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Conclusion The severity of early childhood caries has a negative impact on the oral health-related quality of life of preschool children and their parents.

Keywords Dental caries, Early Childhood Oral Health Impact Scale, Negative binomial regression analysis, Quality of life, Socioeconomic factors.

Impact of Early Childhood Caries on oral health-related quality of life of preschool children

ABSTRACT

Aim Child oral health-related quality of life (COHRQoL) has been assessed in developed areas; however, it remains unstudied in mainland China. Studies on COHRQoL would benefit a large number of children in China suffering from oral health problems such as dental caries. This study explored the relationship between COHRQoL and early childhood caries, adjusted by socioeconomic factors, in 3- to 4-year-old children in a region of southern China.

Materials and methods In this study, 1062 children aged 3-4 years were recruited by cluster sampling and their oral health statuses were examined by a trained dentist. The Chinese version of the Early Childhood Oral Health Impact Scale (ECOHis) and questions about the children's socioeconomic conditions were completed by the children's parents. A negative binomial regression analysis was used to assess the prevalence of early childhood caries among the children and its influence on COHRQoL.

Results The total ECOHis scores of the returned scale sets ranged from 0 to 31, and their average scores was 3.1 ± 5.1 . The negative binomial analysis showed that the dmfs indices were significantly associated with the ECOHis score and subscale scores ($P < 0.05$). The multivariate adjusted model showed that a higher dmft index was associated with greater negative impact on COHRQoL (RR = 1.10; 95% CI = 1.07, 1.13; $P < 0.05$). However, demographic and socioeconomic factors were not associated with COHRQoL ($P > 0.05$).

Introduction

Oral health is defined as the standard of oral and related tissue health that enables individuals to eat, speak and socialise without active disease, discomfort or embarrassment, and it contributes to the general well-being [UK Department of Health, 1994]. Traditional methods for assessing oral health mainly use clinical dental indices and focus on the absence or presence of oral diseases without information about the oral well-being of people. For this reason, quality of life has been used to evaluate both the physical and psychosocial impact of oral health. Some children and adolescents reported pain as well as associated emotional distress and disability [Malleon et al., 2001; Eccleston and Malleon, 2003]. Palermo [2000] examined the impact of chronic pain on child and family functioning and found the influences of chronic pain on sleeping, poor relationships and physical activities.

Assessments of oral health-related quality of life (OHRQoL) among adults have been a long-standing area of research and have proven valuable in assessing oral health needs and evaluating the outcomes of oral health care initiatives. Children's OHRQoL including its social, psychological and functional aspects, has drawn more and more attention [Tapsoba et al., 2000; Eiser and Morse, 2001]. This assessment of how children's oral health status affects their OHRQoL is complex, and measurements of this assessment have only recently been developed. The Early Childhood Oral Health Impact Scale (ECOHis) was developed to evaluate the impact of oral diseases and disorders on the quality of life of preschool children and their families in the United States [Pahel et al., 2007]. The ECOHis has been shown to be valid and reliable when applied to children in Hong Kong [Lee et al., 2009], France [Li et al., 2008], Iran [Jabarifar et al., 2010] and Brazil [Scarpelli et al., 2011].

Early childhood caries (ECC) are defined as "the presence of one or more decayed (non-cavitated or cavitated lesions), missing teeth (due to caries), or filled tooth surfaces in any primary tooth in a child aged 72 months or younger [Drury et al., 1999]. ECC are important factors affecting the quality of life of young children. Dental caries remains one of the most

common chronic diseases worldwide. The short-term consequences of ECC are pain, systemic infection and abscesses. However, the consequences of ECC are not only limited to dental health. Several studies have shown that ECC may delay children's physical development, including height and weight gains, may cause loss of school days and increase days with restricted activities, and may diminish children's ability to learn [Chu et al., 2012; Kramer et al., 2013]. ECC is a severe oral health problem. More than 60% of children suffered from ECC in mainland China and only less than 5% of these children received treatments [Qi, 2008]. Although the impact of ECC on children has been evaluated in Hong Kong [Lee et al., 2009], a special administrative region of China, similar data are lacking in mainland China. The differences in economic levels between Hong Kong and mainland China make it difficult to infer the oral health-related quality of life of mainland children based on data from Hong Kong despite the fact that Hong Kong is geographically close to southern China. Studies in this area would contribute to a better understanding of children's OHRQoL and the rational allocation of insufficient dental resources in southern China.

The objective of this study was to describe the prevalence of ECC among the children in southern China and its influence on COHRQoL. The primary hypothesis to be tested was that ECC was associated with poorer perceptions of COHRQoL.

Methods

Study sample

A cross-sectional study was conducted with 3- to 4-year-old children and their parents in Conghua of Guangzhou city, located in southern China. Conghua is in the middle of Guangdong Province, and Cantonese (a Southern Chinese dialect) is the language spoken there. Conghua is a moderately developed region in China with a per capita GDP of CNY 32,400 in 2011. The study was approved by the Ethics Committee of Guanghua School of Stomatology, Sun Yat-sen University prior to the investigation.

The sample size was calculated using an estimated prevalence of 66% according to the third national epidemiological investigation of oral health in China [Qi, 2008], a design effect of 2, and a precision of 0.10. The minimum sample size to satisfy these requirements was estimated to be 792 children. A randomised cluster sampling was used and five kindergartens were selected from a total of 26 kindergartens listed in the area by simple randomisation using a computer-generated numbers. All children in the five kindergartens who met the inclusion criteria were recruited for the study. Approximately 200 children in each kindergarten were included in the study.

The inclusion criteria were 3- to 4-year-old children

living in Conghua for more than 6 months, with no serious medical conditions and no malfunction, malocclusion, hypodontia or dental trauma.

A consent form was signed by the parents before the survey and only children with consent forms were recruited in the study.

Questionnaires and data collection

Parents of the children were asked to complete a questionnaire including the Chinese version of ECOHIS [Lee et al., 2009] and questions about the children's demographic characteristics and socioeconomic status.

ECOHIS is originally an English measurement developed to assess preschool children's OHRQoL in epidemiological surveys. The Chinese version of ECOHIS was previously translated and validated in Hong Kong [Lee et al., 2009]. Because Cantonese is the spoken language in southern China and Hong Kong, there was no dialectal barrier in using the same Chinese version that was used in Hong Kong. ECOHIS has 13 items and two parts: the child impact section and the family impact section. The child impact section contains four domains: child symptoms, child function, child psychology and social interaction. In the family impact section, there are two domains: parental distress and family function. Responses for ECOHIS were coded: 0 = never; 1 = hardly ever; 2 = occasionally; 3 = often; 4 = very often; 5 = don't know. ECOHIS scores were calculated as a sum of the response codes for the child and family sections, after recoding all "don't know" responses as missing. Subjects with any missing responses to one or more items were excluded from the analysis [Lee et al., 2009]. The scores of the child and family impact sections range from 0 to 36 and 0 to 16 respectively, and the total score ranges from 0 to 52. A higher ECOHIS score indicates greater oral health impact (more oral health problems) and poorer OHRQoL.

The questionnaire provided information on the age and gender of the child, the parents' relationship with the child, and the education level and employment status of the parents. Education level was divided into three levels: junior high school or below, senior high school and college or above. Parents' occupational status was divided into unemployed, employee/non-professional and employer/professional.

Clinical assessment

The children who participated in the study received clinical examinations by a trained examiner (MYL), who had been trained and calibrated by an oral epidemiologist using standards recommended by the WHO [WHO, 1997].

The children were examined in the kindergartens with an intraoral LED light source, dental mirrors and CPI probes. The dental examination followed the 4th Edition of the Oral Health Survey's Basic Methods

recommended by the WHO (WHO, 1997] and the dmfs of the children was recorded. Ten percent of the subjects were re-examined to monitor intra-examiner reproducibility and the Kappa value was calculated.

Statistical analysis

Statistical analysis was conducted with SPSS 17.0 (SPSS Inc., Chicago, IL, USA). Unadjusted analysis (negative binomial regression analysis) was used to assess the association between children’s demographic characteristics, socioeconomic status, dmfs and ECOHIS scores. Multivariate analysis was used to assess overall and domain-specific ECOHIS score covariates. Variables with P value less than 0.25 in unadjusted analyses

were included in multiple negative binomial regression analysis. The level of significance was set at 0.05.

Reliability and validity

Internal consistency reliability was assessed on the full sample using Cronbach’s alpha, and principal components factor analyses were performed using varimax rotation to assess construct validity.

Results

In the study, 1176 children met the inclusion criteria and 1062 children completed the clinical examination and the questionnaire. Of the participants, 56.9% were boys and 43.1% were girls. Intra-examiner reproducibility (Kappa value) of the dmfs examination was 0.97, indicating good intra-examiner reproducibility. The prevalence of ECC was 47.6%, with a mean dmft index of 1.9 and a mean dmfs index of 2.9 (Table 1). The ft (filled tooth) number made up only 7.8% of the dft (decayed-filled tooth) index. The distribution of the ECOHIS responses is shown in Table 2. Overall and domain-specific ECOHIS scores are shown in Table 3. The total ECOHIS scores ranged from 0 to 31 with a mean of 3.1 (SD = 5.1). The highest score was 0.9 in the child function domain and the lowest score was 0.2 in the child social interaction domain. Furthermore,

	Minimun	Maximun	Mean	SD
dmft	0	19	1.93	2.96
dmfs	0	66	2.89	5.87
dt	0	19	1.84	2.87
mt	0	1	0.01	0.08
ft	0	7	0.09	0.53
ds	0	66	2.72	5.61
fs	0	22	0.15	1.11

TABLE 1 Dental caries prevalence of the children.

	Never/hardly ever	Occasionally	Often/very often	Mean(SD)
Child impact				
Have you had pain in the teeth, mouth or jaws	879(82.77)	170(16.01)	13(1.22)	0.515(0.809)
How often has your child ___ because of dental problems or dental treatments?				
Had difficulty in drinking hot or cold beverages	1007(94.82)	55(5.18)	0(0.00)	0.226(0.528)
Had difficulty eating some foods	959(90.30)	88(8.29)	15(1.41)	0.332(0.692)
Had difficulty pronouncing any words	1007(94.82)	46(4.33)	9(0.85)	0.211(0.557)
Missed preschool, daycare or school	1038(97.74)	24(2.26)	0(0.00)	0.114(0.382)
Had trouble sleeping	1019(95.95)	43(4.05)	0(0.00)	0.169(0.470)
Been irritable or frustrated	1007(94.82)	52(4.90)	3(0.28)	0.211(0.531)
Avoid smiling or laughing	1036(97.55)	24(2.26)	2(0.19)	0.133(0.414)
Avoided talking	1048(98.68)	13(1.22)	1(0.09)	0.104(0.351)
Family impact				
How often has you or another family member ___ because of your child’s dental problems or dental treatments?				
Been upset	931(87.66)	113(10.64)	18(1.70)	0.372(0.752)
Felt guilty	935(88.04)	108(10.17)	19(1.79)	0.365(0.760)
Taken time off from work	1008(94.92)	51(4.8)	3(0.28)	0.209(0.528)
How often has your child had dental problems or dental treatments that had a financial impact on your family	1037(97.65)	21(1.97)	4(0.38)	0.152(0.437)

TABLE 2 Distribution of Early Childhood Oral Health Impact Scale response (n = 1062).

ECOHIS domains	Mean(SD)	Possible range	Range
Child section			
child symptom	0.5 (0.8)	0–4	0–4
child function	0.9 (1.7)	0–16	0–11
child psychology	0.4 (1.0)	0–8	0–6
social interaction	0.2 (0.7)	0–8	0–6
Family section			
parental distress	0.7 (1.4)	0–8	0–8
family function	0.4 (0.9)	0–8	0–6
Total ECOHIS	3.1 (5.1)	0–52	0–31

TABLE 3 Descriptive distribution of overall and domain-specific ECOHIS scores. (n = 1062).

49.1% of the parents reported that their children were affected by at least one ECOHIS item.

Data on the prevalence, extent and severity of impacts by ECOHIS dimension and total scale score are summarised in Table 4. Four point seven percent reported one or more ECOHIS items 'often' or 'very often', with an overall mean of 0.08 items reported 'often' or 'very often'. The mean severity score, summed for the items in the scale was 3.11. The parental distress, child function, and child symptom dimensions accounted for the highest prevalence, extent, and severity of impacts.

Table 5 summarises the distribution of the sample according to demographic characteristics, socioeconomic status and their relationship with ECOHIS. The children were predominantly only children in the family. The mean age of the children was 48.5 months, with a range of 36–59 months. Their parents mostly presented with high education levels and 85.1% of the mothers and 97.2% of the fathers were employed.

No significant association was found between sociodemographic status and the total ECOHIS score ($P = 0.07$ – 0.74). No significant association was found between socioeconomic status and the ECOHIS scores

($P > 0.05$). The status of dental caries (dt, ft, ds, fs, dmft and dmfs) correlated significantly with the ECOHIS scores ($P < 0.05$) (Table 5).

Details of the multivariate analysis (the negative binomial regression analysis) of the ECOHIS score and the subscale scores are shown in Table 6. Variables with P values < 0.25 in unadjusted analyses were included in the negative binomial regression analysis. However, if all dental caries statuses were included in the final multivariate model, there would be interference in the variables. Therefore, the dmfs which had the smallest p value was chosen to represent the dental caries status of the children in the final model. No significant association was found between the ECOHIS scores and the demographic status of the children or the socioeconomic status of the parents. In the final model, only the dmfs of the children was significantly associated with the ECOHIS scores. An increase of 1 in the dmfs index of the children was associated with a 10% increase in ECOHIS score (IRR = 1.10, $P < 0.001$).

Cronbach's alphas for the internal consistency reliability of items in the child and family sections were 0.90 and 0.85, respectively, indicating excellent internal reliability. Three factors were produced through varimax rotation. Factor 1, which consisted of items 1 to 7, comprised the oral health-related symptoms, restricted functions, and psychological problems of the children. Factor 2, which consisted of items 10 to 13, comprised the possible influence of children's oral disease on their parents and family. Factor 3, which consisted of items 8 to 9, comprised the children's social interactions affected by oral disease. All factors showed eigenvalues higher than 1, explaining 66.7% of the total variance and indicating good construct validity.

Discussion

ECOHIS assesses the effects of a child's oral health problems on the child as well as his or her parents. The

Dimension	Prevalence: no. reporting 1+ impacts often / very often (%)	Extent: mean no. of items reported often / very often (SD)	Severity: mean ECOHIS score (SD)
Child section			
child symptom	13(1.22)	0.01(0.11)	0.52(0.81)
child function	21(1.98)	0.02(0.17)	0.88(1.72)
child psychology	3(0.28)	0.003(0.05)	0.38(0.92)
social interaction	2(0.19)	0.003(0.07)	0.24(0.74)
Family section			
parental distress	25(2.35)	0.03(0.24)	0.74(1.43)
family function	6(0.56)	0.007(0.09)	0.36(0.89)
Total ECOHIS score	50(4.71)	0.08(0.44)	3.11(5.11)

TABLE 4 Prevalence, extent and severity of impacts by ECOHIS subscale and total score (n=1062).

Variable	n	(%)	RR(95%CI)		
			Child impact section	Family impact section	Total score
Sex			P=0.20	P=0.64	P=0.29
Boys	604	56.9	1.00	1.00	1.00
Girls	458	43.1	1.17(0.92-1.49)	1.08(0.80-1.47)	1.14(0.90-1.44)
Age(month)			P=0.12	P=0.10	P=0.07
36~47	502	47.3	1.00	1.00	1.00
48~59	560	52.7	1.21(0.95-1.54)	1.29(0.95-1.75)	1.24(0.98-1.57)
Single child			P=0.67	P=0.92	P=0.74
Yes	863	81.3	1.00	1.00	1.00
No	199	18.7	1.06(0.79-1.45)	1.02(0.69-1.50)	1.05(0.78-1.42)
Relationship to the child			P=0.27	P=0.27	P=0.61
Mother	758	71.4	1.00	1.00	1.00
Father	304	28.6	1.16(0.89-1.51)	0.92(0.66-1.29)	1.07(0.83-1.39)
Mother's education			P=0.14	P=0.14	P=0.13
Junior high school or below	153	14.4	1.00	1.00	1.00
Senior high school	275	25.9	0.74(0.50-1.10)	0.69(0.42-1.13)	0.72(0.49-1.06)
College or above	634	59.7	0.86(0.61-1.22)	0.84(0.54-1.31)	0.85(0.61-1.20)
Father's education			P=0.18	P=0.25	P=0.19
Junior high school or below	113	10.7	1.00	1.00	1.00
Senior high school	305	28.7	0.75(0.49-1.15)	0.73(0.42-1.25)	0.74(0.49-1.13)
College or above	644	60.6	0.89(0.60-1.32)	0.84(0.51-1.38)	0.87(0.59-1.29)
Mother's occupation			P=0.60	P=0.24	P=0.47
Unemployed	158	14.9	1.00	1.00	1.00
Employee/non- professional	322	30.3	1.11(0.76-1.62)	1.34(0.82-2.18)	1.18(0.81-1.72)
Employer /Professional	582	54.8	1.00(0.70-1.41)	1.17(0.75-1.84)	1.05(0.75-1.49)
Father's occupation			P=0.23	P=0.91	P=0.52
Unemployed	30	2.80	1.00	1.00	1.00
Employee/non- professional	435	41.0	0.67(0.33-1.38)	1.06(0.41-2.72)	0.77(0.38-1.58)
Employer /Professional	597	56.2	0.64(0.32-1.32)	1.01(0.40-2.57)	0.74(0.36-1.51)
dt			P<0.05	P<0.05	P<0.05
			1.10(1.06-1.15)	1.13(1.07-1.20)	1.11(1.07-1.16)
mt			P=0.99	P=0.85	P=0.93
			0.99(0.20-4.92)	1.22(0.16-9.12)	1.07(0.22-5.14)
ft			P<0.05	P<0.05	P<0.05
			1.51(1.16-1.90)	1.51(1.10-2.01)	1.51(1.17-1.90)
ds			P<0.05	P<0.05	P<0.05
			1.10(1.06-1.12)	1.11(1.07-1.14)	1.10(1.07-1.13)
fs			P<0.05	P<0.05	P<0.05
			1.30(1.11-1.51)	1.30(1.07-1.56)	1.30(1.11-1.51)
dmft			P<0.05	P<0.05	P<0.05
			1.18(1.13-1.22)	1.21(1.15-1.27)	1.19(1.14-1.24)
dmfs			P<0.001	P<0.001	P<0.001
			1.09(1.06-1.12)	1.11(1.07-1.14)	1.10(1.07-1.13)

RR: rate ratio

TABLE 5 Unadjusted assessment of variables associating with ECOHIS score (negative binomial regression analysis).

Variable	RR(95%CI)		
	Child impact section	Family impact section	Total score
Sex	P=0.19	**	P=0.37
Boys	1.00		1.00
Girls	1.17(0.93-1.47)		1.11(0.88-1.39)
Age(month)	P=0.95	P=0.78	P=0.95
36~47	1.00	1.00	1.00
48~59	0.99(0.79-1.25)	1.04(0.80-1.40)	1.01(0.80-1.26)
Relationship to the child	**	**	**
Mother			
Father			
Mother's education	P=0.37	P=0.66	P=0.34
Junior high school or below	1.00	1.00	1.00
Senior high school	0.75 (0.49-1.13)	0.82(0.47-1.44)	0.76(0.51-1.14)
College or above	0.84 (0.54-1.29)	0.98 (0.52-1.85)	0.89(0.58-1.36)
Father's education	P=0.20	P=0.45	P=0.19
Junior high school or below	1.00	1.00	1.00
Senior high school	0.89 (0.57-1.39)	0.78 (0.43-1.40)	0.86(0.55-1.33)
College or above	1.19(0.73-1.96)	0.96(0.51-1.81)	1.13(0.71-1.80)
Mother's occupation	**	P=0.52	**
Unemployed		1.00	
Employee/non- professional		1.30 (0.81-2.08)	
Employer /Professional		1.28 (0.78-2.09)	
Father's occupation	P=0.93	**	**
Unemployed	1.00		
Employee/non- professional	0.88 (0.43-1.78)		
Employer /Professional	0.90 (0.44-1.85)		
dmfs	P<0.001	P<0.001	P<0.001
	1.10 (1.07-1.12)	1.11 (1.07-1.15)	1.10(1.07-1.13)

RR: rate ratio
 ** Variables not included in final analysis after the adjustment

TABLE 6 Adjusted assessment of variables associating with ECOHIS score (negative binomial regression analysis).

Chinese ECOHIS was previously translated and validated in Hong Kong [Lee et al., 2009]. It assesses the negative impact of oral health on quality of life among 0- to 5-year-old children. This study reported children's OHRQoL in mainland China using ECOHIS. This information has not previously been available.

It was found that 49.1% of the parents reported at least one impact on the child OHRQoL (ECOHIS >0), lower than the number reported in Lee's study, in which 81.0% of the parents reported an impact on the child's OHRQoL. It was frequently reported that the child experienced only symptoms and functional impairments rather than psychological or social barriers. A randomised cluster sampling was used in this study to better reflect the average situation in the community in

contrast to Lee's study, in which a convenience sample was used [Lee et al., 2010]. The distinction of social and economic development between the two areas may also play a role in the differences.

Parents are more familiar with their children's activities and feelings than others are, but fathers and mothers may have different views about their child's health. In most studies, the majority of the informants were mothers. It has been recognised that fathers may have a limited knowledge of their children's activities and feelings [Jokovic et al., 2004]. No significant difference was observed between fathers and mothers as informants in our study, although only a small proportion of the informants were fathers (28.7% of total participants).

The relationship among gender, age and OHRQoL was analysed in this study. Neither age nor gender had a significant association with ECOHIS in the bivariate analysis or the multivariate analysis.

Previous studies suggested that oral health outcomes are influenced by the mother's education level [Pine et al., 2004; Traebert et al., 2009]. Fernandes found that mothers with a low education level had a relative risk of poor perceptions of their child's OHRQoL [Fernandes et al., 2006]. The mother's education level was a predictor of the child's health. According to Sanders' report [Sanders and Spencer, 2005], low education levels may lead to reduced income, unemployment and poor occupational status. These conditions influence health behaviors and self-rated oral health. On the contrary, some studies have found no significant association between the parents' education level and child's OHRQoL [Wandera et al., 2009; Piovesan et al., 2010; Brennan and Spencer, 2005]. In our study, there was no significant association between education level and the child's OHRQoL, probably because the parents had similar level of education. Future studies would benefit from a more diversified family background.

The relationship between the ECOHIS scores (child impact, family impact and the total scores) and the presence of dental disease was in the expected direction, i.e. the more severe the dental disease, the higher the ECOHIS scores. A significant correlation was found between the ECOHIS scores and caries experience. Half of the children participating in the study had untreated caries. The values of dmft and dmfs in the ECC group were high. Children's dental caries experience of children has a negative impact on their quality of life [Abanto et al., 2011; Cunnion et al., 2010]. Children with active dental caries are more likely to experience oral pain, have difficulty chewing, be worried or upset about their mouths or miss school due to their cumulative disease experience [Foster Page et al., 2005]. Dental interventions in children with ECC have a significant positive impact on parental ratings of their oral health. Our study found that untreated dental caries are an important factor affecting children's OHRQoL, indicating the need to provide dental care for preschool children with dental caries in southern China.

Although reports worldwide have claimed that dental caries have declined significantly in the past decade, recent studies have found a reversed trend in developing countries and in deprived populations in developed areas, especially for primary teeth in young children [Bagramian et al., 2009]. The prevalence of caries among Chinese preschool children, like that among children in other developing areas, is pretty high compared to that of children in developed countries. Furthermore, most of their carious primary teeth remain untreated due to poor access to dental services and lack of interest from both parents and the

government [Qi, 2008]. Neither government funding nor non-government resources are available to provide adequate traditional dental care such as restorations of dental caries to the vast Chinese preschool child population. The finding in our study that ECC has a significant impact on the children's OHRQoL may draw the attention of reluctant parents and the government. The present situation, in which most ECC among young children in mainland China remain untreated should be changed and simple clinical methods that are effective in preventing dental caries are urgently needed for the mass child population.

This study considered ECOHIS scores as count variables and performed a parametric assessment of scores associated with answers. Because the ECOHIS score is heavily skewed, regular multiple linear regression is not suitable. Negative binomial regression analysis is a more appropriate analytical resource than Poisson regression to assess factors associated with variations of observed scores, which shows no identifiable shape of over-dispersion [Joseph, 2011]. Alternatively, categorical classification of quality of life outcomes may allow for meaningful clinical assessments at the expense of losing information and decreasing statistical power [Jokovic et al., 2004].

The prevalence of ECC was 47.6% instead of 66.1%. Thus the power of the study would be weakened if the sample size remained the same as initially calculated. However, the final sample size was 30% larger than we originally calculated, which compensated for the decreased prevalence. Thus statistically significant results can still be achieved.

As a cross-sectional study, this investigation found a positive relationship between dental caries and worsened children's oral health-related quality of life in southern China. However, a well-designed longitudinal study or a study before and after dental treatments may provide more information on this issue.

Conclusion

The severity of ECC has a negative influence on COHRQoL. Better dental care is required to improve children's OHRQoL in southern China.

Conflicts of interests

The authors declare that they have no conflicts of interests.

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