

ORIGINAL ARTICLE

Oral health and well-being of adolescents undergoing orthodontic treatment: perspective of the adolescents and their parents/caregivers

Salud oral y bienestar de los adolescentes que reciben tratamiento de ortodoncia: perspectiva de los adolescentes y de sus padres/cuidadores

Saúde bucal e bem-estar dos adolescentes em tratamento ortodôntico: perspectiva dos adolescentes e de seus cuidadores

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Abstract

Aim: To evaluate the oral health and well-being of adolescents with malocclusion who were submitted to orthodontic treatment, assessing the perspective of parents/caregivers and adolescents and to investigate the effects of orthodontic treatment among adolescents on the perception of oral health and well-being, in relation to the opinion of parents/caregivers and adolescents.

Methods: Adolescents between 11 and 12 years submitted to orthodontic treatment with fixed appliances at the Federal University of Minas Gerais and their parents/caregivers participated in this observational study. Adolescents and their parents/caregivers answered questions about the health of adolescents' teeth, lips, jaws and mouth and about how the condition of adolescents' teeth, lips, jaws or mouth affects adolescents overall life or well-being before orthodontic treatment onset and 12 months after fixed appliances' placement.

Results: A total of 113 pairs of adolescents and parents/caregivers participated. Parents had a significantly more negative perception of the impact of malocclusion on adolescents' lives or well-being ($p < 0.001$). Adolescents reported that their oral health improved after 12 months of

orthodontic treatment ($p < 0.001$). Adolescents also reported that their lives or well-being was significantly less affected after 12 months of orthodontic treatment ($p = 0.026$). Parents/caregivers reported that their adolescents' oral health improved after 12 months of orthodontic treatment ($p < 0.001$). Parents/caregivers also reported that their adolescents' lives or well-being was significantly less affected after 12 months of orthodontic treatment ($p < 0.001$).

Conclusion: Parents/caregivers have a more negative perception regarding the impact of malocclusion on the life and well-being of an adolescent. After 12 months of orthodontic treatment onset, parents/caregivers and adolescents considered that adolescents' overall health and well-being had improved.

Keywords: adolescent; malocclusion; orthodontic treatment; oral health; well-being.

Introduction

In the last decades, several studies on oral health-related quality of life (OHRQoL) have been found in the scientific literature.¹ According to the World Health Organization (WHO), the way how oral health outcomes impact individuals' OHRQoL is an important parameter in evaluations of the Global Oral Health Program.² OHRQoL is a construct consisting basically of four domains: oral symptoms, functional limitations, emotional well-being and social well-being.^{2,3}

Similar to the evaluations among adults, OHRQoL assessments in children/adolescents are performed by means of specific and validated questionnaires. Among these questionnaires, the Child Perceptions Questionnaire (CPQ)⁴ and the Parental-Caregiver Perceptions Questionnaire (PCPQ)⁵ have been used. In the first, questions aiming to evaluate the domains of OHRQoL are answered by the children/adolescents themselves. The second, in turn, is composed of questions answered by the parents/caregivers of

children/adolescents. These two questionnaires also have questions that constitute the global rating, through which children/adolescents and their parents/caregivers rate the oral health of children/adolescents in general and how children/adolescents and their parents/caregivers think that the oral condition of the young individual affects his/her life or well-being in a general way.^{4,5}

Studies with the CPQ and PCPQ show that malocclusion has a negative impact on the OHRQoL of adolescents.^{6,7,8} The more severe the malocclusion, the more negative is the individual's perception of his/her OHRQoL.⁹ The negative repercussions usually take place over the adolescent's emotional and social well-beings.¹⁰ Orthodontic treatment, on the other hand, improves function (chewing, for instance)¹¹ and also enhances the OHRQoL of the individual in the emotional and social dimensions.^{12,13} However, studies with the global rating questions that allow us to evaluate how the adolescent with malocclusion and his/her parents/caregivers rate the oral health of this adolescent in general and how the malocclusion affects the life or well-being of this adolescent are

still scarce in the literature. Moreover, studies evaluating the agreement between the adolescent and his/her parents/caregivers regarding the repercussions of malocclusion on adolescent's health are also sparse.^{14,15,16,17}

Therefore, the objective of this article was two-fold: To examine the agreement between adolescents with malocclusion and their parents/caregivers regarding the evaluation of the health of adolescents' teeth, lips, jaws and mouth and their perceptions with respect to the impact of malocclusion on adolescents' lives and well-being. The hypothesis is as follows: There will be no agreement between adolescents with malocclusion and their parents/caregivers regarding the evaluation of the health of adolescents' teeth, lips, jaws and mouth and their perceptions with respect to the impact of malocclusion on adolescents' lives and well-being.. Adolescents' OHRQoL scores will be higher than parents'/caregivers' scores.

To assess the perceptions of adolescents and their parents/caregivers regarding the health of adolescents' teeth, lips, jaws and mouth and their perceptions with respect to the impact of the conditions of adolescents' teeth, lips, jaws and mouth on their lives and well-being after 12 months of orthodontic treatment with fixed appliances. The hypothesis is as follows: There will be an improvement in the perceptions of adolescents and their parents/caregivers regarding the health of adolescents' teeth, lips, jaws and mouth and their perceptions with respect to the impact of the conditions of adolescents' teeth, lips, jaws and mouth on their lives and well-being after 12 months of orthodontic treatment with fixed appliances.

Materials and Methods

Sampling and setting

The sample of this study was composed of 120 adolescents between 11 and 12 years old in the permanent dentition, who had been referred to the Dental School of the Federal University of Minas Gerais, Belo Horizonte, Brazil for orthodontic treatment with fixed appliances. Adolescents' parents/caregivers also participated. Data collection took place between October 2011 and July 2013. The inclusion criteria were as follows: the adolescent and his/her parents/caregiver should be literate in the Portuguese language. The adolescent should also need orthodontic treatment with fixed appliances. Adolescents with cognitive disorders or syndromes, individuals with a history of dental treatment in the last three months before study's commencement and those with dental caries, dental trauma and/or gingival problems during the therapy with fixed appliances were excluded. Dental caries was evaluated according to the World Health Organization (WHO).¹⁸ Dental trauma was assessed according to the Andreasen criteria.¹⁹ Gingival problems were evaluated according to the criteria of Löe.²⁰

Ethical issues

The study was approved by the Ethics in Research Committee of the Federal University of Minas Gerais (approval number 0421.0.203.000-11). Adolescents and parents/caregivers were informed that participation was voluntary, anonymous,

and the refusal to participate would not preclude adolescents' orthodontic treatment. Adolescents signed a term of free and informed assent and the parents/caregivers a term of free and informed consent. At no point within the study, participants received incentives.

Evaluation of global rating of oral health and well-being

Adolescents answered two questions of the short form of the Child Perceptions Questionnaire (CPQ11-14) and parents/caregivers answered two questions of the Parental-Caregiver Perceptions Questionnaire (PCPQ) on the global rating of the adolescent's oral health and the extent to which the oral/oro-facial condition affected his/her overall life or well-being. These questionnaires were developed in Canada^{4,5} and translated, cross-culturally adapted and validated in Brazil.^{7,21} The two questions for adolescents were: "Would you say that the health of your teeth, lips, jaws and mouth is?" e "How much does the condition of your teeth, lips, jaws or mouth affect your overall life or well-being?" The two questions for parents/caregivers were: "How would you rate the health of your child's teeth, lips, jaws and mouth?" and "How much is your child's life or well-being affected by the condition of his/her teeth, lips, jaws and mouth?" For the first question, adolescents and their parents/caregivers had five response options: excellent (0); very good (1); good (2); acceptable (3) and poor (4). The higher the score, the worse the evaluation of the adolescent and his/her parent/caregiver regarding the health of the adolescent's teeth, lips, jaws and mouth. For the second question, adolescents and their

parents/caregivers had the following five response options: no at all (0); a little (1); somewhat (2); a lot (3) and very much (4). The higher the score, the more negative the perception of the adolescent and his/her parent/caregiver regarding the impact of the condition of the adolescent's teeth, lips, jaws or mouth on the adolescent's life or well-being. Questions were answered by the adolescents and their parents/caregivers prior to banding and fixed appliances' bonding and 12 months after adolescents' orthodontic treatment onset. During data collection, one researcher was responsible for questionnaires' administration.

Malocclusion evaluation

The Dental Aesthetic Index (DAI) was used to determine the need for orthodontic treatment among adolescents. This index consists of the analysis of 10 occlusal characteristics and assigns participants into four groups according to malocclusion severity: adolescents with mild malocclusion/slight need for treatment ($DAI \leq 25$), adolescents with defined malocclusion, for whom orthodontic treatment is elective ($26 \leq DAI \leq 30$), adolescents with severe malocclusion, for whom orthodontic treatment is recommended ($31 \leq DAI \leq 35$) and adolescents with very severe malocclusion, for whom orthodontic treatment is mandatory ($DAI \geq 36$).²² After calibration, one researcher conducted the exams for malocclusion evaluation. The calibration was coordinated by a researcher with expertise in the DAI. Intra- and inter-examiner agreement was calculated by means of the Kappa coefficient. The values of Kappa ranged from 0.84 to 0.90.

Sociodemographic variables

Information on adolescents' sex and age was collected. The monthly income was calculated as the sum of the wage of all members of the adolescents' families and was divided by the value of the Brazilian minimum wage (BZMW). At the time of the study, the BZMW corresponded to R\$ 622.00 (US\$ 300.00). Adolescents were categorized into four groups: adolescents whose families had an income of ≤ 1 BZMW, adolescents whose families had an income >1 and ≤ 3 BZMWs, those whose families had an income of >3 and ≤ 5 BZMWs and those whose families had an income >5 BZMWs.

Statistical analysis

The software Statistical Package for the Social Sciences (SPSS, SPSS Inc., version 22.0, Chicago, IL., EUA) was used for statistical analysis. Descriptive analysis of adolescents' sociodemographic characteristics and orthodontic treatment need was performed.

The agreement between adolescents and their parents/caregivers regarding the evaluation of the health of adolescents' teeth, lips, jaws and mouth and their perceptions with respect to the impact of the malocclusion of on their lives or well-being was assessed before banding and fixed appliances' bonding (impact of malocclusion). Directional differences for both questions were determined subtracting parents'/caregivers' global rating scores from adolescents' global rating scores. Directional differences for both questions were then compared to zero using the Wilcoxon test to assess statistical

significance. To assess the magnitude of systematic bias, mean directional differences were divided by their respective standard deviations. To interpret the difference magnitude, a standardized difference of 0.2 was considered small, 0.5 was considered moderate, and 0.8 was considered large.²³ The mean absolute differences for the two questions were calculated by ignoring the positive and the negative signs of the directional differences, which provide an indicator of agreement. This was then expressed as a percentage of the maximum score to assess the size of the absolute differences. The intra-class correlation coefficient (ICC) values were also calculated for the two questions. The level of agreement presented by the ICC was categorized as follows: 0.2 (poor), 0.21–0.4 (fair), 0.41–0.60 (moderate), 0.61–0.80 (substantial), and 0.81–1.0 (excellent).²⁴

Comparisons of global rating assessment prior to banding and fixed appliances' bonding and 12 months after adolescents' orthodontic treatment onset were carried out for adolescents and their parents/caregivers by means of the Wilcoxon test. Statistical significance was set at $p < 0.05$.

Results

Of the 120 pairs of adolescents and parents/caregivers invited to participate in the study, 113 accepted to participate and answered the questions prior to banding and bracket bonding. Twelve months after adolescents' orthodontic treatment onset,

78 adolescents and 79 parents/caregivers answered the questions again. The reasons for losses during the follow-up were due to the non-attendance of the adolescents and/or their parents/caregivers to the adolescents' appointment on the day of the

second interview. The mean age of adolescents was 11.5 years (± 0.50). Figure 1 displays the flowchart of the study. Table 1 shows the sociodemographic characteristics and the need for orthodontic treatment of adolescents.

Figure 1. Study flow chart.

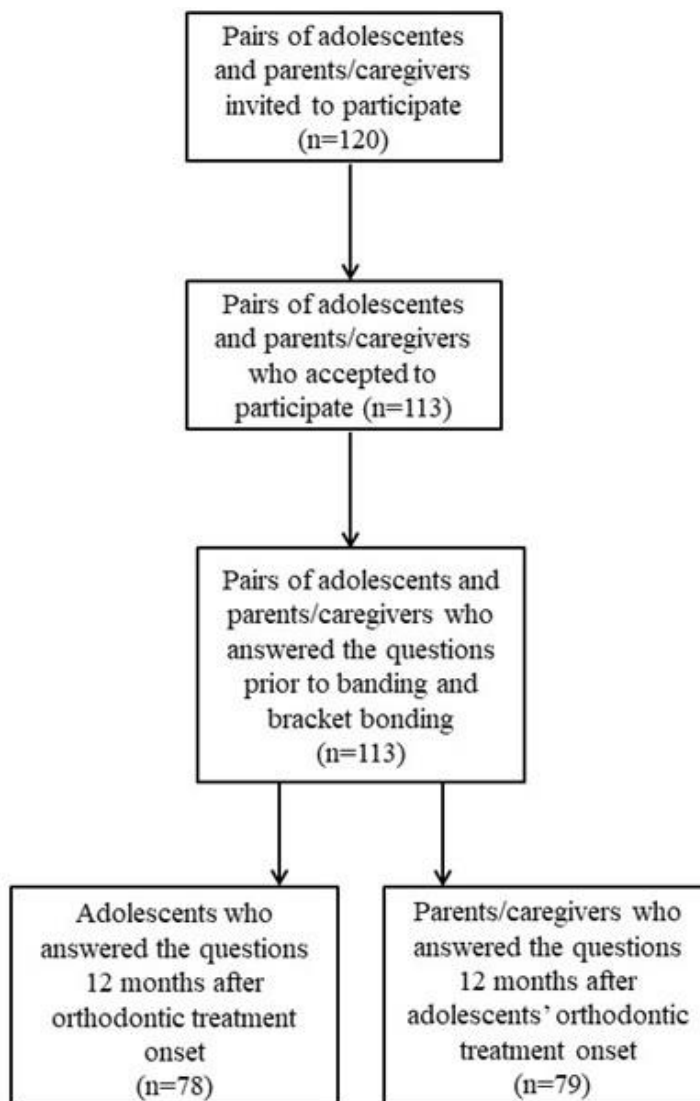


Table 1: Sociodemographic characteristics and adolescents' orthodontic treatment need

	Number (%)
Adolescents' sex	
Male	50 (44.2)
Female	63 (55.8)
Family income (Brazilian minimum wage = BZMW)	
≤1 BZMW	19 (16.8)
>1 – ≤3 BZMWs	65 (57.5)
>3 – ≤5 BZMWs	18 (15.9)
>5 BZMWs	11 (9.8)
Dental Aesthetic Index (DAI)	
≤25	39 (34.5)
26 – 30	32 (28.3)
31 – 35	26 (23.0)
≥36	16 (14.2)

Table 2 shows adolescents' and their parents'/caregivers' reports regarding the global rating of the adolescent's oral health and the extent to which malocclusion affected his/her overall well-being before banding and fixed appliances' bonding. Table 3 displays the agreement between adolescents and parents'/caregivers

regarding both global ratings. Compared with the adolescents (mean=1.07), parents'/caregivers (mean=1.73) had a significantly more negative perception regarding the impact of the malocclusion on adolescent's life or well-being (directional difference=0.66, and absolute difference = 1.35, $p<0.001$).

Table 2: Mean global rating and the extent to which the child is affected by malocclusion (adolescents' and parents'/caregivers' reports)

	Range	Adolescents Mean (SD)	Range	Parents'/caregivers Mean (SD)
Question 1*	0 – 4	2.02 (0.96)	0 – 4	2.19 (0.89)
Question 2*	0 – 4	1.07 (1.00)	0 – 4	1.73 (1.08)

Question 1 asks to the adolescent and parents'/caregivers how they would rate the health of the adolescent's teeth, lips, jaws and mouth

Question 2 ask to the adolescent and parents'/caregivers how much the adolescent's life or well-being is affected by his/her teeth, lips, jaws and mouth

*N=113 pairs of adolescents and parents'/caregivers

SD=standard deviation

Table 3: Mean directional differences, absolute differences, and correlation analysis for mean global rating and the extent to which the adolescent is affected by malocclusion between adolescents and their parents/caregivers

	Directional differences				Absolute differences			Correlation analysis	
	Mean (SD)	CI (95%)	<i>p</i> value	D	Mean	SD	S (%)	ICC (95% CI)	<i>p</i> value
Question 1*	0.17 (1.15)	-0.03; 0.39	=0.122	0.14	0.90	0.74	22.5	0.36 (0.07; 0.55)	=0.009
Question 2*	0.66 (1.50)	0.38; 0.94	<0.001	0.44	1.35	0.93	23.2	0.06 (0.44; 0.22)	=0.663

Question 1 asks to the adolescent and parents/caregivers how they would rate the health of the adolescent's teeth, lips, jaws and mouth

Question 2 ask to the adolescent and parents/caregivers how much the adolescent's life or well-being is affected by his/her teeth, lips, jaws and mouth

*N=113 pairs of adolescents and parents/caregivers

SD=standard deviation; CI=confidence interval; D, Standardized difference 5 mean directional difference/standard deviation of directional difference; S, size of the absolute difference

Table 4: Comparison of global rating of the adolescents' health before and 12 months after banding and fixed appliance bonding (adolescents' report)

	Before fixed appliance bonding		12 months after fixed appliance bonding		<i>p value</i> *
	Median (Mean)	Interval Interquartil	Median (Mean)	Interval Interquartil	
Question 1**	2.00 (1.97)	1.00 – 3.00	1.00 (1.47)	1.00 – 2.00	<0.001
Question 2**	1.00 (1.09)	0.00 – 1.00	1.00 (0.81)	0.00 – 1.00	=0.026

Question 1 = Would you say that the health of your teeth, lips, jaws and mouth is?

Question 2 = How much does the condition of your teeth lips, jaws or mouth affect your life or well-being overall?

*Wilcoxon test. Significant at $p < 0.05$

**N=78 adolescents

Table 4 shows the comparison of adolescents' global rating of the adolescent's health before and 12 months after banding and fixed appliances' bonding. Adolescents reported that the health of their teeth, lips, mouth and jaws significantly improved after 12 months of orthodontic treatment with fixed appliances ($p < 0.001$). Adolescents also reported that their overall lives or well-being was significantly less affected by the condition of their teeth lips, jaws or mouth after 12 months of orthodontic treatment with fixed appliances ($p = 0.026$).

Table 5 demonstrates the comparison of parents'/caregivers' global rating of the adolescent's health before and 12 months after banding and fixed appliances' bonding. Parents/caregivers reported that the health of their adolescents' teeth, lips, mouth and jaws significantly improved after 12 months of orthodontic treatment with fixed appliances ($p < 0.001$). Parents/caregivers also reported that their adolescents' overall lives or well-being was significantly less affected by the condition of their teeth lips, jaws or mouth after 12 months of orthodontic treatment with fixed appliances ($p < 0.001$).

Table 5: Comparison of global rating of the adolescents' health before and 12 months after banding and fixed appliance bonding (parents/caregivers report)

	Before fixed appliance bonding		12 months after fixed appliance bonding		<i>p value</i> *
	Median (Mean)	Interval Interquartil	Median (Mean)	Interval Interquartil	
Question 1**	2.00 (2.10)	1.00 – 3.00	2.00 (1.66)	1.00 – 2.00	<0.001
Question 2**	2.00 (1.73)	1.00 – 3.00	1.00 (0.90)	0.00 – 1.00	<0.001

Question 1 = How would you rate the health of your adolescent's teeth, lips, jaws and mouth?

Question 2 = How much is your adolescent's overall life or wellbeing affected by the condition of his/her teeth lips, jaws or mouth?

*Wilcoxon test. Significant at $p < 0.05$

**N=79 parents/caregivers

The power of the study was calculated using the Power and sample Size Calculation Program (PS, version 3.0, Nashville, USA). For sample power calculation, information on question 1 before fixed appliance bonding and 12 months after fixed appliance bonding for adolescents and their parents/caregivers was used. For adolescents, the difference in the mean between the score before fixed

appliance bonding and the score 12 months after fixed appliance bonding was 0.50. The pooled standard deviation was 0.93. The number of adolescents was 78 and type I error was 0.05. Therefore, the power of the study was 99%. For parents/caregivers, the difference in the mean between the score before fixed appliance bonding and the score 12 months after fixed appliance bonding was 0.44. The pooled standard

deviation was 0.90. The number of parents/caregivers was 79 and type I error was 0.05. Therefore, the power of the study was 98%.

Discussion

The present study evaluated the general health of the adolescent and how the oral and orofacial condition affects his/her life and well-being, from the perspective of the adolescents themselves and from the perspective of their parents/caregivers. The scores of parents/caregivers were higher than those of the adolescents. There is a sharp contrast between the result presented herein and our hypothesis through which we had stated that adolescents would have higher scores compared with their parents/caregivers. Thus, it is suggested that parents/caregivers are more bothered by the impact that malocclusion generates on the general life or well-being of their sons/daughters than the adolescents themselves. After 12 months of orthodontic treatment onset, adolescents and parents/caregivers considered that the life and general well-being of adolescents had improved.

The results of this study are in agreement with the results of other studies found in the literature, in which the perception of parents/caregivers on the malocclusion of adolescents was evaluated.^{25,26} This negative perception is mainly based on the clinical characteristics of the position of the teeth. Tooth misalignment and crowding of teeth disturbs not only adolescents, but also their parents/caregivers.^{27,28} Malocclusion in adolescents can lead to family problems, involving the feeling of guilt and irritation

on the part of parents/caregivers, since they feel responsible for the deteriorated oral health of their sons/daughters. Disagreements among family members may also take.^{29,30,31}

This negative perception makes parents/caregivers think that they need to worry and make decisions about their adolescents' oral health.³² However, another study demonstrates a small percentage of parents/caregivers who are concerned with adolescents' regular visits to the dentist.³³ During the consultations, the clinician must provide guidance to show to parents/caregivers, demonstrating to these individuals show to parents/caregivers their essential role for the success of the adolescent's dental treatment. Parents/caregiver are also the main decision makers with respect to the health of the young individual. Therefore, parents/caregivers can assist the adolescent in the oral health care at home, based on the guidelines and recommendations given by the dentist with respect to tooth-brushing, flossing and diet.^{34,35}

The literature has several studies that discuss the role of orthodontic treatment in improving the well-being of adolescents.^{36,37,38} This is due to the psychosocial impact of dentofacial aesthetics on the life of an adolescent and the impairment of functions caused by severe dento-skeletal discrepancies.³⁹ The correction of malocclusion by means of orthodontic treatment contributes to increase the patient's self-esteem, directly benefiting his/her mental and psychological health.⁴⁰ However, during orthodontic treatment, the adolescent may encounter adversity, such as pain and chewing

impairment. These factors associated with the lack of guidelines/recommendations of the orthodontist may culminate in the discontinuation of treatment by the adolescent¹¹. Given the benefits to the adolescent's well-being and the negative impact of malocclusion,^{9,12,13} the practitioner should advise parents/guardians on the importance of starting treatment for malocclusion in the early stages and explain to the patient and to his/her parent/caregiver that even though possible inconveniences on the course of treatment may take place, the adolescent undergoing fixed appliance therapy is paving the way towards a better appearance and improved aesthetics.⁴¹

It is important to recognize the limitations of this study. Ideally, the orthodontic treatment should have been carried out by the same orthodontist. Herein, residents in the Orthodontic Program of the Federal University of Minas Gerais conducted the treatments. Therefore, differences in the orthodontic skills among residents should have had influence on the results.

Conclusion

In comparison to the adolescent himself/herself, parents/caregivers have a more negative perception regarding the impact of malocclusion on the life and well-being of an adolescent. After 12 months of orthodontic treatment onset, parents/caregivers and adolescents considered that the adolescent's overall health and well-being had improved.

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