QUALITY OF LIFE AND ADHERENCE TO DENTAL TREATMENT IN ADOLESCENTS: A LONGITUDINAL ANALYTICAL STUDY

Jaqueline Vilela BULGARELI[1] iD, Karine Laura CORTELLAZZI[2] iD, Luciane Miranda GUERRA[2] iD, Glaúcia Maria Bovi AMBROSANO[2] iD, Silvia Leticia FREDDO[2] iD, Inara Pereira DA CUNHA[2] iD, Antonio Carlos PEREIRA[2] iD

[1] Faculty of Dentistry of Uberlândia, Universidade Federal de Uberlândia, Uberlândia, Minas Gerais, Brazil.
[2] Department of Community Dentistry, Piracicaba Dental School, State University of Campinas, Campinas, São Paulo, Brazil.

Corresponding author:
Inara Pereira da Cunha
inara-pereira@hotmail.com

Abstract

The study aimed to analyze the quality of life, oral health impact on daily activities and its association with adherence to dental treatment, and other factors, among vulnerable adolescents. It is a longitudinal analytical study performed with 15- to 19-year-old adolescents in the city of Piracicaba, São Paulo, from 2014 to 2015. The sample consisted of 476 adolescents referred for the treatment of caries and/or periodontal disease in family health units (initial phase). After 18 months, 325 individuals were assessed to investigate the dental treatment provided (final phase). The response variables considered in the final phase were the Quality of Life (WHOQOL-bref) and the Oral Impacts on Daily Performances (OIDP) questionnaires. The independent variables analyzed were sex, age, treatment adherence, and family cohesion and adaptability. A multiple regression model was used. The data on the physical (p<0.0001), social (p=0.0003), environmental (p<0.0001), and psychological (p<0.0001) domains of the WHOQOL collected in the initial phase had a positive relationship with the same domains assessed in the final phase. The WHOQOL data of the initial phase were associated with the WHOQOL data of the final phase (p=0.0341). The OIDP data of the initial phase were associated with the OIDP data of the final phase (p<0.0001). The OIDP of volunteers who did not adhere to dental treatment showed a higher impact (p=0.0234). The quality of life and impacts on daily performances of adolescents improved between the evaluation periods.

Keywords: Adherence. Adolescents. Dental care. Quality of life. Longitudinal study.

1. Introduction

Adolescents have specific biophysical, intellectual, and emotional characteristics (Sawyer et al. 2012). This scenario may reflect their relationship with health and risk-taking behaviors, especially among adolescents that live in vulnerable situations, considering that those without access to basic goods and services are more susceptible to diseases and other health problems (Institute of Medicine 2011).

Vulnerable adolescents must behave toward their health protection (Souza et al. 2019) but this life stage leads to the appearance of some intrinsic challenges.

As they reach adolescence, important health decisions are no longer a responsibility shared only between parents and health professionals (Garanito and Lucia 2019). Therefore, health care becomes more complex because it mainly depends on the participation of the adolescent in medical decision-making

regarding treatment (Diekema 2020). However, there is a common misconception that factors related to patient behavior would be the only issues responsible for affecting a person's capacity to adhere to treatment (Freddo et al. 2018).

The World Health Organization considers that adherence could interact with various dimensions related to social and economic factors, health care systems/teams, therapies, and patient-related factors (Sabaté 2003).

Thus, treatment adherence depends on the desire of patients to accept some type of guidance. This desire might be encouraged by explaining the consequences and advantages of the treatment (Vazquez et al. 2015). It might also be stimulated by strong subjective influences acquired in the dynamics of the family environment and the perception of the positive effects of the treatment on their daily lives (Stiggelbout et al. 2015).

Quality of life is affected by the adoption of healthy habits such as a balanced diet, regular practice of physical exercise, and preventive and curative treatments, thus reducing health risks (Rippe 2018).

Dental treatment is a part of required health care actions because dentistry covers a significant range of oral diseases, such as dental caries and periodontal disease, and improves the oral health-related quality of life (Marozene et al. 2019).

Previous studies have identified a better quality of life after dental treatment among vulnerable adolescents (Brondani et al. 2018; Maroneze et al. 2019). This supports the hypothesis that vulnerable adolescents who do not adhere to dental treatment present worse quality of life and oral health impact on daily activities.

To test this hypothesis, this study aimed to analyze the quality of life, oral health impact on daily activities and its association with adhesion to dental treatment, and other factors, among vulnerable adolescents assisted by the primary oral health care team.

2. Material and Methods

Type of study and ethical criteria

It is an analytical, longitudinal, and observational study. All national (National Health Council) and international (Declaration of Helsinki) ethical practices related to research involving human beings were respected. An Independent Human Research Ethics Committee approved the project (protocol number #27/2011). Consent was obtained from the parents before starting the study.

Study location

This study was conducted in the city of Piracicaba, São Paulo, Brazil, during the second half of 2014 and the first half of 2015, with 15- to 19-year-old adolescents. Piracicaba has an estimated population of approximately 391,449 inhabitants and a human development index (HDI) of 0.84. It has 68 districts distributed into five administrative regions (North, South, East, West, and Downtown area), including a population of 28,539 15- to 19-year-old adolescents (IBGE 2011).

Initial phase

The adolescents lived in the area covered by the family health units (FHUs) and were enrolled in state schools within the scope of these units. Each FHU team provides primary care for families residing in a circumscribed region of approximately 4,000 individuals.

The city has 34 FHUs, of which 12 have oral health teams. An average of 320 adolescents between the ages of 15 and 19 was registered in each unit, amounting to approximately 11,000 individuals. The highest Social Exclusion Index (SEI) (≤-0.75) was found in the regions where the adolescents participating in this research lived. The value of this index is determined by the Institute of Research and Planning of Piracicaba (IPPLAP) and ranges from -1 to 1 (Piracicaba 2003).

During the home visits, the community-health agent of the FHU handed the informed consent forms to the guardians so they would authorize the adolescents to participate in this study. These agents also scheduled the date and time the participants would go to the health units for examinations.

At the beginning of the study (initial phase), which aimed to investigate the prevalence of major dental problems, the sample size was calculated based on caries experience found in the Southeast region of Brazil, using data from the previous National Epidemiological Survey (Brasil 2012). This phase included the 34 FHUs in the city corresponding to the study universe and samples were randomly selected among the adolescents registered in these units. The study accepted a 5% sampling error, DMFT=5.16 with standard deviation=4.54, a 20% sample loss, and a 95% confidence interval, obtaining a sample of 1,428 individuals aged 15 to 19 years randomly selected. From this total, 249 failed to appear on the examination day or did not wish to participate. Therefore, 1,179 adolescents were examined. The tests were performed on the facilities of the FHUs and at the state high schools by two examiners (previously calibrated and aided by two note-takers), in an outdoor setting, under artificial light using a flashlight, and toothbrushing previously performed with the help of a Dental Assistant. For each examination, a ballpoint probe and plane oral mirror were used (WHO 1997). The data were collected for the following clinical characteristics: caries by the DMFT index (decayed, missing, and filled teeth) and periodontal disease (Community Periodontal Index-CIP) by the World Health Organization (WHO 1997).

The inclusion criteria were the absence of systemic diseases, communication challenges, neuromotor problems, the absence of severe hypoplasia, and the absence of orthodontic appliances. Individuals who did not agree to participate in the study and those absent on the day of the examination were excluded from the sample.

Final phase

Eighteen months after the initial tests, the researchers returned to the health units to reassess the adolescents referred for treatment in the initial phase of the study. From the 1,179 adolescents examined in the initial phase, 474 of them needed dental treatment (presence of caries and/or periodontal disease). They were instructed to schedule an appointment at an FHU, where the professionals were fully prepared to receive them. In the FHUs without an oral-health team, the adolescents received a referral form and were instructed to seek the nearest reference unit for treatment.

A new clinical assessment was performed under the same conditions and with the same examiners who had worked in the initial phase. Among the 474 adolescents, some individuals (n=131) had changed their address or telephone number, moved to other cities (n=9), or refused to participate in the research (n=9), which resulted in 325 participants. To analyze the group without follow-up, descriptive analyses were performed with frequencies and percentages for categorical variables and mean, standard deviation, median, and minimum and maximum values for quantitative variables. Effect sizes between the two groups were also calculated. The analyses were performed in the SAS (SAS 2001) and GPower software, with a 5% significance level. The effect size was low to medium (0.02 to 0.30, according to Cohen 1988) and, therefore, did not affect the significance values found in the final model.

The adherence to dental treatment of adolescents was investigated. The clinical examination was collected in the two phases of the study (initial and final) to verify who adhered to the dental treatment. A clinical examination in the final phase was performed to confirm whether the tooth that had been diagnosed with caries and/or periodontal disease had been treated, which would be considered adherence by those who no longer had caries disease. Additionally, the participants were asked if and when they had been seen for a dental appointment at that time. Those who sought dental care and concluded the treatment were considered "adherent" (n=164). Conversely, the adolescents who did not seek dental care or sought care but did not complete the treatment were considered "non-adherent" (n=161), amounting to 325 (68.5%) of the adolescents reassessed.

Training and calibration

The theoretical-practical activities of training and calibration exercises consisted of the following seven periods: one theoretical period of 4 hours, four clinical training sessions of 4 hours each (a total of 16 h), and two calibration exercises of 4 hours each (a total of 8 hours). The training stage consisted of a theoretical discussion followed by a practical stage, during which the examiners evaluated 12 adolescents per period. The final calibration exercise consisted of two periods (total of 8 hours) resulting in mean inter-examiner Kappa values of 0.95. To verify the maintenance of the diagnostic criteria and intra-examiner error, 10% of the sample was re-examined, showing mean Kappa values of 0.96. The examiners were trained and calibrated in both initial and final phases.

Study variables and instruments

Patient characteristics (age and sex) were collected during the clinical examination. The variables related to subjective factors that affected the behavior of treatment adherence were related to family cohesion and adaptability, quality of life, and oral health impact on daily activities.

To assess the perceived family cohesion and adaptability, the FACES III (Family Adaptability and Cohesion Scale) questionnaire, validated in Brazil (Falceto 2000), was applied in the initial phase to investigate familial functioning and risk by collecting data on family cohesion and adaptability. The existent domain of family cohesion is based on whether family members are separated or connected and whether they support one another or not. The domain of family adaptability analyzes the ability of the family system to change its power structure, roles, and relationship rules in response to a demand or problem. The instrument consists of 20 questions, in which odd-numbered questions assess cohesion and even-numbered questions assess adaptability. For each question, a value from 1 to 5 is assigned, with 1= "hardly ever" and 5= "almost always." The sum of the values is determined and the final score can range from 5 to 10 for each domain.

The Quality of Life (WHOQOL-bref) questionnaire, validated in Brazil by Fleck et al. (2000), and the Oral Impacts on Daily Performances (OIDP) questionnaire were the instruments applied in the initial and final phases to determine whether adherence to dental treatment impacted the quality of life and/or daily activities of the adolescents examined.

Adherence to dental treatment (yes or no) and sex (male or female) were considered individual categorical variables, and age, WHOQOL-bref, OIDP, and family cohesion and adaptability were non-categorical variables.

The WHOQOL-bref refers to a transcultural nature index that values the perception of people of their QOL. It consists of 26 questions, with two general questions on health and quality of life self-perception. The other 24 questions represent four domains: physical, psychological, social, and environmental relationships (Skevington et al. 2004).

All WHOQOL-bref questions are measured with the 5-point Likert scale: never/nothing/very dissatisfied (1), sometimes/rarely/dissatisfied (2), often/medium/neither satisfied nor dissatisfied (3), very often/highly/satisfied (4), and always/completely/very satisfied (5). The score of each question varies from 1 to 5 points, thus indicating that the higher the score the better the quality of life, except for pain and discomfort, which are negative feelings, and medication dependence, which has a reverse score. The sum of the instrument from each individual and the sum by domain are calculated to allow comparisons and analyses (Skevington et al. 2004).

The OIDP is a dental social indicator that measures the impact of oral health conditions on daily activities, and it was validated by Adulyanon and Sheiham (1997). The OIDP assessed the frequency, intensity, and impact of oral conditions on the ability of individuals to develop eight daily functions, divided into three performance groups: physical (eating and appreciating food, speaking and pronouncing words clearly, and performing dental hygiene), psychological (sleeping and relaxing, smiling, laughing and showing teeth without embarrassment, and maintaining a balanced emotional state), and social (working, performing a social role, and enjoying social gatherings). The frequency that individuals are affected negatively by the conditions presented in the OIDP is assessed with a stratified frequency scale: 0 (never over the last six

months), 1 (less than once a month), 2 (once or twice a month), 3 (once or twice a week), 4 (three or four times a week), 5 (every day or almost every day). The OIDP also assessed perceived intensity, in which the respondents grade the level of difficulty of that function in their daily lives, from 0 (none or unknown) to 5 (extremely severe).

The impacts of the OIDP are quantified by multiplying the frequency by severity to obtain a performance score for each of the eight dimensions. The total score is divided by the maximum possible score (200) and multiplied by 100 to obtain the result in percentage form (Adulyanon and Sheiham, 1997).

Data analysis

The data were analyzed with generalized linear models (PROC GENMOD of the SAS software). The response variables analyzed were WHOQOL and OIDP in the final phase. The WHOQOL and OIDP of the initial phase were included in the study with a control variable (covariate). The independent variables collected in the initial phase were sex and family cohesion and adaptability. The values for the variables "age of the volunteers" and "adherence to dental treatment" were collected in the final phase. The model was adjusted for deviance (value/DF) and AICc (Corrected Akaike Information Criterion), and the best adjustment was achieved with Poisson distribution for quality of life and gamma distribution for OIDP. The significant variables with $p \leq 0.05$ remained in the final model.

Model 1 tested the association between adherence to dental treatment and the WHOQOL and OIDP collected in the final phase of the study, which was adjusted for all other variables. In model 2, only the variables that were significant in Model 1 were adjusted.

3. Results

The 325 adolescents who needed treatment had a mean age of 17 years (SD=1.3). Among them, 188 (57.8%) were women and 137 (42.2%) were men. The effect sizes (Cohen, 1988) for the variables of sex, age, oral health impact on quality of life, and OIDP between groups with and without follow-up were low to medium and did not affect the significance found in the final model.

Table 1 presents the descriptive analysis, including the mean, standard deviation, median, and minimum and maximum values of the domains of quality of life (WHOQOL-bref) and OIDP in both assessment periods (initial and final), according to adherence to dental treatment.

Table 2 presents the multiple regression model for the domains of WHOQOL-bref. The physical (p<0.0001), social (p=0.0003), environmental (p<0.0001), and psychological domains (p<0.0001) collected in the initial phase had a positive relationship with the same domains assessed in the final phase.

Table 3 shows the multiple regression model for WHOQOL-bref in the final phase. Only the WHOQOL data of the initial phase was associated with the WHOQOL data of the final phase, showing a positive relationship between the two variables (p=0.0341).

Table 4 shows the multiple regression model for OIDP in the final phase. The OIDP data of the initial phase was associated with the OIDP data of the final phase, showing a positive relationship between the two variables (p<0.0001). It was also found that the volunteers who did not adhere to dental treatment showed a higher impact on daily activities (p=0.0234).

Table 1. Oral and general quality of life (WHOQOL and OIDP) in both times of assessment according to adherence to dental treatment, 2015.

Adherence	WHOQOL	Average	SD*	Median	Minimum	Maximum
No (N=161)	Initial	15.04	1.62	15.10	10.80	19.40
	Final	14.95	1.90	15.20	7.36	21.85
Yes (N=164)	Initial	15.20	1.73	15.40	10.20	19.10
	Final	15.27	1.64	15.38	10.40	20.00
	Physical Domain					
No (N=161)	Initial	15.82	2.00	16.00	10.29	20.00
	Final	15.45	2.01	15.46	9.71	20.00
Yes (N=164)	Initial	16.01	1.94	16.00	9.71	20.00

	Final	15.93	1.85	16.00	10.86	20.00
Psychological Domain						
No (N=161)	Initial	15.14	2.30	15.33	8.67	20.00
	Final	15.39	3.43	15.33	4.67	43.67
Yes (N=164)	Initial	15.23	2.07	15.33	8.67	19.33
	Final	15.48	2.00	16.00	10.86	20.00
Social Domain						
No (N=161)	Initial	15.98	2.91	16.00	6.67	20.00
	Final	15.88	3.02	16.00	6.00	20.00
Yes (N=164)	Initial	16.29	2.48	16.00	6.67	20.00
	Final	16.14	2.48	16.00	8.00	20.00
Environmental Domain						
No (N=161)	Initial	13.65	2.12	14.00	7.50	19.00
	Final	13.72	2.32	14.00	6.00	19.00
Yes (N=164)	Initial	14.02	2.12	14.00	6.00	20.00
	Final	13.89	2.45	14.00	4.00	20.00
OIDP						
No (N=161)	Initial	9.99	21.62	0.00	0.00	125.00
	Final	5.52	10.67	0.00	0.00	55.00
Yes (N=164)	Initial	7.07	18.32	0.00	0.00	135.00
	Final	3.84	8.33	0.00	0.00	53.00

*Standard Deviation.

Table 2. Multiple regression model for the domains of WHOQOL-bref assessed in the final phase, 2015.

Physical Domain	Model 1			Model 2		
	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value
Intercept	2.1789	0.2552	<0.0001	2.2868	0.1164	<0.0001
Adherence (ref=No)	0.0246	0.0291	0.3964			
Physical, initial phase	0.0270	0.0077	0.0004	0.0292	0.0072	<0.0001
Gender (ref=Female)	0.0440	0.0303	0.1461			
Age	0.0040	0.0115	0.7251			
Family cohesion	0.0020	0.0027	0.4524			
Family adaptability	-0.0009	0.0028	0.7460			

Psychological domain	Model 1			Model 2		
	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value
Intercept	2.2770	0.2469	<0.0001	2.3294	0.1014	<0.0001
Adherence (ref=No)	-0.0009	0.0292	0.9766			
Psychological, initial phase	0.0260	0.0071	0.0002	0.0267	0.0066	<0.0001
Gender (ref=Female)	0.0288	0.0306	0.3457			
Age	0.0025	0.0116	0.8328			
Family cohesion	0.0002	0.0027	0.9289			
Family adaptability	0.0002	0.0028	0.9372			

Social Domain	Model 1			Model 2		
	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value
Intercept	2.3886	0.2279	<0.0001	2.4634	0.0869	<0.0001
Adherence (ref=No)	0.0064	0.0287	0.8234			
Social, initial phase	0.0199	0.0054	0.0002	0.0191	0.0053	0.0003
Gender (ref=Female)	-0.0043	0.0329	0.8834			
Age	0.0055	0.0113	0.6228			
Family cohesion	-0.0008	0.0027	0.7603			
Family adaptability	-0.0001	0.0027	0.9743			

Environmental Domain	Model 1			Model 2		
	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value
Intercept	1.9597	0.2633	<0.0001	2.1412	0.0999	<0.0001
Adherence (ref=No)	-0.0096	0.0309	0.7573			
Environment, initial phase	0.0358	0.0075	<0.0001	0.0348	0.0071	<0.0001
Gender (ref=Female)	0.0068	0.0317	0.8294			
Age	0.0066	0.0123	0.5938			
Family cohesion	0.0018	0.0029	0.5312			
Family adaptability	0.0001	0.0029	0.9629			

Table 3. Multiple regression model for WHOQOL-bref assessed in the final phase, 2015.

Variable	Model 1			Model 2		
	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value
Intercept	2.3738	0.2661	<0.0001	2.4360	0.1331	<0.0001
Adherence (ref=No)	0.0135	0.0296	0.6481			
WHOQOL Bref - initial phase	0.0174	0.0090	0.0541	0.0185	0.0014	0.0341
Gender (ref=Female)	0.0342	0.0301	0.2554			
Age	0.0025	0.0118	0.8317			
Family cohesion	0.0015	0.0028	0.5843			
Family adaptability	-0.0013	0.0028	0.6528			

Table 4. Multiple regression model for OIDP assessed in the final phase, 2015.

Variable	Model 1			Model 2		
	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value
Intercept	0.1735	0.0952	0.0684	0.1026	0.0361	0.0045
Adherence (ref=No)	0.0300	0.0137	0.0281	0.0308	0.0136	0.0234
OIDP - initial phase	-0.0006	0.0002	0.0015	0.0007	0.0001	<0.0001
Gender (ref=Female)	0.0014	0.0144	0.9225			
Age	-0.0039	0.0043	0.3711			
Family cohesion	-0.0009	0.0014	0.5164			
Family adaptability	0.0004	0.0015	0.7703			

4. Discussion

Testing the hypothesis that prompted this study resulted in important reflections. The quality of life and oral impact on the daily activities of vulnerable adolescents (outcome variables of this study) were associated with dental treatment, which shows that dental care caused a positive contribution to the lives of these patients. Similar results were found in other studies (Brondani et al. 2018; Maroneze et al. 2019). Although the independent variable of adherence was associated with the impact on daily activities and not with the quality of life, the way the variable of adherence to dental treatment was treated in the analysis of the present study (performing dental treatment or not) should be considered. This may not reveal whether professional recommendations were used and deleterious habits were changed, which may contribute to a better quality of life, and it should be further investigated in qualitative studies.

The association between oral health and its overall impact on the quality of life of individuals has been extensively discussed in the literature (Slade and Sanders 2011; Guerra et al. 2014). The results of research on this topic show that health self-perception is potentially associated with individual characteristics and the life context of the subjects investigated (Gabardo, 2013).

Thus, previous research performed with vulnerable adolescents did not identify an association of adherence to dental treatment with the oral health impact on daily activities (Bulgareli et al. 2021). The authors indicate that socioeconomic conditions can mediate adherence to dental treatment and that sociocultural conditions and the relationship of instruction between professionals and patients must be explored regarding adherence to dental treatment.

The relationship between the WHOQOL data of the final and initial phases was significant, showing that all adolescents who were advised to schedule an appointment with a dentist improved their quality of life at the end of the study. A study performed in Brazil with 182 adolescents aged 10 to 15 years identified that one month after finishing the dental treatment, there were higher scores in the questionnaire that measured the relationship between oral health and quality of life. The increase in the final score of the questionnaire is justified by qualitative findings in which the adolescents mentioned that the reduction in dental problems helped to improve self-esteem and social relationships. This shows that there is a psychosocial meaning to dental treatment, which reflects in improved quality of life at the end of the interventions performed (Maroneze et al. 2019).

Although adolescents who did not adhere to the dental treatment were expected to have a worse overall quality of life, this outcome was not found in the present study. This can be explained by the specificity of the quality-of-life instrument used in the data collection. Even if the adolescents were

immersed in the objective nature of the social, cultural, and environmental context, the WHOQOL-bref instrument reflected the subjective nature of the assessment, meaning the perception of respondents being assessed at that time (Fleck 2000), regardless of the perception of family or health professionals for these domains. Another potential bias would be the prior experience of the adolescents with the instrument (in the initial phase), which may have facilitated a better understanding and adaptability in the final phase of the study.

Another important factor to consider would be the set of aspects that comprise the quality of life. In a broader sense, the living standards, degree of independence, social relationships, personal beliefs, and relationship with the environment of the individuals are included (Fleck 2000). The questions in the WHOQOL-bref cover a singular and specific feature of individuals related to temporality. Therefore, the questions depend on the memory of respondents because they are answered according to the perception of the adolescents over the previous two weeks. This was noted when the participants sometimes did not remember how they felt about certain aspects of the instrument. Finally, the findings of our study should provide new insights into the association of adherence with the quality of life of Brazilian adolescents. However, further research is suggested to prove these findings.

Our findings indicated that the initial scores of the physical, social, environmental, and psychological domains were associated with these same domains in the final phase. This result showed that the adolescents improved their quality of life between the two phases of the study or at least noticed some difference. Therefore, none of the WHOQOL domains interfered with the quality of life of the adolescents not subjected to dental treatment.

Oral health perception seems dissociated from general health because the quality of life measured in both evaluation periods was not significant and did not affect negatively the adolescents who had oral diseases and needed dental care. However, our findings do not support those of previous studies, such as the one by Reis et al. (2010), which assessed adherence related to other diseases and found that the psychological domain affected negatively the quality of life even for individuals who adhered to treatment. However, it is worth noting that this study had different aims and designs, which can be a reason for caution when comparing them with our findings.

The WHOQOL has been developed based on the assumption that the concept of quality of life is comprehensive and can be applied to various diseases and non-medical conditions (Almeida-Brasil et al. 2017). However, for some groups of persons or diseases, the WHOQOL may not assess the quality of life completely or appropriately. In these cases, the application of another instrument would be indicated to assess the circumstances and particularities of the disease in question. Therefore, this study also required the application of the OIDP instrument, which assesses specific problems involving the mouth and teeth.

Therefore, the impact of oral health on the daily activities of the respondents decreased from the initial to the final OIDP (i.e., those who did not adhere to dental treatment experienced a higher impact on daily activities). This was confirmed by other findings of the present study. For example, a significant portion of the adolescents did not adhere to treatment even when they presented caries and pain (76%); periodontal disease and pain (53.7%); and caries, periodontal disease, and reported pain (22%). This development was concerning because it showed that the individuals who needed dental care the most did not seek care and, consequently, experienced a decline in their quality of life.

Supporting these findings, previous studies have revealed that patients not subjected to dental treatment reported a higher impact on daily activities (Bulgareli et al. 2018). For Usha (2013), oral health perception and satisfaction with the mouth were strongly associated with the quality of life and lower prevalence of oral impacts.

Each population has distinct experiences regarding health conditions, which depend on lifestyle, socioeconomic status, and access to health services (Papageorghiou 2020). The quality of oral health is relevant to adolescents because they have different perceptions, considering that their social and psychological coping skills are still developing.

The transformations arising from this maturing phase in the lives of adolescents can cause a great impact on either their self-concept or self-esteem, which can play an important role and cause behavioral changes in the approach to oral health, such as lack of care for their teeth and non-adherence to the recommended dental treatment (Freddo et al. 2018). This type of uncaring behavior can interfere with the

socialization of these young individuals and change their relationship with the environment in which they are inserted (Bulgareli et al. 2018).

Poor oral health conditions can have extensive effects on overall health. The determinants of oral diseases such as diet, hygiene, smoking, alcohol, and risky behavior are predisposing factors for several chronic diseases (Sanchez et al. 2017). Moreover, oral conditions have a psychological effect on families by negatively affecting the quality of life (Butten et al. 2019). Therefore, it is suggested to address risk factors by integrating oral health into strategies of education and general health promotion, in addition to monitoring and evaluating adherence to dental treatment and determining whether oral health has an impact on the quality of life of adolescents.

Although municipal health teams know the location of underprivileged families and actively seek individuals likely to be sick, it is important to consider that the paradigm of health with the quality of life requires a comprehensive effort that goes beyond the health sector and holding the agent exclusively responsible for making this concept a reality. The involvement of multiple sectors of society is necessary, such as social assistance, sanitation, housing, and especially education. Therefore, researchers of further projects should seek actions and strategies to create awareness among adolescents about the importance of dental treatment and oral health care. Family health teams would perform these actions in partnership with education professionals and share the responsibility for coordinating the care of schoolchildren (Almeida-Brasil et al. 2017).

Therefore, educational and health-promotion practices could produce ways to help adolescents to think about and adhere to professional guidance and treatment more spontaneously. During the 90s, the WHO developed the concept of health-promoting schools. They were created with a multifactorial approach that developed health topics in the classroom and transformed the physical and social environments of schools by creating bonding and partnership with the community (Langford et al. 2014), including the FHU.

In schools, health promotion activities with students, teachers, and staff need to be focused on the ability to interpret daily life and incorporate appropriate attitudes and/or behaviors to improve the quality of life. In this process, autonomy and competence should be encouraged for the full exercise of citizenship through a permanent attitude of empowerment of those involved, thus consolidating the basic principle of health promotion (Vazquez et al. 2015).

The difference of the present study was that it previously ensured the access of individuals to the appointments, by reaching a prior agreement with the oral health coordinator. Appointments in the schedules of the respective FHUs were made as soon as there was a need for treatment to avoid patients waiting in a "queue".

Nevertheless, nearly half of the adolescents did not adhere to the recommended treatment. The decision to seek dental care and undergo treatment may relate to the autonomy of participants and the degree of importance that oral health represents to these adolescents. Vazquez et al. (2015) confirmed this hypothesis by studying the justifications of adolescents for not adhering to dental treatment and verified that the need for dedicating attention to oral health, in the view of respondents, depended on what they considered urgent, important, and interesting.

Depending on the design used, the cause and effect relationship between the dependent and independent variables of the study can be explained. However, as they are monitoring studies, the loss of follow-up is likely a limitation.

Another important factor to consider in this study is the use of generalized linear models to observe the outcome over time. This factor, particularly in a life stage when changes are fast, complex, and meaningful as in adolescence, makes the results more consistent and less prone to measurement biases associated with subjective responses, which are affected by changes in the emotional state of respondents.

Finally, this study had some limitations. Despite using reliable and valid self-administered questionnaires and ensuring data confidentiality, there is a possibility of some information bias, as some instruments were subjective and depended on the memory of participants. Moreover, researchers point out that young people may not respond truthfully to the questionnaires (Brenner et al. 2016). However, other studies have revealed that in research with large samples, the self-administered instruments can be considered the gold standard for their easy applicability and low operating costs (Razanamihaja et al. 2017).

A causal relationship between adherence and OIDP probably cannot be confirmed with this study alone, thus other longitudinal studies are required to assess the causal relationship.

The literature on this topic is scarce and this study on the investigation and adherence to dental treatment and the association with impact on daily activities is potentially new. It is suggested that qualitative studies should be developed to deepen the understanding of the effects of dental treatment on the psychological aspects of adolescents, especially those in vulnerable situations.

5. Conclusions

The quality of life of socially underprivileged adolescents improved between the evaluation periods. There was an increase in the quality of life not related to adherence. Moreover, there was a higher impact on daily activities in participants who did not adhere to dental treatment and consequently experienced worse quality of life. These results corroborated the fact that oral health is an inseparable part of the whole, being determinant and important for the quality of life.

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