## ORIGINAL ARTICLE

JN Amato TS Barbosa FY Kobayashi MBD Gavião

#### Authors' affiliations:

JN Amato, TS Barbosa, FY Kobayashi and MBD Gavião, Department of Pediatric Dentistry, Piracicaba Dental School, University of Campinas, Piracicaba, Brazil

#### Correspondence to:

Prof. TS Barbosa Faculdade de Odontologia de Piracicaba/ UNICAMP – Departamento de Odontologia Infantil – Área de Odontopediatria Av. Limeira 901 Piracicaba/SP 13414-903 Brasil Tel.: +55 19 2106 5369/5287 Fax: +55 19 2106 5218 E-mail: tais\_sb@fop.unicamp.br

Dates: Accepted 30 January 2014

#### To cite this article:

Int J Dent Hygiene **12**, 2014; 226–233. DOI: 10.1111/idh.12075 Amato JN, Barbosa TS, Kobayashi FY, Duarte Gavião MBD. Changes in the oral-health-related quality of life of Brazilian children after an educational preventive programme: an 1-month longitudinal evaluation.

© 2014 John Wiley & Sons A/S. Published by John Wiley & Sons Ltd

Official Journal of the International

Changes in the oral-health-related quality of life of Brazilian children after an educational preventive programme: an 1-month longitudinal evaluation

Abstract: Objective: This 1-month longitudinal study assessed whether the oral status and the oral-health-related quality of life (OHRQoL) of children changed after four sessions of an educational preventive programme. Study population and methods: Fifty Brazilian students (11 -12 year old) were examined for signs and symptoms of gingivitis using the Community Periodontal Index and two questions about gingival bleeding. The OHRQoL was measured using the Brazilian Portuguese version of the Child Oral Impacts on Daily Performances (Child-OIDP). Higher scores indicated worse OHRQoL. The results were analysed using the Shapiro-Wilk, Chi-square, Wilcoxon signed-rank and Mann-Whitney tests. The magnitude of the mean change was calculated using the effect size. Results: Twenty-four percentage of children had more than six sites with bleeding at follow-up compared with 58% at baseline. There was a significant decline in the intensity and extension of impacts at follow-up. A significant improvement in the clinical status and oral hygiene was observed for both transitional categories. There was a significant decline in the Child-OIDP scores of those reporting 'much improved'. A significant improvement in the global ratings of oral health was observed at follow-up. Conclusions: In the studied sample, an improvement occurred with respect to the severity of disease, intensity and extension of impacts and global ratings of oral health after 1-month follow-up. These results suggest that improving the global transition in health by enhancing coping and management skills while inducing slight changes in the clinical status and the specific aspects of health compromised by the disease is possible.

**Key words:** child; gingivitis; oral health; prevention and control; quality of life

## Introduction

Gingivitis is the most prevalent form of periodontal disease in childhood and adolescence (1). Approximately 24% of 12-year-old Brazilian children exhibit signs of gingivitis (bleeding after probing) (2). The continuous accumulation of microbial biofilm due to impaired or poor oral hygiene results in the clinical manifestations of gingivitis, such as gingival bleeding, redness, swelling and loss of the natural contour of the gums (1, 3). The presence of the biofilm for 10–21 days is sufficient to cause gingivitis, but this process may be reversible if appropriate methods of control are used (4).

A variety of clinical indicators have been used for the diagnosis of gingivitis. Although the Community Periodontal Index, CPI (5), has attracted much criticism (6, 7), it is an index that is easy to use (8, 9), and it constitutes the major source of descriptive epidemiological data on periodontal diseases in many countries, allowing international comparisons. However, the use of clinical measures alone has been criticized as they give little indication of subjectively perceived symptoms (10). Therefore, measures of self-reported periodontal disease are being used more often to complement clinical measures and to explore the symptoms of gingivitis from an individual's perspective, such as bleeding gums or bleeding after teeth brushing (11–13).

According to Locker (14), clinical dental measures inadequately reflect the oral health status because they do not capture oral functioning and psychosocial well-being. Therefore, in addition to the presence of oral diseases, oral-health-related quality of life (OHRQoL) should be used to identify oral health problems and needs, evaluate oral health care and set oral health goals (15, 16). The associations between normatively assessed oral diseases and OHROoL have been reported in child and adolescent populations (17). Although gingivitis was significantly associated with children's OHROoL (18, 19), some studies reported no associations (20, 21). However, all abovementioned studies used generic OHRQoL measures that reflect impacts on the quality of life due to oral diseases in general and not related specifically to gingivitis. Bernabé et al. (22) showed that condition-specific (CS) OHRQoL measures had better discriminative ability than generic measures to differentiate between groups of children with different oral status levels. Although Mbawalla et al. (23) found no difference between the CS-OHRQoL in children with calculus, Krisdapong et al. (24) found significant relationships between 12-year-old children with extensive calculus and/or gingivitis and the CS impacts at a moderate or higher level. However, the above-mentioned findings were based on cross-sectional, not longitudinal, study designs. Therefore, the objective of this study was to assess whether the oral status and the OHRQoL of children changed after four sessions of an educational preventive programme.

## Study population and methods

#### Anamnesis and clinical examination

A longitudinal study design was implemented using a sample of children from the public schools of Piracicaba, SP, Brazil. The sample size was calculated using the Epi Info software, version 3.5.1 (Epi Info<sup>TM</sup> Help Desk, Centers for Disease Control and Prevention, Atlanta, GA, USA). A standard error of 10%, a 90% confidence interval level and a prevalence of 26% of 12-year-old Thai children reporting CS impacts related to gingivitis (24) were used for the calculation. The minimal sample size required to satisfy the requirements was estimated to be 52 individuals. Fifty-eight children from 11 to 12 years of age were evaluated; from this initial sample, fifty healthy subjects (mean age 11.6  $\pm$  0.7 years) were selected after the performance of a complete history and examination. The Research Ethics Committee of the Dental School of Piracicaba, State University of Campinas, approved the study (protocol nº 025/2011). All participating children and their parents or guardians gave verbal and written consent.

The children were excluded if they had systemic disorders that compromise gingival health (e.g. diseases of the endocrine and metabolic systems), used medications associated with gingival overgrowth (e.g. amphetamines, cyclosporine, phenytoin, nifedipine) had chronic diseases that affect the quality of life (e.g. asthma, epilepsy, cancer, rheumatoid arthritis and sleep disorders) or had at least one of the following items that interferes with tooth brushing and favours biofilm accumulation: the presence of dental caries and restorations without marginal adaptation, crowns, mouth breathing and the use of orthodontic appliances. Subjects who did not participate in at least one the four educational preventive sessions were also excluded (n = 8).

Gingivitis was diagnosed using the following parameters:

**1** Interview: spontaneous gingival bleeding (yes/no); bleeding gums during tooth brushing (yes/no) (11–13);

**2** CPI: identifies the presence of gingival bleeding based on six index teeth (16, 11, 26, 36, 31 and 46) (0 = no bleeding and 1 = bleeding observed after probing directly or while using a mouth mirror) (5). For each tooth, four surfaces were recorded (CPI range, 0-24).

The presence of gingivitis was confirmed using both the child's report and the presence of gingival bleeding on probing (25).

The oral hygiene status was evaluated using the Oral Hygiene Index-Simplified (OHI-S), developed by Greene and Vermillion (26). The criteria of this index are related to the sum of the Plaque Index Score (PI-S) and the Calculus Index Score (CI-S). In both the cases, the surfaces of index teeth were examined: vestibular surfaces of 11, 16, 26 and 31; lingual surfaces of 36 and 46. The PI-S was scored as 0: no plaque; 1: plaque covering no more than 1/3 of the examined surface; 2: > 1/3 but < 2/3; 3: > 2/3 of the surface. The CI-S was scored as 0: no calculus; 1: supragingival calculus < 1/3; 2: >1/3 but <2/3 of the surface or isolated subgingival points; 3: >2/3 of the surface or subgingival in the form of a continuous band. These two components were calculated separately and were summed up to get OHI-S for an individual. Finally, the oral hygiene of each child was classified as 'satisfactory' when the OHI-S score was 0-1.0; 'regular' when it was 1.1-2.0; 'fair' when it was 2.1-3.0; and 'poor' when it was 3.1 up to 6.

All clinical examinations were performed by the first author (JNA) using the World Health Organization guidelines (27). Kappa statistics were used to evaluate the intra-examiner reproducibility of the clinical diagnosis of gingivitis. Examinations were replicated in 20 individuals after a period of 2 weeks, and the value obtained was 0.81 (excellent agreement) (28).

#### Oral-health-related quality of life

The self-perceived OHRQoL of each child was assessed with a translated and validated version of the Brazilian Portuguese version of the Child Oral Impacts on Daily Performances (Child-OIDP) (29). This questionnaire was originally developed by Gherunpong et al. (30). Using face-to-face interviews, the Child-OIDP assesses the oral impacts experienced in the past 3 months with respect to eight common daily activities (eating, speaking, cleaning teeth, emotional stability, relaxing/sleeping, smiling without feeling embarrassment, studying and social contact). For each activity, the frequency and severity score (range, 0-3) were recorded. If an impact was detected, the child was asked to report the oral conditions they perceived as the main causes of the oral impacts. The same measure was used at follow-up, except that the Child-OIDP items were introduced by the phrase, 'Since your last visit to the dental clinic, how often have you...'.

One examiner (JNA) performed the interview in a room without the presence of the parent or caregiver.

#### Educational preventive programme

The educational preventive programme consisted of four sessions, once a week, during 1 month (31). First, the programme features were presented to the children and their parents: educational lectures, revealing biofilm, direct guidance on the toothbrushing technique (Bass's technique) (32) and flossing with the aid of a macromodel. In the next three sessions, a motivational enhancement programme was developed using visual aids that were always accompanied by verbal instructions and supervised toothbrushing.

In the four sessions, the child was also submitted to the professional control of biofilm (prophylaxis) following a standardized technique: reception, explanation about the procedure (tell-show-do) and implementation of the prophylaxis for 15 min. Finally, written instructions were given to the children to perform daily oral hygiene at home, combining toothbrushing twice daily (morning and evening) with flossing once a day. In the last session, the clinical examinations were performed again (OHI-S and CPI), and the questionnaire (Child-OIDP) was reapplied.

All sessions were performed by the same researcher (JNA).

#### Global ratings of change

The participant's perceptions of the change in their oral health since the completion of the educational preventive programme were assessed by a single item with a 5-point response scale ('much worse', 'slightly worse', 'stayed the same', 'slightly improved' and 'much improved'). Such transition judgments are often used as a 'gold standard' when evaluating the sensitivity to change in health-related quality of life (HRQoL) measures (33). One advantage of these judgments appears to be that they are not affected by the mood of the individual (34).

#### Global ratings of oral health

At both the baseline and follow-up, the self-rating of oral health was obtained from all the participants. They were asked, 'How would you describe the health of your teeth and mouth today?', and their responses were scored on a 5-point scale ranging from 'Excellent' to 'Poor'.

#### Statistical analysis

The statistical analysis was performed using SPSS 9.0 (SPSS, Chicago, IL, USA) with  $\alpha = 0.05$ . Normality was assessed using the Shapiro-Wilk test. The chi-square test was used to verify the sample distribution according to the diagnosis of gingivitis, the number of bleeding sites, the child's self-report of gingivitis and oral hygiene before and after the educational preventive programme. The CS impacts attributed to gingivitis were calculated by including only impacts for which the perceived causes reported by the child were bleeding gums, swollen gums, tartar and/or bad breath. The 'extent' and 'intensity' of the impacts were also calculated (35). Extent refers to the number of daily performances affected and ranges from 0 to 8. Intensity was based on the highest performance score from the 8 activities, and it was then classified into one of three levels: little, moderate and severe. The characteristics of the CS impacts on daily performance (8 activities, extension and intensity) were investigated by descriptive analysis (chi-square or Fisher exact tests, where appropriate). The CS impact scores were also calculated by multiplying the frequency and severity scores for each activity, resulting in eight performance scores. The sum of the eight performance scores was divided by 72 and then multiplied by 100 to result in the percentage impact score. Differences in the baseline and follow-up distribution of sample and mean scores were evaluated using the Fisher exact and Wilcoxon signed-rank tests, respectively. The changes in the scores for the scale were calculated by subtracting the follow-up scores from the baseline scores. Consequently, a positive change in the score indicates an improvement in the OHRQoL, whereas a negative score indicates deterioration. The magnitude of the change between the times was assessed using the effect size (ES), which was calculated by dividing the mean of the change in the score by the standard deviation of the baseline score: a value of 0.2 was considered to be small, 0.5 to be moderate and 0.8 to be large (36). The significance of the differences between the baseline and follow-up scores of those who had 'much improved' and those who reported 'slightly improved' was evaluated by the Wilcoxon signed-rank test. An unpaired *t*-test was used to compare the mean change in the scores of those who 'much improved' with the mean change in the scores of those who 'slightly improved'.

#### Results

#### Characteristics of participants

The baseline questionnaire was completed by 58 subjects, 50 (86.2%) of whom also completed the follow-up questionnaire.

The participants included in the analysis comprised 30 boys and 20 girls (mean age,  $11.6 \pm 0.7$  years). Of the 50 children initially diagnosed with gingivitis, 54% still presented a positive diagnosis after the educational preventive programme. However, there was a significant decrease in the severity of the gingivitis after the educational preventive programme (P < 0.01, chi-square test), that is, 24% of children had more than six sites with bleeding at follow-up compared with 58% at baseline (P < 0.01) (Table 1). 'Bleeding gums during tooth brushing' was the most frequent symptom of gingivitis reported by the children at baseline (82%). At follow-up, 46% of the children reported no symptoms of gingivitis. A satisfactory oral hygiene was observed in 100% of the children at follow-up, which originally totalled 90 and 10% of satisfactory and regular oral hygiene, respectively.

#### Characteristics of the oral impacts on the daily activities

The CS impacts relating to gingivitis were reported by 30% of the children at both baseline and follow-up (Table 2). When considering the intensity of the impacts, the prevalence of children who reported that the impacts were of severe intensity decreased from 10% at baseline to 6% at follow-up (P < 0.05). While 6% of children with impacts had five to eight of their daily activities affected at baseline, none presented this extension at follow-up (P < 0.001), that is, the children had a maximum of four daily activities affected at follow-up. Finally, the pattern of the impacts on the eight daily activities was similar at both the baseline and the follow-up. 'Cleaning teeth' was the most affected, followed by 'smiling'.

Table 1. Distribution of the sample [n (%)] according to the diagnosis of gingivitis, number of bleeding sites and child's self-report of gingivitis before and after the educational preventive programme (n = 50)

	Educational preventive programme		
	Baseline	Follow-up	
Positive diagnosis of gingivitis Number of bleeding sites [0–24]	50 (100.0)	27 (54.0)	
0	0 (0.0)	0 (0.0)	
1–5	18 (36.0)*	38 (76.0)*	
6–10	29 (58.0)*	12 (24.0)*	
11–15	3 (6.0)	0 (0.0)	
Child's self-report			
Spontaneous gingival bleeding	1 (2.0)	0 (0.0)	
Bleeding gums during tooth brushing	41 (82.0)	24 (48.0)	
Both	8 (16.0)	3 (6.0)	
None	0 (0.0)	23 (46.0)	
Oral hygiene			
Satisfactory	45 (90.0)	50 (100.0)	
Regular	5 (10.0)	0 (0.0)	

\*P < 0.05 (differences between columns; chi-square test).

Values in square brackets indicate range of possible number of bleeding site.

#### **Global transition judgments**

Following the educational preventive programme, 30% of the subjects reported that their oral health was 'much improved', 68% reported that it was 'slightly improved', and 2% reported no change (Table 3). None of the subjects reported that their oral health was worse. There was significant decrease in the severity of the gingivitis (number of bleeding sites) after educational preventive programme for all subjects (6.5 versus 4.2, P < 0.001) and for those reporting changes that were 'much' (7.5 versus 4.7, P < 0.01) and 'slightly' (6.1 versus 4.7, P < 0.01) improved (Table 3). There was a significant improvement in the oral hygiene for both transitional categories (P < 0.001); however, this proportion was higher for those who reported that they had 'much improved' than those who reported 'slightly improved' (20% versus 5.9%, P < 0.001).

The observation that the majority 'slightly improved' was reflected by the small (ES = 0.09) and non-significant difference between the mean at baseline and follow-up Child-OIDP scores, which were 4.8 (SD = 12.0) and 3.1 (SD = 7.4; Wilcoxon signed-rank test, P > 0.05), respectively (Table 3). When considering each category of global transition, a decline in the Child-OIDP scores of those reporting changes that were 'much' (10.2 versus 1.5) and 'slightly' (2.6 versus 2.5) improved was observed, but the difference was only significant for those who reported that they had 'much improved' (P < 0.05; Wilcoxon signed-rank test) (Table 3). There was also a significant difference in the mean Child-OIDP change in the scores between the children who reported 'much' and 'slightly' improved OHRQoL (P < 0.01; Mann–Whitney test). The ES for those who reported that they had 'much improved' was moderate (ES = 0.51), and the magnitude of the difference for those who reported 'slightly improved' was small (ES = 0.01).

#### Global ratings of oral health

At baseline, 60% rated their oral health as 'fair/poor', and this proportion declined to 30% at follow-up (Table 4). Seventy per cent of the subjects reported that their oral health was 'excellent/very good/good' at follow-up compared with 40% at baseline.

#### Discussion

The descriptive analyses conducted on the baseline data indicated that children experienced gingivitis at a moderate level of severity and CS impacts at a low prevalence (30% of sample). Only approximately 15% of children had more than one daily life activity affected, and the impacts on the affected activities ranged from little to severe intensity. The low level of the impacts of gingivitis reported herein using the CS-OHRQoL measures might explain the non-significant relationships between periodontal disease and OHRQoL when using generic OHRQoL measures (20, 21). The most frequently affected activity herein was 'cleaning teeth', suggest-

Table 2.	Characteristics of the CS im	pacts attributed to gingivitis	before and after the educational	preventive programme $(n = 50)$

	Baseline				Follow-up			
		Intensity of impacts				Intensity of impacts		
Characteristics of the CS impacts	% of sample	Little Moderate		Severe	% of sample	Little	Moderate	Severe
CS impacts	30.0	10.0	10.0	10.0*	30.0	10.0	14.0	6.0*
Extent of oral impacts <sup>a</sup>								
1	14.0				16.0			
2–4	10.0				14.0			
5–8	6.0**				0.0**			
Daily activities affected								
Eating	6.0	2.0	2.0	2.0	6.0	4.0	2.0	0.0
Speaking	8.0	0.0	4.0	4.0	6.0	0.0	6.0	0.0
Cleaning teeth	22.0	10.0	8.0	4.0	16.0	6.0	6.0	4.0
Relaxing/sleeping	6.0	4.0	0.0	2.0	2.0	0.0	2.0	0.0
Emotion	6.0	4.0	2.0	0.0	8.0	6.0	2.0	0.0
Smiling	12.0	4.0	4.0	4.0	12.0	6.0	6.0	0.0
Study	4.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0
Social contact	8.0	2.0	6.0	0.0	4.0	0.0	2.0	2.0

CS impacts, condition-specific impacts.

<sup>a</sup>Number of performances with oral impacts; possible maximum = eight performances.

\*P < 0.05; \*\*P < 0.001 (differences between columns/in the baseline and follow-up scores for each category of intensity/extent of impact; Fisher's exact test).

Table 3. N	Mean bleeding sites	and mean change in t	he scores and effect size	s (ES) by globa	I transition category $(n = 50)$
------------	---------------------	----------------------	---------------------------	-----------------	----------------------------------

	Mean bleeding sites		Mean CS impact scores		Maan ahanga	
Global transition category	Baseline	Follow-up	Baseline	Follow-up	score	ES
All subjects	6.5 (2.6)***	4.2 (1.7)***	4.8 (12.0)	3.1 (7.4)	1.7	0.09
Much improved $(n = 15)$	7.5 (2.4)**	4.7 (1.6)**	10.2 (17.2)*	1.5 (2.9)*	8.70 <sup>†</sup>	0.51
Slightly improved $(n = 34)$	6.1 (2.4)***	4.7 (1.6)***	2.6 (5.6)	2.5 (8.3)	0.08 <sup>†</sup>	0.01
Stayed the same $(n = 1)$	_	_	_	_	_	_

CS impacts, condition-specific impacts.

ES, mean of change/standard deviation of baseline.

\*P < 0.05; \*\*P < 0.01; \*\*\*P < 0.001 (differences between columns/in the baseline and follow-up scores for each global transition category; Wilcoxon signed-rank test).

<sup>†</sup>P < 0.01 (differences between lines/in the mean change in the scores between the global transition categories; Mann–Whitney test).

# Table 4. Distribution of responses [n (%)] to the global rating of oral health before and after the educational preventive programme (n = 50)

	Educational pr programme	Educational preventive programme	
Global rating of oral health	Baseline	Follow-up	
Excellent/Very good/Good Fair/Poor	20 (40.0) 30 (60.0)	35 (70.0) 15 (30.0)	

ing that one-fifth of the children with gingivitis were concerned by gums bleeding upon brushing. Similarly, in the study by Krisdapong *et al.* (24), 'cleaning teeth' was the most frequently affected activity in children with calculus and/or gingivitis. According to Gherunpong *et al.* (35), children with difficulty in cleaning their teeth because of gingival inflammation are unlikely to achieve good levels of oral hygiene because brushing may lead to bleeding, thus resulting in their

would not be solved by the traditional dental treatment without understanding the effects of the oral impacts on behaviour. However, the main aim of this study was to assess whether the oral status and OHRQoL changed after four sessions of an educational preventive programme. In contrast to the positive diagnosis still present in 46% of the children at follow-up, <25% of the children had more than six sites with bleeding

> compared with 64% at baseline. The significant decrease in the severity of the gingivitis reinforced the importance of motivation accompanied by practical demonstrations of proper

> gingival problems undoubtedly remaining or even worsening.

This problem may reflect the experience of gingival bleeding

while toothbrushing reported by 98% of participants who presented gingivitis at baseline. Of these children, 16% also experienced gingival bleeding spontaneously, which could cause discomfort during toothbrushing and a consequent deficiency in their oral hygiene practice. In conclusion, gingival problems oral health care (37). In addition, the prevalence of children reporting gingival bleeding during toothbrushing decreased by half at follow-up, suggesting that information on improving the toothbrushing practices should be stressed in oral health education for children, particularly among those with gingivitis who may avoid brushing because of bleeding gums. On the other hand, satisfactory hygiene was observed in 100% of children at follow-up compared with 90% at baseline, suggesting that the presence of biofilm on dental consultation may not reflect oral hygiene practices at home. This result reinforces the importance of using complementary methods to obtain an accurate diagnosis (25).

The analysis of the scores derived from the CS impact scores indicated a non-significant improvement in the OHR-QoL as a whole (mean change = 1.7). However, when considering intensity and extension of impacts, significant improvement was observed. These results corroborate the significant decrease in the severity of the gingivitis at follow-up for all subjects and for both transitional categories. Moreover, significant improvement in the oral hygiene was observed for both transitional categories (P < 0.001), especially for those who reported that they had 'much improved'. When considering the magnitude of change in CS impact scores, the small ES observed within the transitional category 'slightly improved' and between baseline and follow-up suggests that any changes have, to some extent, remained undetected. Similarly, Mashoto et al. (38) also found small ES within the transitional category 'improved' and between the baseline and follow-up Generic Child-OIDP scores in a group of children receiving oral health education. On the other hand, the moderate ES for those reporting substantial improvements might reflect the notion that the OHRQoL can be improved by enhancing the coping and management skills while inducing no change in the clinical status.

Although it has not been the main objective of this study, the judgements of patients about stability/change are used as the 'gold standard' in assessing responsiveness. The use of such a judgment presumes that the patients are able to judge whether they have changed over a period of time as well as the direction and magnitude of that change (39). However, some authors have argued that transition judgments are not valid and are more likely to be related to the patients' ratings of their current health state rather than change over time (40). Definitive conclusions about the validity of transition judgments cannot be made as no studies have investigated the psychometric properties of these indicators of change (39). Consequently, at the present time, global transition judgments represent the best option for assessing the patients' ratings of change over time, that is, the responsiveness of the HRQoL measure (41).

Analyses conducted on the global rating data indicate an improvement in the children's oral health as a whole after the educational preventive programme. Although 70% of the children rated the health of their teeth and mouth more favourably at follow-up, half (n = 17) of those rating their oral health as 'excellent/very good/good' still presented gingivitis. These results can be interpreted in terms of the contemporary

models of health outcomes described earlier, that is, the health outcomes experienced by an individual are determined by not only the nature and severity of the disease/disorder but also personal and environmental characteristics (42). In other words, although discomfort due to gingival bleeding may remain problematic for some people with gingivitis, the received educational preventive motivation in the clinical setting provides optimism and resilience as the children cope with the challenges posed by the disease. Global ratings provide a summary of how people perceive their oral health, and thus they may be as useful as more complex multiitem scales and indices (42). However, the brevity of the global questions is also their main disadvantage as the summary answers do not provide information about the aspects of health compromised by the disease/disorder (43).

Overall, the results presented in this article are preliminary findings based on quantitative data. Consequently, research based on qualitative methods is required to better understand the content areas that are reflected in the children's perceptions of their oral health and its impact on their daily life and activities. Second, the subjects were not randomized to intervention and control groups. The inclusion of a control group would have allowed a valid comparison of the changes in the scores over time between groups. Finally, to better understand the change over time, research using additional external indicators of change, such as the clinician's ratings and change in the scores of physiological indicators, is recommended.

## Conclusions

In the studied sample, an improvement occurred with respect to the severity of disease, intensity and extension of CS impacts and global ratings of oral health after 1-month followup educational preventive programme. These results suggest that improving the global transition in health by enhancing coping and management skills while inducing slight changes in the clinical status and the specific aspects of health compromised by the disease is possible.

## Acknowledgements

JNA would like to thank the second author (TSB) for direct supervision. The authors gratefully acknowledge the financial support from the State of São Paulo Research Foundation (FAPESP, SP, Brazil, n. 2010/19455-0), the volunteers and their parents for participating in this research.

## Conflict of interest

The authors declare that they have no conflict of interest.

## Clinical relevance

Oral diseases can lead to physical, psychological and social disability. This paper shows that children with gingivitis

frequently are concerned by gums bleeding upon brushing. However, the significant improvement in the clinical status and OHRQoL after the educational preventive programme reinforced the importance of motivation accompanied by practical demonstrations of proper oral health care. In other words, although discomfort due to gingival bleeding may remain problematic for some children with gingivitis, the received educational preventive motivation in the clinical setting provides optimism and resilience as the children cope with the challenges posed by the disease.

## References

- Lopez R, Fernandez O, Baelum V. Social gradients in periodontal diseases among adolescents. *Community Dent Oral Epidemiol* 2006; 34: 184–196.
- 2 Projeto SB Brasil 2010: Pesquisa Nacional de Saúde Bucal Resultados Principais; 2011. Available at: http://bvsms.saude.gov.br/ php/index.php (accessed 14 April 2012).
- 3 Schroeder MDS, Ribeiro GLU. Evaluation of periodontal index of gingival and plaque with dental crowding in development of gingivitis in children and adolescents. *RSBO* 2004; **1**: 17–21.
- 4 van der Velden U. The significance of supragingival plaque accumulation in periodontal disease. *Int J Dent Hyg* 2006; **1**: 11–14.
- 5 Ainamo J, Barmes D, Beagrie G, Cutress T, Martin J, Sardo-Infirri J. Development of the World Health Organization (WHO) community periodontal index of treatment needs (CPITN). *Int Dent J* 1982; 32: 281–291.
- 6 Jenkins WM, Papapanou PN. Epidemiology of periodontal disease in children and adolescents. *Periodontol 2000* 2001; **26**: 16–32.
- 7 Leroy R, Eaton KA, Savage A. Methodological issues in epidemiological studies of periodontitis – How can it be improved? *BMC Oral Health* 2010; **10**: 8.
- 8 Benigeri M, Brodeur JM, Payette M, Charbonneau A, Ismail AI. Community periodontal index of treatment needs and prevalence of periodontal conditions. *J Clin Periodontol* 2000; 27: 308–313.
- 9 Müller HP, Barrieshi-Nusair KM. Gingival bleeding on repeat probing after different time intervals in plaque-induced gingivitis. *Clin Oral Investig* 2005; 9: 278–283.
- 10 Blicher B, Joshipura K, Eke P. Validation of self-reported periodontal disease: a systematic review. J Dent Res 2005; 84: 881–890.
- 11 Kallio P, Nordblad A, Croucher R, Ainamo J. Self-reported gingivitis and bleeding gums among adolescents in Helsinki. *Community Dent Oral Epidemiol* 1994; 22: 277–282.
- 12 Kallio P. Self-assessed bleeding in monitoring gingival health among adolescents. *Community Dent Oral Epidemiol* 1996; 24: 128–132.
- 13 Taani DQ, Alhaija ES. Self-assessed bleeding as an indicator of gingival health among 12-14-year-old children. J Oral Rehabil 2003; 30: 78–81.
- 14 Locker D. Measuring oral health: a conceptual framework. Community Dent Health 1988; 5: 3–18.
- 15 Gherunpong S, Sheiham A, Tsakos G. A sociodental approach to assessing children's oral health needs: integrating an oral health-related quality of life (OHRQoL) measure into oral health service planning. *Bull World Health Organ* 2006; **84**: 36–42.
- 16 Sheiham A, Tsakos G. Oral health needs assessment. In: Pine CM, Harris R, eds. *Community Oral Health*. London, Quintessence Books, 2007, pp. 59–79.

- 17 Barbosa TS, Gavião MB. Oral health-related quality of life in children: part II. Effects of clinical oral health status. A systematic review. *Int J Dent Hyg* 2008; 6: 100–107.
- 18 Nurelhuda NM, Ahmed MF, Trovik TA, Astrom A. Evaluation of oral health-related quality of life among Sudanese schoolchildren using Child-OIDP inventory. *Health Qual Life Outcomes* 2010; 8: 152.
- 19 Castro RA, Portela MC, Leão AT, de Vasconcellos MT. Oral health-related quality of life of 11- and 12-year-old public school children in Rio de Janeiro. *Community Dent Oral Epidemiol* 2011; **39**: 336–344.
- 20 Biazevic MG, Rissotto RR, Michel-Crosato E, Mendes LA, Mendes MO. Relationship between oral health and its impact on quality of life among adolescents. *Braz Oral Res* 2008; 22: 36–42.
- 21 Barbosa TS, Tureli MC, Gavião MB. Validity and reliability of the Child Perceptions Questionnaires applied in Brazilian children. *BMC Oral Health* 2009; 9: 13.
- 22 Bernabé E, de Oliveira CM, Sheiham A, Tsakos G. Comparison of the generic and condition-specific forms of the Oral Impacts on Daily Performances (OIDP) Index. J Public Health Dent 2009; 69: 176–181.
- 23 Mbawalla HS, Mtaya M, Masalu JR, Brudvik P, Astrom AN. Discriminative ability of the generic and condition-specific Child-Oral Impacts on Daily Performances (Child-OIDP) by the Limpopo-Arusha School Health (LASH) project: a cross-sectional study. *BMC Pediatr* 2011; **11**: 45.
- 24 Krisdapong S, Prasertsom P, Rattanarangsima K, Sheiham A, Tsakos G. The impacts of gingivitis and calculus on Thai children's quality of life. *J Clin Periodontol* 2012; **39**: 834–843.
- 25 Lang NP, Adler R, Joss A, Nyman S. Absence of bleeding on probing: an indicator of periodontal stability. *J Clin Periodontol* 1990; 17: 714–721.
- 26 Greene JC, Vermillion JR. The simplified oral hygiene index. J Am Dent Assoc 1964; 68: 7–13.
- 27 World Health Organization. Oral Health Surveys. Basic Methods. Geneva, World Health Organization, 1997.
- 28 Cohen J. A coefficient of agreement for nominal scales. *Educ Psychol Measurement* 1960; 20: 37–46.
- 29 Castro RA, Cortes MI, Leão AT *et al.* Child-OIDP index in Brazil: cross-cultural adaptation and validation. *Health Qual Life Outcomes* 2008; 6: 68.
- 30 Gherunpong S, Tsakos G, Sheiham A. Developing and evaluating an oral health-related quality of life index for children; the CHILD-OIDP. *Community Dent Health* 2004; **21**: 161–169.
- 31 Adjunctive Dental Therapies for the Reduction of Plaque and Gingivitis; Acceptance Program Guidelines. Council on Scientific Affairs, 1997. Available at: http://www.ada.org/seal/standards/ guide\_adjunctive.pdf (accessed 9 July 2012).
- 32 Bass CC. An effective method of personal oral hygiene. J La State Med Soc 1954; 106: 100–112.
- 33 MacKenzie CR, Charlson ME, DiGioia D, Kelley K. Can the sickness impact profile measure change? An example of scale assessment. J Chronic Dis 1986; 39: 429–438.
- 34 Fitzpatrick R, Ziebland S, Jenkinson C, Mowat A, Mowat A. A comparison of the sensitivity to change of several health status instruments in rheumatoid arthritis. J Rheumatol 1993; 20: 429–436.
- 35 Gherunpong S, Tsakos G, Sheiham A. The prevalence and severity of oral impacts on daily performances in Thai primary school children. *Health Qual Life Outcomes* 2004; 2: 57.
- 36 Cohen J. Statistical Power Analysis for the Behavioural Sciences. Hillside, NJ, Lawrence Erlbaum Associates, 1988.

- 37 Kolawole KA, Oziegbe EO, Bamise CT. Oral hygiene measures and the periodontal status of school children. *Int J Dent Hyg* 2011; 9: 143–148.
- 38 Mashoto KO, Astrøm AN, Skeie MS, Masalu JR. Changes in the quality of life of Tanzanian school children after treatment interventions using the Child-OIDP. *Eur J Oral Sci* 2010; **118**: 626–634.
- 39 Guyatt GH, Osoba D, Wu AW, Wyrwich KW, Norman GR; Clinical Significance Consensus Meeting Group. Methods to explain the clinical significance of health status measures. *Mayo Clin Proc* 2002; 77: 371–383.
- 40 Norman GR, Stratford P, Regehr G. Methodological problems in the retrospective computation of responsiveness to change: the lesson of Cronbach. *J Clin Epidemiol* 1997; **50**: 869–879.

- 41 Locker D, Jokovic A, Clarke M. Assessing the responsiveness of measures of oral health-related quality of life. *Community Dent Oral Epidemiol* 2004; **32**: 10–18.
- 42 Wilson IB, Cleary PD. Linking clinical variables with healthrelated quality of life. A conceptual model of patient outcomes. *JAMA* 1995; **273**: 59–65.
- 43 Jokovic A, Locker D, Guyatt G. What do children's global ratings of oral health and well-being measure? *Community Dent Oral Epidemiol* 2005; **33**: 205–211.

Copyright of International Journal of Dental Hygiene is the property of Wiley-Blackwell and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.