

A Multivariate Analysis of the Psychosocial Impact of Malocclusion and Self-Esteem in Adolescents

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ABSTRACT

Objective: To evaluate the psychosocial impact of malocclusion and self-esteem in adolescents in the Amazon region. **Material and Methods:** A cross-sectional study was carried out with 212 adolescents with 12-year-old enrolled in all public schools in the Boca do Acre (Amazonas, Brazil). Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) assessed the psychosocial impact of malocclusion. The self-perception of the need for orthodontic treatment was evaluated by the Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN) and Global Negative Self-evaluation (GSE), the adolescent's self-esteem. The malocclusion was clinically evaluated by the Dental Aesthetic Index (DAI). The variables with $p < 0.20$ in the individual analyses were tested in multiple logistic regression models, and those with $p < 0.10$ remained in the model. The adjusted odds ratio (OR) was estimated with a 95% confidence interval (CI). **Results:** Adolescents with low self-esteem were 2.20 (95% CI: 1.23-3.93) times more likely to have a more significant impact on dental aesthetics ($p < 0.05$). When verified by domains, the adolescents with low self-esteem had 2.33 (95% CI: 1.31-4.17) and 1.93 (95% CI: 1.09-3.42) times more likely to impact the psychological and social domains of the PIDAQ, respectively. **Conclusion:** Self-esteem influenced adolescents' perception of dental aesthetics in the domains related to psychological and social impact.

Keywords: Quality of Life; Esthetics, Dental; Adolescent.

Introduction

The aesthetics of the smile plays a fundamental role in the face's attractiveness and harmony [1-5] in all stages of life. In this sense, dissatisfaction with the alignment of teeth can influence the concern with the dentofacial appearance and, consequently, the self-perception of the need for orthodontic treatment, with functional and psychological implications [1,3,6-9].

In the same context, malocclusion influences an individual's social interaction and psychological well-being [8,10-12]. The higher the severity of malocclusion, the more significant the impact in the domains related to the individual's oral symptoms and functional limitations [1,2,12-18]. Also, the psychosocial aspects directly influence the perception of aesthetics [6,7,19] and are conditions that motivate the individual to seek orthodontic treatment [19].

Conditions related to oral health also play an essential role in the individual's self-esteem [20,21]. During adolescence, social identity and self-image are developed [22], and it is at that moment appearance becomes determinant in emotional well-being [18]. Thus, conditions related to face and appearance are associated with satisfaction and acceptance of body image, impacting the quality of life and, consequently, on the individual's self-esteem [6,20,23].

Self-esteem includes several aspects of the individual's context [20,21,24], including aesthetic concern. Self-perception with dental appearance starts early, with criteria similar to those of adults [1,25]. Thus, this study has its importance justified by contributing to understanding the aspects involved in malocclusion's aesthetic impact.

Thus, the study hypothesis was that the severity of malocclusion could impact the domains of quality of life-related to oral health (OHRQoL), specifically related to orthodontics, and associated with aesthetic perception, negatively influence adolescents' daily lives. In addition, this study evaluated the psychosocial impact of malocclusion and self-esteem in adolescents in the Amazon region.

Material and Methods

Ethical Aspects

This study was previously submitted and approved by the Human Research Ethics Committee (CAAE # 82394117.2.0000.5385). The adolescents and parents/caregivers signed an informed consent form authorizing their child's participation in the study.

Study Design and Setting

A cross-sectional study was conducted with adolescents from Boca do Acre (Amazonas, Brazil). Boca do Acre is located in the southwest region of the Amazonas and has an estimated population of 34,308 inhabitants with a Human Development Index of 0.58 (Atlas of Human Development). A sample of 12-year-old adolescents was selected from public schools in the Boca do Acre (Amazonas, Brazil). The Municipal Secretary of Education's information determined the distribution of 12-year-old adolescents in all city administrative districts, and the sample was stratified according to each district.

Participants

The sample size was calculated considering a significance level of 5%, a test power of 80%, an odds ratio of 2.0, and a minimum size of 200 adolescents were defined. The eligibility criteria were adolescents without current or previous orthodontic treatment and without physical or intellectual limitations that would prevent them from undergoing the examination. Adolescents with physical limitations, cleft lip and palate, or

any form of congenital craniofacial deformity were excluded from the study. Adolescents with incomplete questionnaires were also excluded. The final sample included the participation of 212 adolescents. Data collection was carried out between May and August 2019.

Training and Calibration Exercise

The clinical examination of malocclusion was performed by a single calibrated evaluator, who participated in theoretical and clinical training exercises based on the criteria proposed by the DAI index. Theoretical training was carried out with plaster models to discuss all the characteristics evaluated by the indexes. For clinical calibration, 20 adolescents were examined by the examiner to determine the inter-examiner agreement. Adolescents who participated in the clinical calibration were excluded from the main sample of this study. The inter-examiner Kappa coefficient was performed between the only examiner in the present study and a gold standard examiner. The Kappa coefficient was greater than 0.92 for the variable malocclusion.

Variables

The study's outcome variable was an orthodontic-specific OHRQoL measure (Psychosocial Impact of Dental Aesthetics Questionnaire, PIDAQ), classified by total score and four questionnaire domains. The independent variables were classified into and self-esteem (Global Negative Self-evaluation, GSE), self-perception of orthodontic treatment need (Aesthetic Component of the Index of Orthodontic Treatment Need, IOTN-AC) and malocclusion severity levels (Dental Aesthetic Index, DAI).

The adolescents answered the Brazilian version of the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) [26]. PIDAQ is an OHRQoL psychometric measure specific to orthodontics traits and developed to evaluate dental appearance impacts and perceptions. The scale consists of 23 items, divided into four domains: Dental self-confidence (1 to 6); Aesthetic concern (7 to 9); Psychological impact (10 to 15), and Social impact (16 to 23). Each item receives a score on a five-point scale, ranging from 0 (no impact) to 4 (maximum impact). An overall PIDAQ total score was obtained by adding the scores of all items, and the domain scores were obtained by adding the item scores in each domain [3,19,26-28]. This variable was dichotomized by the median of the total score and the instrument's domains [28].

Self-esteem was assessed using the Global Negative Self-evaluation (GSE). The GSE has six questions, which must be answered on a six-point scale, being: 1 - not applicable; 2 - does not apply well; 3 - applies a little well; 4 - applies reasonably well; 5 - it applies well and 6 - it applies precisely. The sum of all responses was performed and, to obtain the final score, it was divided by the number of questions in the instrument. For the present study, self-esteem was dichotomized into high self-esteem (≤ 2.69) and low self-esteem (> 2.70) [29,30].

For the subjective evaluation of malocclusion, the Aesthetic Component of the Index of Orthodontic Treatment Need (IOTN-AC) was used. The IOTN-AC assesses the individual's psychosocial needs using a dental attractiveness scale illustrated by ten color photographs that show a decreasing and continuous degree of attractiveness. The first photograph represents a more attractive occlusion, and the tenth photograph being less attractive. The adolescents themselves made the assessments, identifying the degree of aesthetic commitment in the pictures of the scale, considered similar to their smile. Adolescents who indicated photographs from 1 to 4 were categorized as without or with little need for orthodontic treatment (Grades 1 and 2). Adolescents who showed photographs from 5 to 10 were categorized with the need for orthodontic treatment (Grades 3 to 5) [31].

The Dental Aesthetic Index (DAI) was used to determine the severity of malocclusion based on the measurement of 10 clinical and aesthetic characteristics (number of lost incisors, canines and premolars, crowding, spacing, diastema, maxillary and mandibular misalignment, overjet maxillary and mandibular, open bite and molar ratio), where mathematically using an equation, produces a single score [32]. The severity of malocclusion was categorized into four degrees, as follows: DAI 1 (score ≤ 25) adolescents with or without mild malocclusion; DAI 2 (score 26 to 30) adolescents with defined malocclusion; DAI 3 (score 31 to 35) adolescents with severe malocclusion and DAI 4 (score ≥ 36) adolescents with very severe or disabling malocclusion [33].

Statistical Methodology

The psychosocial impact of dental aesthetics was considered an outcome variable (PIDAQ), using the general score and the domains: dental self-confidence, aesthetic concern, psychological impact, and social impact. In addition, independent variables were considered: self-esteem (GSE), self-perception of the need for orthodontic treatment (IOTN-AC) and malocclusion severity levels (categorized by the DAI).

To analyze the variables associated with the outcomes, simple logistic regression analyzes were performed between each independent variable and the outcomes, estimating the crude odds ratios with 95% confidence intervals. For multiple logistic regression, the independent variables tested were those with $p < 0.20$ in the individual analyzes, with those in the final model remaining with $p \leq 0.05$. The analyzes were performed in the R Program (R Foundation for Statistical Computing, Vienna, Austria) with a significance level of 5%.

Results

Table 1 presents the descriptive data and the absolute frequency of the independent variables. A total of 212 adolescents were assessed, 115 boys and 97 girls. Regarding the severity levels of the malocclusion, 18.4% of the adolescents did not present malocclusion (DAI = 1), 24.5% presented definite malocclusion (DAI = 2), 23.1% severe malocclusion (DAI = 3), and 34% very severe malocclusion (DAI = 4). Through the aesthetic component (IOTN-AC), 41.5% of the adolescents were classified as needing orthodontic treatment in the subjective evaluation. 34.9% of the participating adolescents had low self-esteem (scores > 2.70).

Table 1. Descriptive data (absolute frequency).

Variables	Categories	N (%)
Sex	Male	115 (54.2)
	Female	97 (45.8)
Malocclusion Severity Levels (DAI)	Without malocclusion	39 (18.4)
	Defined malocclusion	52 (24.5)
	Severe malocclusion	49 (23.1)
	Very severe malocclusion	72 (34.0)
IOTN-AC	No need of treatment	124 (58.5)
	In need of treatment	88 (41.5)
Self-esteem	High (≤ 2.69)	138 (65.1)
	Low (> 2.70)	74 (34.9)

Table 2 presents the crude and adjusted analyzes between the independent variables and the general score of the Psychosocial Impact of Dental Aesthetics. Adolescents with low self-esteem are 2.20 (95% CI: 1.23-3.93) times more likely to have a greater psychosocial impact of dental aesthetics ($p < 0.05$).

Table 2. Analyzes (crude and adjusted) of the associations between the impact of dental aesthetics on quality of life (Psychosocial Impact of Dental Aesthetics Questionnaire - PIDAQ) and the independent variables.

Variables	Categories	N (%)	PIDAQ		*OR Crude (#CI 95%)	p-value	*OR Adjusted (#IC95%)	p-value
			≤31 N (%)	>31* N (%)				
DAI	Without malocclusion	39 (18.4)	18 (46.2)	21 (53.8)	0.88 (0.40-1.93)	0.7537		
	Defined malocclusion	52 (24.5)	27 (51.9)	25 (48.1)	0.70 (0.34-1.43)	0.3295		
	Severe malocclusion	49 (23.1)	28 (57.1)	21 (42.9)	0.57 (0.27-1.80)	0.1295		
	Very severe malocclusion	72 (34.0)	31 (43.1)	41 (56.9)	1			
IOTN-AC	No need of treatment	124 (58.5)	65 (52.4)	59 (47.6)	1			
	In need of treatment	88 (41.5)	39 (44.3)	49 (55.7)	1.38 (0.80-2.40)	0.2455		
Self-esteem	High (≤2.69)	138 (65.1)	77 (55.8)	61 (44.2)	1		1	
	Low (>2.70)	74 (34.9)	27 (36.5)	47 (63.5)	2.20 (1.23-3.93)	0.0079	2.20 (1.23-3.93)	0.0079

*Reference category for the outcome variable; *Median; *Odds ratio; #Confidence interval.

Table 3 presents the crude and adjusted analyzes between the independent variables and the score by domains of the Psychosocial Impact of Dental Aesthetics. Adolescents with low self-esteem are 2.33 (95% CI: 1.31-4.17) and 1.93 (95% CI: 1.09-3.42) times more likely to have a greater psychosocial impact of dental aesthetics on the psychological impact and social impact domains respectively (p<0.05).

Table 3. Analysis of the association between the domains of the instrument of impact of dental aesthetics on quality of life (Psychosocial Impact of Dental Aesthetics Questionnaire - PIDAQ) and the independent variables.

Variables	Categories	Dental Self-confidence		Aesthetic Concern		Psychological Impact		Social Impact	
		OR* Crude (CI#)	*OR Adjusted	OR* Crude (CI#)	*OR Adjusted	OR* Crude (CI#)	*OR djusted	OR* rude (CI#)	*OR Adjusted
DAI	Without malocclusion	1.65 (0.75-3.63)		1.27 (0.58-2.79)		0.62 (0.28-1.38)		0.74 (0.33-1.62)	
	Defined malocclusion	1.35 (0.65-2.77)		1.09 (0.53-2.24)		1.17 (0.57-2.38)		0.84 (0.41-1.72)	
	Severe malocclusion	0.91 (0.43-1.93)		0.72 (0.34-1.54)		0.96 (0.46-1.98)		0.79 (0.38-1.65)	
	Very severe malocclusion	1		1		1		1	
IOTN-AC	No need of treatment	1		1		1		1	
	In need of treatment	1.14 (0.66-1.98)		0.98 (0.56-1.71)		1.29 (0.74-2.22)		0.89 (0.51-1.55)	
Self-esteem	High (≤2.69)	1		1		1	1	1	1
	Low (>2.70)	1.74 (0.99-3.09)		1.03 (0.58-1.83)		**2.33 (1.31-4.17)	**2.33 (1.31-4.17)	*1.93 (1.09-3.42)	*1.93 (1.09-3.42)

*Odds ratio; #Confidence interval; *p<0.05; **p≤0.01.

Discussion

This study evaluated the psychosocial impact of dental aesthetics in adolescents and the influence of the severity levels of malocclusion and self-esteem. Our findings showed that self-esteem is a modulating agent of the perception of the psychosocial impact of dental aesthetics.

Self-esteem is the individual's ability to accept and recognize his value [20,21] and can be influenced by family ties, the environment in which they live, and other people [34]. It also seems to be strongly associated with physical appearance in general [34,35].

Self-esteem seems to have a protective effect on the perception of malocclusion's psychosocial impact [34,36]. Adolescents with low self-esteem can identify small occlusal deviations; on the other hand, a more severe malocclusion may not be noticed in adolescents with high self-esteem [37]. However, especially in adolescence, there is still a lack of a better understanding of self-assessment and the influence of physical and psychosocial factors. The answers to this information gap become essential since the prevention and intervention of problems, even in adolescence, allow for balanced adult life [20,21]. For this, the present study set out to investigate conditions that affect the psychosocial impact of dental aesthetics in adolescents.

Based on the results, the study's main finding showed that low self-esteem was associated with the greatest psychosocial impact of dental aesthetics in the total scores and individually in the psychological and social impact domains of the index. Our results did not allow comparison with previous studies, as this association had not yet been made. However, they can be justified by what was proposed by Klages et al. [27] for each domain. The domains "dental self-confidence", "social impact" and "psychological impact" are related to the aesthetic impact on the individual's emotional state, to social problems due to unfavorable dental appearance, and the feeling of inferiority or unhappiness when compared with individuals with dental aesthetics higher education, respectively [27].

Although malocclusion did not present significance with the impact of dental aesthetics, more than half of the adolescents who participated in the study presented severe or very severe malocclusion according to the normative assessment of both indexes used, corroborating with a previous study, which found that regardless of the severity of the malocclusion, there was no association with the psychosocial impact [2].

Previous studies suggest that untreated malocclusion negatively affects psychosocial domains related to the OHRQoL [12,38], and it is known that orthodontic treatment has a positive psychological impact. Also, improving the individual's self-esteem and social interaction could be observed after orthodontic treatment [37]. However, based on previous studies, malocclusion was associated with the impact on the OHRQoL when individuals had low self-esteem [36,39].

Regarding the presence of malocclusion and its effects, its identification is generally based on clinical criteria without considering the individual's perception [3]. However, by ignoring subjective needs, the individual's satisfaction about treatment is negatively affected [16], and perceptions can act as relevant indicators of the need for treatment and complement normative assessment [19,37].

The socioeconomic characteristic of the sample is an aspect that deserves reflection. The adolescents are from public schools and in the same social range, not allowing inferences to other strata. Future studies should be conducted with different socioeconomic adolescents' levels to evaluate how social conditions influence malocclusion's psychosocial impact. In addition, the cross-sectional design does not allow cause and effect relationships and, therefore, is measured as a chance or probability, as shown in the results. These can be considered the limitations of the study.

Finally, our findings highlight the importance of including psychological parameters in orthodontic practice. Thus, in an attempt to understand the psychosocial effects of malocclusion in adolescents, the present study contributes to the previous literature.

Conclusion

Self-esteem influenced adolescents' perception of malocclusion in the domains related to psychological and social impact.

Authors' Contributions

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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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None.

Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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