









PSYCHOSOCIAL IMPACT OF DENTAL AESTHETICS,
ORTHODONTIC TREATMENT NEEDS, AND SELF-ESTEEM IN
AMAZONIAN ADOLESCENTS

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Abstract

This study aimed to evaluate the psychosocial impact of dental aesthetics on the quality of life associated with normative and subjective orthodontic treatment needs and the self-esteem of adolescents living in the Brazilian Amazon region. It is a cross-sectional observational study conducted with 212 adolescents of both sexes enrolled in public schools in Boca do Acre (Amazonas, Brazil). The Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) assessed the psychosocial impact of malocclusion, and the Global Negative Self-Evaluation (GSE) scale evaluated the adolescents' self-esteem. The assessment of normative and subjective orthodontic treatment needs used the Index of Orthodontic Treatment Need (IOTN), including its dental health (DHC) and aesthetic (AC) components. Initial descriptive analyses of the data used absolute and relative frequencies, medians, and interquartile ranges. Poisson regression models with robust variance estimators appraised the prevalence ratios - with respective confidence intervals (95% CI) - of the associations with the PIDAQ. The prevalence of adolescents needing normative orthodontic treatment (IOTN-DHC) was 76.4%, and the subjective orthodontic treatment need prevalence (IOTN-AC) was 9.0%. Adolescents with low self-esteem reported a more significant impact on dental aesthetics (PR = 1.25; 95% CI: 1.14-1.36; $p < 0.05$). The study concluded that self-esteem and the psychosocial impact of dental aesthetics on the quality of life of Amazonian adolescents are significantly associated.

Keywords: Adolescent. Malocclusion. Psychosocial impact. Self-esteem.



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1. Introduction

Physical appearance, especially facial features such as eyes and the mouth, is crucial for social interaction (Stojilković et al. 2024). The smile is one of the first perceived facial features, significantly contributing to facial attractiveness (Sardenberg et al. 2013; Richards et al. 2015; Twigge et al. 2016; Prado et al. 2016; Patusco et al. 2018; Godinho et al. 2020; Stojilković et al. 2024). This region attracts considerable attention during interactions and is the primary source of oral, physical, and emotional communication (Stojilković et al. 2024).

There is substantial pressure to be accepted by others today. The societal standards established by friends, colleagues, and social networks significantly affect individuals (Yang et al. 2021; ALSagob et al. 2021). Slight variations of the beauty standards created by this society, especially among young people, may reduce self-confidence and self-esteem, harming the overall quality of life (Zaidi et al. 2020; Yang et al. 2021; ALSagob et al. 2021; Stojilković et al. 2024). Malocclusions, mainly those visible in the smile, significantly affect aesthetics (Kaur et al. 2017), and dental aesthetics may harm the individual well-being of adolescents, influencing body image and self-esteem (Kaur et al. 2017; Dallé et al. 2019; Militi et al. 2021).

Higher self-esteem allows for more positive coping with social interactions, consequently impacting oral health-related conditions, which are relevant for self-esteem (Kaur et al. 2017; Sharma et al. 2017). Adolescence is a decisive phase for preventing current impacts and future diseases, promoting a more productive adult life (Sharma et al. 2017; Muniz-Junior et al. 2022). In this sense, the tested hypothesis was that orthodontic treatment needs and self-esteem are associated with the psychosocial impact of dental aesthetics in adolescents from the Brazilian Amazon region. This study aimed to evaluate the psychosocial impact of dental aesthetics on the quality of life associated with orthodontic treatment needs and the self-esteem of Amazonian adolescents.

2. Material and Methods

Sample characteristics

It is a cross-sectional epidemiological study conducted with adolescents enrolled in public schools in Boca do Acre, in the southwest region of Amazonas, Brazil. The city has an estimated population of 34,308 inhabitants and a 0.58 Human Development Index (Atlas of Human Development in Brazil). The Human Research Ethics Committee approved the study (#82394117.2.0000.5385).

The sample size calculation considered a 5% significance level, 80% test power, and a 2.0 odds ratio, yielding a minimum of 200 adolescents. The study included only 12-year-old adolescents whose parents authorized participation by filling out and signing the informed consent form, thus providing consent. The selected adolescents should neither be undergoing nor have undergone orthodontic treatment. Furthermore, they should be free of diseases that impair communication. The final sample included 212 12-year-old adolescents: 97 girls and 115 boys.

Non-clinical data

The adolescents answered the Brazilian version of the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) (Sardenberg et al. 2013). It consists of 23 items divided into four domains: dental self-confidence (items 1 to 6), aesthetic concern (items 7 to 9), psychological impact (items 10 to 15), and social impact (items 16 to 23). A five-point scale from zero (no impact) to four (maximum impact) rates each item. An overall PIDAQ total score was obtained by summing the scores of all items (Klages et al. 2006; Sardenberg et al. 2013; Prado et al. 2016; Santos et al. 2016; Raghavan et al. 2019; Muniz-Junior et al. 2022) and dichotomizing them by the median of the total index score. Values ≤ 31 indicated a lower impact and > 31 denoted a higher impact (Santos et al. 2016; Muniz-Junior et al. 2022).

The Global Negative Self-Evaluation (GSE) scale assessed self-esteem. The GSE presents six questions that must be answered on a six-point scale: 1 – does not apply at all; 2 – does not apply well; 3 – applies somewhat well; 4 – applies fairly well; 5 – applies well, and 6 – applies exactly (Alsaker and Olweus, 1986;

Dos Santos et al. 2017; Dallé et al. 2019). The responses were summed to obtain the final score. The present study dichotomized self-esteem by response medians: high (≤ 14) and low (> 14) self-esteem.

Normative and subjective malocclusion

The Dental Health Component (DHC) of the Index of Orthodontic Treatment Need (IOTN) assessed the dental aspects of malocclusion and the need for normative orthodontic treatment (Mandall et al. 2000). Although all changes were evaluated, only the most severe condition determined malocclusion severity and the orthodontic treatment need of each individual. These items were subsequently classified as mild/moderate malocclusion and no need for orthodontic treatment (IOTN 1- 2) or severe malocclusion requiring orthodontic treatment (IOTN 3-5) (Brook and Shaw 1989; Dallé et al. 2019; Muniz-Junior et al. 2022).

The Aesthetic Component (AC) of the IOTN evaluated subjective malocclusion. It assesses an individual's psychosocial needs using a dental attractiveness scale illustrated by ten colored photographs, presenting a decreasing and continuous attractiveness degree. The first photograph represents the most attractive occlusion, while the tenth is the least attractive. The teenagers performed the assessments, identifying the degree of aesthetic impairment in the photographs on the scale, which was similar to their smile. Adolescents who indicated photographs one to four were categorized as having no or little need for orthodontic treatment, while those indicating photographs five to ten were classified as needing orthodontic treatment (Brook and Shaw 1989; Vedovello et al. 2019).

Training and calibration exercise

A single calibrated evaluator conducted the malocclusion clinical examination. This evaluator participated in theoretical and clinical training exercises based on the IOTN criteria. Plaster models aided the theoretical training in discussing all characteristics evaluated by the index. As for clinical calibration, the evaluator examined 20 adolescents to determine inter-examiner agreement. Adolescents who participated in the clinical calibration were excluded from the primary sample of this study. The inter-examiner Kappa coefficient was greater than 0.92 for malocclusion.

Statistical methodology

Initially, the data was descriptively analyzed with absolute and relative frequencies, medians, and interquartile ranges. Next, Poisson regression models with robust variance estimators appraised the prevalence ratios - with respective confidence intervals (95% CI) - of the associations with the impact on quality of life. The analyses were conducted in the R Program (R Foundation for Statistical Computing, Vienna, Austria) at a 5% significance level.

3. Results

Table 1 presents the descriptive analysis and absolute frequency of the studied variables. Two hundred and twelve adolescents ($n = 212$) were evaluated: 54.2% boys and 45.8% girls. The prevalence of adolescents needing normative (IOTN-DHC) was 76.4%, and the subjective orthodontic treatment need prevalence (IOTN-AC) was 9%.

Table 2 presents the analysis of associations with the impact on quality of life. There were no associations between the variables of IOTN-DHC, IOTN-AC, sex, and the psychosocial impact of malocclusion (PIDAQ) ($p > 0.05$). However, self-esteem showed an association ($p < 0.05$). Among adolescents with lower self-esteem, the prevalence of the psychosocial impact of malocclusion was higher than among those with high self-esteem (PR = 1.25; 95% CI: 1.14-136) ($p < 0.05$). Additionally, 61.5% of adolescents with low self-esteem reported a higher impact of malocclusion.

Table 1. Descriptive analysis of the study variables (n = 212).

Variable	Category	Frequency (%)
Sex	Male	115 (54.2%)
	Female	97 (45.8%)
IOTN - DHC	Little/no need	50 (23.6%)
	With need	162 (76.4%)
IOTN - AC	Little/no need	193 (91.0%)
	With need	19 (9.0%)
Variable	Median	Interquartile range
GSE	14	11 - 18
PIDAQ	31	24 - 36

IOTN: Index of Orthodontic Treatment Need. DHC: Dental Health Component. AC: Aesthetic Component. GSE: Global Negative Self-Evaluation. PIDAQ: Psychosocial Impact of Dental Aesthetics Questionnaire.

Table 2. Analysis of associations with the impact on quality of life using the PIDAQ (n = 212).

Variable	Category	n (%)	Impact		PR crude (95% CI)	p-value	PR final model (95% CI)	p-value
			Lower (PIDAQ ≤ 31 [§])	*Higher (PIDAQ > 31)				
			n (%)	n (%)				
Sex	Male	115 (54.2%)	60 (52.2%)	55 (47.8%)	1.04 (0.95-1.14)	0.4177	-	-
	Female	97 (45.8%)	56 (57.7%)	41 (42.3%)	1			
IOTN (DHC)	Little/no need	50 (23.6%)	27 (54.0%)	23 (46.0%)	1		-	-
	With need	162 (76.4%)	89 (54.9%)	73 (45.1%)	0.99 (0.89-1.11)	0.9072		
IOTN (AC)	Little/no need	193 (91.0%)	106 (54.9%)	87 (45.1%)	1		-	-
	With need	19 (9.0%)	10 (52.6%)	9 (47.4%)	1.02 (0.87-1.19)	0.8477		
Self-esteem	High (≤14 [§])	108 (50.9%)	76 (70.4%)	32 (29.6%)	1		1	
	Low (>14)	104 (49.1%)	40 (38.5%)	64 (61.5%)	1.25 (1.14-1.36)	<0.0001	1.25 (1.14-1.36)	<0.0001

*Outcome event. [§]Sample median. [†]Reference category for independent variables. PIDAQ: Psychosocial Impact of Dental Aesthetics Questionnaire. PR: Prevalence ratio. CI: Confidence interval. IOTN: Index of Orthodontic Treatment Need. DHC: Dental Health Component. AC: Aesthetic Component.

4. Discussion

This study aimed to answer the following questions: Is the psychosocial impact of malocclusion higher in adolescents needing normative and/or subjective orthodontic treatment? What is the role of self-esteem? Hence, this investigation evaluated the psychosocial impact of dental aesthetics on quality of life, normative and subjective orthodontic treatment needs, and adolescents' self-esteem in the Brazilian Amazon region.

Boca do Acre, located on the triple border between Amazonas, Acre, and Rondônia, has peculiar characteristics, such as mixed cultural influences and limited access to specialized health services (Boca do Acre 2011), which may significantly affect malocclusion perception and psychosocial impact. Furthermore, there is a gap in the literature on adolescents' oral and psychosocial health in this region, as most studies focus on riverside and indigenous populations, justifying the present study (Normando et al. 2013; de Souza et al. 2015).

Self-esteem may represent the ability to recognize and accept personal value (Lincoln et al. 2010; Kaur et al. 2017). Despite the little knowledge about adolescents' self-assessments, the literature highlights that self-esteem is essential to understanding life constructs, including health (Polce Lynch et al. 2001; Lincoln et al. 2010; Kaur et al. 2017). The justification for studying this population is based on the adolescence phase, which is crucial to identify risk factors and the need for intervention to promote a productive adult life.

This study primarily showed that low self-esteem significantly influences the perception of the psychosocial impact of malocclusion, even if normative and subjective orthodontic treatment needs were not significant factors. Furthermore, most adolescents reporting higher psychosocial impact had lower self-esteem than those with higher scores. That allows the inference that individuals more influenced by their dental aesthetics tend to have lower self-esteem (Stojilković et al. 2024).

The study with Amazonian adolescents benefited from standardized questionnaires, allowing discussions and comparisons with other studies. Regarding the psychosocial impact of malocclusion, the PIDAQ is a psychometric measure for orthodontics to assess the effects and perceptions of dental appearance on oral health-related quality of life (Klages et al. 2006; Sardenberg et al. 2013; Prado et al. 2016; Stojilković et al. 2024).

The literature (El Mourad et al. 2021; Stojilković et al. 2024) reports that the main factors influencing overall dental and mouth appearance include tooth color and shape, followed by alignment and arrangement, especially of anterior teeth. These aspects affect the perception of the subjective orthodontic treatment need assessed by the aesthetic component, justifying the discrepancy in prevalence rates compared with the assessment of the normative orthodontic treatment need in the present study (El Mourad et al. 2021; Nabarrette et al. 2021; Stojilković et al. 2024).

Studies indicate that, even though the IOTN is a widely used and validated tool to assess malocclusion severity, its aesthetic component may be prone to subjective perceptions, yielding moderate agreement with clinical diagnoses (Abdulla and Rock 2001; Vedovello et al. 2019). This limitation may have influenced the present findings, as orthodontic treatment need perception may vary according to the means of assessing dental aesthetics. Therefore, future studies should use complementary methods that consider analyzing the face as a whole or applying other tools that reduce possible biases in the aesthetic assessment.

The findings of the present study suggest the tendency of young people to adapt to malocclusion psychologically, considering its gradual development. Our discussions highlight that psychological characteristics influence daily activities more than dentofacial appearance (Dallé et al. 2019; Recabarren et al. 2023). However, malocclusion treatment in clinical practice is often based solely on clinical criteria, neglecting relevant dimensions, such as self-esteem (Kragt et al. 2018; Muniz-Junior et al. 2022; Recabarren et al. 2023).

5. Conclusions

There is a significant association between self-esteem and the psychosocial impact of dental aesthetics on the quality of life of adolescents in the Brazilian Amazon region.

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Conflicts of Interest: The authors declare no conflicts of interest.

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