

Parental perceptions of impact of oral disorders on Colombian preschoolers' oral health-related quality of life

Shyrley Díaz¹, María Mondol¹, Angélica Peñate¹,
Guillermína Puerta¹, Marcelo Boneckör²,
Saul Martins Paiva³, Jenny Abanto^{2,4}

¹ Universidad de Cartagena, Facultad de Odontología,
Departamento de Odontología Preventiva y Social,
Cartagena, Colombia

² Universidade de São Paulo, Faculdade de Odontologia,
Departamento de Odontopediatria, Sao Paulo, Brasil

³ Universidade Federal de Minas Gerais, Faculdade de Odontologia,
Departamento de Odontopediatria, Minas Gerais, Brasil

⁴ Universidade de Sao Paulo, Faculdade de Saúde Pública,
Departamento de Epidemiologia, Sao Paulo, Brasil.

ABSTRACT

There is no study assessing the impact of dental caries (DC), traumatic dental injuries (TDI) and dental malocclusions (DM) on the oral health-related quality of life (OHRQoL) of preschool children from Spanish-speaking countries in population-based samples. The purpose of this study was to assess the impact of DC, TDI and DM, on Colombian preschool children's OHRQoL through a cross-sectional study. The clinical setting included private and public preschools in Cartagena, Colombia. The sample included 643 preschool children aged 1-5 years and their parents, who answered the Colombian version of the Early Childhood Oral Health Impact Scale (C-ECOHIS) and socioeconomic questionnaire. Three calibrated examiners performed clinical assessment of severity of DC according to decayed, missing and filled primary teeth index, TDI and DM. Poisson regression

associated clinical and socio economic conditions to the outcome. Overall, 48.2% of parents reported children's oral impacts (total C-ECOHIS score ≥ 1). The mean (standard deviation) C-ECOHIS scores were 2.20 (0.15). The multivariate adjusted model showed that children from non-nuclear families (RR=1.51; $p=0.003$), with low and high DC severity (RR=1.51, $p=0.003$; RR=1.53, $p=0.009$) and TDI (RR=1.56, $p=0.003$), were more likely to experience negative impact on total C-ECOHIS scores.

DC and TDI have negative impact on Colombian preschool children's OHRQoL. Children from non-nuclear families have worse OHRQoL at this age, independently of the presence of oral conditions.

Key words: Dental caries; tooth injuries; quality of life; malocclusion; child, preschool.

Percepción de padres del impacto de desórdenes orales de preescolares Colombianos sobre calidad de vida relacionada con la salud oral

RESUMEN

No existen estudios que evalúen el impacto de la caries dental (CD), el trauma dentoalveolar (TDA) y las maloclusiones dentales (MD) sobre la calidad de vida relacionada con la salud bucal (CVRSB) en niños preescolares en muestras de poblaciones de países hispanohablantes. El propósito de este estudio fue evaluar el impacto de CD, TDA y MD sobre la CVRSB en niños colombianos en edad preescolar a través de un estudio transversal. Las evaluaciones clínicas se realizaron en colegios privados y públicos de Cartagena, Colombia, en una muestra de 643 niños en edad de 1-5 años y sus padres quienes respondieron la versión colombiana de la Escala Early Childhood Oral Health Impact Scale (C-ECOHIS) y un cuestionario socioeconómico. Tres examinadores calibrados realizaron la evaluación clínica de la severidad de CD acorde con el Índice ceod para dentición decidua, TDA y MD. La regresión de Poisson asoció las condiciones clínicas y

socioeconómicas al puntaje total del C-ECOHIS y sus dominios. En general, el 48,2% de los padres reportaron impactos orales de los niños (puntuación C-ECOHIS total ≥ 1). La media (DE) del C-ECOHIS fue de 2,20 (0,15). El modelo multivariado ajustado mostró que los niños de familias no nucleares (RR = 1,51; $p = 0,003$), que tienen baja y alta severidad de CD (RR = 1,51, $p = 0,003$; RR = 1,53, $p = 0,009$) y TDA (RR = 1,56, $p = 0,003$) tuvieron mayor probabilidad de experimentar un impacto negativo en las puntuaciones totales de C-ECOHIS.

La CD y la TDA tienen un impacto negativo sobre la CVRSB en niños preescolares colombianos. Los niños de familias no nucleares tienen peor CVRSB a esta edad, independientemente de la presencia de las condiciones orales.

Palabras clave: Caries dental, traumatismos de los dientes, calidad de vida, maloclusión, preescolar.

INTRODUCTION

Oral health-related quality of life (OHRQoL) is important for measuring the impact of oral health disparities and access to care in different populations¹. Children are the main priority of Public Health Dentistry, so urgent efforts should be made to apply the OHRQoL concept to children around the world, considering that their OHRQoL can be influenced by social, cultural and economic factors².

In Colombia, the latest national epidemiological survey for Oral Health indicated that the prevalence of dental caries (DC), traumatic dental injuries (TDI) and dental malocclusions (DM) in children aged 1 to 5 years is 38.3%, 34.5% and 15.8%, respectively³. At present, there is concrete evidence of the negative impact of DC on preschool children's OHRQoL⁴⁻⁸, while the evidence for TDI and DM at this age remains controversial⁹⁻¹⁴. However, as far as we know, all the studies available in the literature are on non-Hispanic children.

The ECOHIS is the most frequently used instrument in the literature to assess OHRQoL in preschool children. Recently, the Latin American Spanish version of the ECOHIS has been cross-culturally adapted and validated to evaluate parents' perceptions of their preschool children's OHRQoL¹⁵. Nevertheless, to the best of our knowledge, it has not been tested among preschoolers in Spanish-speaking countries to assess the impact of oral diseases and disorders on preschool children's OHRQoL. The first use of the Latin American Spanish version of the ECOHIS would enable OHRQoL comparisons with other cultural and ethnic groups for which the ECOHIS has been adapted and validated, as well as being an outcome measure for evaluating service initiatives and oral health promotion programs in different countries.

The aim of this study was to evaluate the impact of DC, TDI and DM on the OHRQoL of Colombian preschool children and their parents in a population-based sample.

MATERIALS AND METHODS

This study was approved by the Research Ethics Committee of the Public Health School of the University of Cartagena in compliance with Colombian National Health Council Resolution 8430/1993, and abided by the Helsinki Convention. Parents signed informed consent forms allowing their children to participate in the study.

Sampling

A preschool-based cross-sectional study was performed in 2015 on children aged 1 to 5 years enrolled at private and public preschools in Cartagena, Colombia. The city of Cartagena has an estimated population of 1,001,755 inhabitants, including 116,293 preschool children.¹⁶

A 2-stage random sampling method was adopted to select the sample. The first stage units were all the public and private preschools in the city. A total of six schools, three public and three private, were randomly selected with a chance proportional to the number of enrolled children and considering their strategic distribution among the city districts. Since the preschools were of different sizes, an equal probability selection method (probability proportional to size) was used to ensure that all children would have the same probability of being selected¹⁷. The second stage units were the 1-to 5-year-old children enrolled in each selected preschool.

Sample size was calculated based on a 5% margin of error, 95% confidence interval and 1.4 correction factor for design effect. As there was no data on the prevalence of oral impacts on the OHRQoL of Colombian preschool children, a prevalence of 50% was used to obtain the largest possible sample and increase the power of the study. The minimum sample was determined to be 538 under five-year-old preschool children, to which 20% was added to compensate for possible dropouts, totaling 641 children. Children of both sexes and with parents/caregivers who were fluent in Spanish language and who agreed to participate in the study were included. Children undergoing dental treatment in the past 3 months or with systemic and/or neurological diseases were excluded.

Data collection

One of the parents, preferably the one who spent most time with the child, was invited to answer two structured questionnaires in face-to-face interviews at schools: one on socioeconomic conditions and another on the child's OHRQoL. Interviews were conducted by two dental assistants who were blinded to the children's oral examinations. They were trained in the reading and intonation of each question and answer options to the OHRQoL instrument, and in the use of modalizers.

Socioeconomic conditions such as parental age, number of siblings, and family income were collected

as discrete quantitative variables, whereas parental level of education and family structure were collected as ordinal and nominal qualitative variables, respectively. All these variables were then categorized for statistical analyses as follows: child's age [1-2 years old and 3-5 years old]; child's sex [female, male]; type of school [public, private]; age of parents [≤ 44 years old, > 44 years old]; number of siblings [≤ 2 children, > 2 children]; parental education [< 10 years, ≥ 10 years]; family income [as measured in terms of the Colombia minimum wage-CMW, a standard for this type of assessment, which corresponds to approximately US\$ 255.4 per month and was divided into ≤ 01 CMW, ≥ 02 CMW]; household crowding [≤ 02 members per room, >02 members per room] and family structure [Nuclear family, Non-nuclear family (living with single parents or others)].

OHRQoL instrument

The Latin American Spanish version of the Early Childhood Oral Health Impact Scale (ECOHIS) assesses preschool children's OHRQoL according to parents' proxyreports¹⁵. It contains 13 items corresponding to four domains for items included in the child impact section: symptoms - 01 item; function - 04 items; psychological - 02 items; self-image / social interaction - 02 items; and two domains for the family impact section: parent distress - 02 items and family function - 02 items. The responses to each item are coded as follows: 0 = never; 1 = almost never; 2 = sometimes; 3 = often; 4 = very often; 5 = don't know. Total scores are calculated as the sum of the response codes. The answers "do not know" are counted, but excluded from the total ECOHIS score for each patient. A high score means a high degree of negative oral impacts on the child's OHRQoL.

In this study, the Latin American Spanish version of the ECOHIS¹⁵ was adapted to the Colombian context. The Latin American Spanish version of the ECOHIS was pilot-tested on a convenience sample of 30 parents of children aged 1-5 years. These parents did not take part in the final sample. Parents suggested the substitution of some words or expressions by synonyms to facilitate de comprehension of the questionnaire; modifications were made according the parents' comments. Only one expression related to question 7, "has your child been annoyed or bad tempered?" was adapted to "has your child expressed frustration of been sad?".

A Revision Panel consisting of three postgraduate professors in Pediatric Dentistry and Family Health Care, all fluent in Spanish, who knew the objectives of the study and had experience in OHRQoL studies, reviewed the results and in consensus developed the Colombian version of the ECOHIS (C-ECOHIS), which was the instrument used in this study.

Children's oral examination

Four previously calibrated dental examiners independently carried out the children's oral examination. The examiners were all graduate dentists with experience in previous epidemiological surveys. All examiners underwent two 6-h sessions of training exercises with pictures of clinical cases for the study clinical conditions. The calibration process was established with an interval of 1 week between oral clinical sessions to obtain intra- and inter-examiner reliability Kappa values using all examiners' assessments of 20 children who received dental treatment at Dental School of Cartagena University. These children did not form part of the study sample. Intra- and inter-examiner Kappa values were calculated for all clinical conditions.

DC was assessed according to the World Health Organization criteria¹⁷ and calculated in terms of decayed, indicated for extraction owing to caries and filled primary teeth (dmft). The dmft was categorized according to the severity of DC, based on the previously proposed scores^{4,18}: dmft 0 = caries free; dmft 1-5 = low severity; and dmft > 6 = high severity. The children were then classified by dental caries experience according to the Knutson index¹⁹.

TDI was performed using the criteria proposed by Andreasen et al.²⁰, which is based on the system adopted by the WHO. It includes injuries to hard dental tissues and pulp; injuries to hard dental tissues, pulp and alveolar process; and injuries to periodontal tissues. The TDI data were then analyzed according to the presence of at least one kind of trauma or the absence (tooth present and sound) of TDI in the upper and lower arches.

DM were diagnosed according to published clinical criteria: anterior open bite - lack of a vertical overlap of the incisors in the occlusal position^{4,11,21,22}; anterior cross bite - when the lower incisors were observed in front of the upper ones^{4,23,24} posterior cross bite - when the upper primary molars

occluded in lingual relationship to the lower primary molars in centric occlusion^{4,10,21,23}, and increased overjet – horizontal distance between the incisal edges of upper and lower central incisors >3 mm^{4,10,24}. The presence of at least one of these malocclusions classified the child as having malocclusions.

Table 1: Sociodemographic features of the sample (n = 643).

Variables	n (%)
Child's age	
Infant (1 – 2 years old)	157 (24.2)
Preschool (3 – 5 years old)	486 (75.6)
Child's sex	
Female	310 (48.2)
Male	333 (51.8)
Type of School	
Public	326 (50.7)
Private	317 (49.3)
Age of parents	
≤ 44 years old	632 (98.3)
> 44 years old	11 (1.7)
Number of siblings	
≤ 2 children	509 (79.3)
> 2 children	134 (20.8)
Parental education level	
< 10 years	121 (18.8)
≥ 10 years	522 (81.2)
Mother's education level	
< 10 years	93 (14.5)
≥ 10 years	550 (85.5)
Family income	
≤ 01 CMW	277 (43.1)
≥ 02 CMW	366 (56.9)
Household crowding	
≤ 2 members per room	476 (74.0)
> 2 members per room	167 (26.0)
Family structure	
Nuclear family	476 (64.8)
Non-Nuclear family	167 (26.0)
Dental caries experience	
Absence (dmft = 0)	446 (69.4)
Presence (dmft ≥ 1)	197 (30.6)
Dental caries severity	
Caries free: dmft = 0	446(69.4)
Low severity: dmft 1-5	160(24.9)
High severity; dmft < 6	37(5.7)
Traumatic dental injuries	
Absence	573 (86.0)
Presence	90 (14.0)
Dental malocclusion	
Absence	492 (76.5)
Presence	151 (23.5)

Data analysis

Data were analyzed using STATA 9.0 (Stata Corp. College Station, TX, USA). Descriptive analyses assessed measures of central tendency (mean, standard deviation and observed range) of the total and individual domains of the C-ECOHIS scores. Poisson regression with robust variance was performed to associate domains and total scores of the C-ECOHIS to oral clinical conditions (DC, TDI and DM) and socioeconomic conditions. Univariate Poisson regression analysis was performed to select variables with a p-value ≤ 0.20 to enter the model. Then the explanatory variables selected were tested in the multivariate adjusted model and retained only when p ≤ 0.05. In these analyses, the outcome was employed as a count outcome, and rate ratios (RR) and 95% confidence intervals (95% CI) were calculated.

RESULTS

Internal consistency of the C-ECOHIS was analyzed using Cronbach's alpha coefficient, and was 0.87 for total C-ECOHIS scores in the pilot test phase and 0.90 for total C-ECOHIS scores in the final sample size of the study, showing the stability of the instrument.

As a result of the calibration process, inter-examiner reliability values for Cohen's Kappa agreement were 0.86 for DC, 0.90 for TDI and 0.91 for DM. Intra-examiner agreement kappa values were 0.87, 0.86 and 0.90 for DC, TDI and DM, respectively.

Altogether, 664 parents were invited to participate in the study, of whom 9 were excluded because they did not meet the study criteria. Of the 655 eligible participants, 643 provided signed parental informed consent to participate in the study (positive response rate = 98.2%).

Table 1 shows the socioeconomic and clinical conditions of the sample. It was observed that 197 children had dental caries experience (30.6%), whereas TDI and DM were present in 14% and 23.5% of the sample, respectively. All questionnaires were fully completed without omitting any answers. Most surveys were answered by children's mothers (84.1%).

Overall, 48.2% of parents reported children's oral impacts (total C-ECOHIS scores ≥ 1). The highest impact scores reported were 25 on the child impact section and 16 on the family impact section.

Table 2 shows the mean, standard deviation, and the range observed for the total C-ECOHIS scores and individual domains. The most strongly affected domains were the function domain and the parent distress domain in the child section and family section, respectively.

Table 3 shows the univariate unadjusted analysis of socioeconomic and clinical variables associated with total and individual domains of the C-ECOHIS. There was significant association between some independent variables, total scores, and individual domains ($P < 0.05$). In general, total C-ECOHIS scores was associated with child's age, type of school, mother's education, family structure, DC experience and its severity, and TDI.

The multivariate adjusted model (Table 4) showed that children from non-nuclear families, those with low and high DC severity and with presence of TDI were more likely to experience a negative impact on total C-ECOHIS scores (RR = 1.51, $p = 0.003$; RR = 1.53, $p = 0.009$; RR = 3.38, $p < 0.0001$; RR = 1.56; $p = 0.003$, respectively). Children from non-nuclear families, with low and high DC severity and TDI showed a negative impact on the oral symptoms domain (RR = 1.40, $p = 0.034$; RR = 1.46, $p = 0.04$; RR = 3.26, $p < 0.0001$ and RR = 1.60, $p = 0.012$, respectively). For the functional limitations domain, 3- and 5-year-old children, with mother's education ≥ 10 years, from non-nuclear families and those with high DC severity and TDI showed a negative impact (RR = 1.92, $p = 0.002$; RR = 1.72, $p = 0.002$; RR = 1.38, $p = 0.03$; RR = 1.69, $p = 0.001$; RR = 2.89, $p < 0.0001$; RR = 1.95, $p < 0.0001$, respectively). Children from non-nuclear families, with low and high DC severity were associated with negative impact on the psychological domain (RR = 1.76, $p = 0.036$; RR = 1.48, $p = 0.021$; RR = 3.22, $p = 0.003$, respectively). The negative impact on the self-image social interaction domain was associated with children from non-nuclear families (RR = 2.54, $p = 0.01$), low and high DC severity ($p < 0.05$). The low and high DC severity, and presence of TDI showed negative impact on the parent distress domain (RR = 1.75, $p = 0.002$; RR = 2.85, $p < 0.0001$; RR = 1.57, $p = 0.017$, respectively). For the family function domain, 3- and 5-year-old children and with DC experience showed negative impact on the family function domain (RR = 2.53, $p = 0.038$; RR = 2.09, $p = 0.009$, respectively).

Table 2: Mean, standard deviation, possible range and range observed overall and for each C-ECOHIS domain score (n = 643).

C-ECOHIS (variances)	Means(SD)	Range Observed
Oral symptoms (0-4)	0.37 (0.03)	0-4
Functional limitations (0-16)	0.65 (0.05)	0-9
Psychological (0-8)	0.21 (0.02)	0-7
Self-image and social interaction(0-8)	0.12 (0.2)	0-8
Parent distress (0-8)	0.63 (0.05)	0-8
Family function(0-8)	0.19 (0.02)	0-8
Total Score	2.2(0.15)	0-33

DISCUSSION

This is the first study to assess parents' perceptions of the impact of DC, TDI and DM on the OHRQoL of Colombian preschool children using the C-ECOHIS in a population-based sample of 1-to 5-year-old children. The C-ECOHIS showed semantic equivalence and excellent internal consistency for this study.

Our adjusted results show that in general, low and high DC severities were associated with negative impact on total C-ECOHIS scores and most of the C-ECOHIS domains, while DC prevalence was only associated with the family function domain. This may be explained by the similarity of the two variables, which confound the associations in the analysis. Moreover, DC severity appears to be a more sensitive measure because the effect of the disease on children's OHRQoL can be observed in detail. Our results are also in accordance with previous studies assessing the impact of DC on preschool children's OHRQoL using other ECOHIS versions^{4,5,7-9,25}. However, although there is conclusive evidence of the impact of DC on preschool children's OHRQoL, never before had this association been confirmed in Spanish-speaking preschoolers. This suggests that oral health perceptions concerning DC are not influenced by ethnic and cultural issues.

TDI showed negative impact on preschool children's OHRQoL, but only on the oral symptoms domain, functional limitations domain, parent distress domain and total C-ECOHIS scores. Most studies in the literature¹¹⁻¹³ found no association between the presence of TDI and preschool children's OHRQoL in total ECOHIS scores. Conversely, and

Table 3: Univariate analysis of sociodemographic variables and clinical conditions associated with total ECOHIS score and total scores for domains.

	Oral Symptoms Domain		Functional Limitations Domain		Psychological Domain		Self-Image And Social Interaction Domain		Parent Distress Domain		Family Function Domain		Total Ecohis Score	
	RR (95% IC)	P	RR (95% IC)	P	RR (95% IC)	P	RR (95% IC)	P	RR (95% IC)	P	RR (95% IC)	P	RR (95% IC)	P
Child age														
Infant (1 - 2 years old)														
Preschool (3 - 5 years old)	1.29 (0.84–1.97)	0.235	1.07 (1.19–2.93)	0.006	0.96 (0.53-1.74)	0.917	1.77 (0.67-4.69)	0.247	1.11 (0.74-1.65)	0.597	3.12 (1.26-7.70)	0.013	1.42 (1.00-2.04)	0.049
Type of school														
Private														
Public	1.33 (0.97–1.83)	0.071	1.58 (1.15–2.18)	0.005	2.05 (1.22-3.44)	0.006	1.94 (0.90-4.20)	0.091	0.93 (0.67-1.28)	0.661	1.42 (0.78-2.55)	0.242	1.34 (1.025-7.7)	0.032
Number of siblings														
≤ 2 children														
> 2 children	1.29 (0.88–1.88)	0.178	1.39 (0.96–2.00)	0.074	1.62 (0.88-2.98)	0.012	1.13 (0.51-2.53)	0.749*	1.02 (0.70-1.49)	0.893	0.74 (0.33-1.63)	0.464	1.20 (0.85-1.70)	0.279
Father's education														
< 10 years	0.99 (0.64 – 1.53)	0.984	1.43 (0.99–2.07)	0.055	1.27 (0.63-2.58)	0.495	1.48 (0.69-3.18)	0.307	1.04 (0.70–1.56)	0.816	1.56 (0.79-3.04)	0.193	1.23 (0.86-1.76)	0.237
≥ 10 years														
Mother's education														
< 10 years	1.21 (0.77 – 1.90)	0.387	1.86 (1.29-2.69)	0.001	2.12(1.10-4.10)	0.025	1.90 (0.86-4.17)	0.108	1.01 (0.63–1.62)	0.945	1.89 (0.94-3.76)	0.070	1.51 (1.03-2.22)	0.033
≥ 10 years														
Family income														
≤ One CSW	0.96 (0.69 – 1.32)	0.804	1.24 (0.90-1.70)	0.183	1.43 (0.85-2.42)	0.170	0.96 (0.46-2.00)	0.932	0.84 (0.61-1.16)	0.286	1.09 (0.61-1.93)	0.755	1.05 (0.79-1.38)	0.715
≥ Two CSW														
Household crowding														
≤ 2 members														
> 2 members	1.32 (0.93–1.87)	0.119	1.56 (1.11-2.18)	0.009	1.84 (1.07-3.17)	0.027	1.50 (0.70-3.24)	0.292	1.18 (0.83–1.67)	0.342	0.87 (0.44-1.70)	0.691	1.35 (0.99-1.84)	0.051
Family structure														
Nuclear family														
Non-nuclear family	1.43 (1.04–1.97)	0.027	1.78 (1.30-2.44)	<0.001	1.84 (1.09-3.09)	0.021	2.79 (1.36-5.74)	0.005	1.26 (0.90–1.75)	0.169	1.34 (0.76-2.38)	0.308	1.56 (1.18-2.06)	0.002
Dental caries experience														
Absence														
Presence	1.81 (1.32–2.50)	<0.0001	1.62 (1.16-2.26)	0.004	1.94 (1.14-3.30)	0.014	3.80 (1.82-7.95)	<0.001	1.94 (1.40–2.68)	<0.001	2.69 (1.53-4.72)	0.001	1.03 (1.00-1.06)	0.011
Dental caries severity														
Caries free: dmft 0														
Low severity: dmft 1-5	1.52 (1.05-2.18)	0.024	1.19 (0.81-1.73)	0.356	1.57 (0.86-2.87)	0.137	2.78 (1.30-5.94)	0.008	1.76 (1.23-2.53)	0.002	2.41 (1.28-4.52)	0.006	1.61 (1.17-2.21)	0.003
High severity: dmft > 6	3.28 (2.13-5.06)	<0.001	3.67 (2.35-5.71)	<0.001	3.33 (1.50-7.39)	0.003	7.23 (2.37-22.0)	<0.001	2.80 (1.76-4.45)	<0.001	3.21 (1.42-7.25)	0.005	3.42 (2.28-5.14)	<0.001
Traumatic dental injuries														
Absence														
Presence	1.53 (1.03– 2.28)	0.035	1.67 (1.12-2.49)	0.012	0.90 (0.39-2.09)	0.818	2.11 (0.79-5.64)	0.133	1.56 (1.06–2.30)	0.024	1.00 (0.50-1.98)	0.987	1.49 (1.05-2.10)	0.022
Dental malocclusion														
Absence														
Presence	0.92 (0.65– 1.31)	0.656	1.08 (0.74-1.56)	0.672	0.96 (0.56-1.66)	0.899	0.59 (0.26-1.31)	0.198	0.21 (0.86-1.71)	0.269	1.59 (0.84-3.00)	0.152	1.09 (0.81-1.45)	0.555

in line with our results, only one study⁹ found a negative impact of the presence of TDI on total scores. Moreover, few studies^{12,13} have assessed the impact of the presence of TDI on the ECOHIS domains using regression analysis, but no association was found. Notwithstanding, one of these studies also used a classification for severity of TDI¹³, showing that complicated TDI has negative impact on the oral symptoms and self-image/social

interaction domains. Our results corroborate the findings for the symptoms domain, however, we also found associations for other domains of the C-ECOHis. Discrepancies between our results and previous studies can be explained by the use of different clinical criteria and analysis for TDI. Nevertheless, although some types of TDI can be expected to have negative effects on symptoms and to cause functional limitations and parental

Table 4: Multivariate analysis of sociodemographic variables and clinical conditions associated with total scores for domains and ECOHIS.

	Oral Symptoms Domain		Functional Limitations Domain		Psychological Domain		Self-Image And Social Interaction Domain		Parent Distress Domain		Family Function Domain		Total Ecohis Score	
	RR (95% IC)	P	RR (95% IC)	P	RR (95% IC)	P	RR (95% IC)	P	RR (95% IC)	P	RR (95% IC)	P	RR (95% IC)	P
Child age														
Infant (1 - 2 years old)														
Preschool (3 - 5 years old)	†		1.92(1.26-2.93)	0.002	†		†		†		2.53 (1.05-6.17)	0.038	†	
Mother's education														
< 10 years	†		1.72 (1.21-2.44)	0.002	†		†		†		†		†	
≥ 10 years														
Household crowding														
≤ 2 members														
> 2 members	†		1.38(1.03-1.86)	0.03	†		†		†		†		†	
Family structure														
Nuclear family														
Non-nuclear family	1.40 (1.02-1.91)	0.034	1.69 (1.25-2.29)	0.001	1.76 (1.03-3.01)	0.036	2.54 (1.23-5.26)	0.001	†		†		1.51(1.15-1.99)	0.003
Dental caries experience														
Absence														
Presence	†		†		†		†		†		2.09(1.20-3.6)	0.009	†	
Dental caries severity														
Caries free: dmft 0														
Low severity: dmft 1-5	1.46(1.01-2.10)	0.040	0.94(0.66-1.34)	0.75	1.48(0.79-2.76)	0.21	2.52 (1.15-5.51)	0.021	1.75 (1.23-2.51)	0.002	1.09(0.62-1.91)	0.74	1.53(1.11-2.13)	0.009
High severity: dmft ≥6	3.26(2.16-4.92)	<0.0001	2.89 (1.93-4.34)	<0.0001	3.22(1.47-7.02)	0.003	6.84 (2.36-19.81)	<0.0001	2.85 (1.80-4.51)	<0.0001	1.34(0.54-3.34)	0.52	3.38(2.35-4.86)	<0.0001
Traumatic dental injuries														
Absence														
Presence	1.60 (1.10-2.31)	0.012	1.95 (1.40-2.71)	<0.0001	†		†		1.57 (1.08-2.30)	0.017	†		1.56(1.16-2.11)	0.003

†Variables not associated with the respective domains in the final multivariate model after the adjustment.

distress, our study did not assess whether this was true. Overall, the association between TDI and preschoolers' OHRQoL is still controversial. The negative impact of TDI on preschoolers seems to be more frequently reported in Spanish-speaking preschoolers, since presence of TDI affected not only total C-ECOHIS scores, but also most of its domains. DM did not show a negative impact on the OHRQoL of preschool children and their parents. Our results are in line with a recent systematic review¹⁴ that did not find any type of association between malocclusions and impact on preschool children's OHRQoL according to the ECOHIS. At this age, children probably do not perceive this impact, which is often related to non-nutritive sucking habits. In addition, parents may attribute greater importance to oral symptoms than to any occlusal and aesthetic changes caused by the bad position of primary teeth¹³ which will be replaced by permanent teeth in the future. Thus, the effect of malocclusions on OHRQoL is modified by the age

of the children and their cultural environment¹⁴. Our study indicates that perceptions concerning the impact of DM on preschool children's OHRQoL is similar around the world when assessed by proxy reports. However, as this is the first study using the C-ECOHIS on Spanish-speaking preschoolers, further studies in other Spanish populations would be required to confirm our results.

A systematic review² that assessed the influence of parental socioeconomic status and home environment on children's OHRQoL suggested that children from families with high income, parental education and family economy had better OHRQoL. In addition, family structure, among other factors, was a significant predictor of children's OHRQoL². In accordance with the systematic review, we have also found significant associations between C-ECOHIS scores, its domains and some socioeconomic and home environment conditions such as family structure, child's age and mother's education. Our study found that the variable most strongly associated with worse

preschool children's OHRQoL was family structure. Children from non-nuclear families were more likely to experience negative impact not only on total C-ECOHIS scores, but also on all the domains related to the child impact section. In this regard, living in a non-nuclear family predisposes preschool children to higher prevalence of DC²⁶, reflecting a situation of unstable economic circumstances and less ability to access health services and preventive tools, which could lead to higher oral impacts. Thus, mothers and children in non-nuclear families require substantially more attention and support than those from nuclear families to eliminate their disadvantage in developing oral diseases.²⁶

This study is the first to test the C-ECOHIS in Spanish-speaking preschoolers and indicates the need for public policies providing comprehensive

oral care to children at this age and redirecting efforts for prevention for DC and TDI in order to improve OHRQoL. In addition, the first use of the C-ECOHIS has important implications for research and practice. In this regard, the first use of the C-ECOHIS in a Spanish-speaking country enables comparisons with other cultural and ethnic groups around the world, as well as providing support for public oral health programs and dental care services for this age group.

CONCLUSIONS

Dental caries and traumatic dental injuries have negative impact on Colombian preschool children's OHRQoL according to proxy reports, whereas malocclusions do not. In general, children from non-nuclear families have worse OHRQoL at this age, independently of the presence of oral conditions.

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CORRESPONDENCE

Dra. Shyrley Díaz Cárdenas,
Facultad de Odontología, Universidad de Cartagena
Departamento de Odontología Preventiva y Social,
Campus de la Salud,
Zaragocilla, Cartagena, Colombia
sdiazc@unicartagena.edu.co

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