among male adolescents. Conversely, higher scores of general quality of life and having visited the dentist during childhood serve as protective factors, enhancing oral health-related quality of life. These findings suggest that experiences during childhood may set a standard for adolescence. Lastly, it is crucial to note the significant impact of mental health on oral health perceptions.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUBMISSION DECLARATION AND VERIFICATION

This manuscript has not been published previously, it is not under consideration for publication elsewhere, and the publication is approved by all authors. If accepted, this work it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder.

AUTHOR CONTRIBUTION STATEMENT

Interpretation of data, redaction of first draft, redaction of final draft: L.R.B., Y.R.U. and C.B.S.
Data collection: J.B.B.C., S.S.G. and C.B.S.
Conception, design, acquisition of data, data analysis: C.B.S.

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