

Adverse oral conditions associated with worse emotional and social well-being of Brazilian teenagers: a population-based study in a deprived rural-urban boundary

Condições bucais adversas associadas a pior bem-estar emocional e social de adolescentes brasileiros: um estudo de base populacional em uma periferia rural-urbana negligenciada

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Abstract

Background: The relationship between dental appearance and emotional/social well-being in underprivileged areas undergoing rapid urbanization is unknown. **Objective:** To assess if the emotional and social well-being of teenagers living in urban areas might be more affected by unfavorable dental appearance determined by oral conditions. **Method:** A population-based cross-sectional exploratory study with 12-year-old Brazilian schoolchildren was carried out in two poor, underserved districts of Sao Paulo City, Brazil. Outcome was severity of oral health-related quality of life (QHRQoL) due to the emotional and social well-being and exposures were oral conditions and residence district (rural or urban). **Results:** The impact on severity of QHRQoL due to emotional well-being and due to social well-being, respectively, were 14% and 16% higher for those presenting at least one untreated decayed tooth; 36% and 54% higher for those with unfavorable dental appearance and 25% and 39% higher for those from the urban district. No association between malocclusion and district was observed. **Conclusion:** Despite higher prevalence of untreated dental caries in the rural district, teenagers from the urban district felt that their OHRQoL, adjusted by oral conditions investigated, was more negatively affected. This suggests that urban environmental influences can lead to stressful social pressures stemming from dental appearance, leading to diminished emotional and social well-being.

Keywords: urbanization; underserved area; quality of life; dental appearance.

Resumo

Introdução: A relação entre aparência dentária e bem-estar emocional/social em áreas carentes com urbanização acelerada é desconhecida. **Objetivo:** Avaliar se o bem-estar emocional e social de adolescentes residentes em área urbana pode ser mais impactado pela aparência dentária desfavorável controlada pelas condições bucais. **Método:** Um estudo exploratório transversal de base populacional envolvendo escolares brasileiros de 12 anos foi realizado em dois bairros carentes foi realizado, na cidade de São Paulo, Brasil. O desfecho foi a gravidade da qualidade de vida relacionada à saúde bucal (QVRSB) devido ao bem-estar emocional e social, e as exposições foram condições bucais e distrito de residência (rural e urbano). **Resultados:** O impacto sobre a gravidade da QVRSB em decorrência do bem-estar



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emocional e do bem-estar social, respectivamente, foi 14% e 16% maior para aqueles que apresentavam pelo menos um dente cariado não tratado; 36% e 54% maior para aqueles com aparência dentária desfavorável e 25% e 39% maior para aqueles moradores em distrito urbano. Nenhuma associação entre má oclusão e distrito foi observada. **Conclusão:** Apesar da maior prevalência de cárie dentária não tratada no distrito rural, os adolescentes do distrito urbano sentiram-se mais afetados negativamente em sua qualidade de vida relacionada à saúde bucal ajustada pelas condições bucais, sugerindo que as possíveis influências do ambiente urbano podem trazer experiências sociais estressantes devido à aparência dentária impactando no bem-estar emocional e social.

Palavras-chave: urbanização; áreas desfavorecidas; qualidade de vida; aparência dentária.

INTRODUCTION

Teeth and/or jaw misalignment, also known as malocclusion, is associated with higher levels of dissatisfaction with appearance and can negatively affect an adolescents' quality of life¹. Systematic reviews and meta-analysis have reported impacts from malocclusion on quality of life due to impaired emotional and social well-being². This situation can involve issues such as unfavorable dental esthetics that compromise social interaction, including avoidance of showing teeth, laughing, or talking with other teenagers at school or with people at home, and even being given nicknames and experiencing teasing from other students. These situations can lead to low self-esteem, insecurity, depression and poor quality of life due to psychosocial pressures^{3,4}.

Facial appearance affects how a person perceives him/herself and is perceived by society. The perception of health and its meaning vary between individuals and within an individual over time. It is influenced by his/her way of life, past experiences, hopes for the future and aspirations. People with different expectations and experiences may report different perceived qualities of life, even when they have the same clinical condition. Experiences and expectations regarding quality of life are closely related to people's relationships with their environment. This can lead to structural variations in evaluations of the impact on quality of life⁵. However, oral health studies that have investigated such variations are scarce.

Adolescence is a period of transformation, characterized by an emotional reorganization involving various internal and external conflicts, accompanied by many body-related changes and strongly influenced by sociocultural context⁶. The impact on quality of life from severe occlusal disorders and adverse dental appearance can be significant and vary between individuals, societies, and cultures⁷. Young people from rural areas, characterized by a lower uptake of orthodontic treatments, have been found to be more tolerant of malocclusions than those in urban areas, who present a more frequent uptake of treatment⁸. The experiences and expectations of subjects living in rural environments may be quite different to those living in urban environments, where social pressures associated with lifestyle expectations, and greater individualism and consumerism may be present. A study investigating demand for treatment, and perceptions of teeth and dental appearance among second-year high school students from a rural (Jahra) and an urban (Capital) area of Kuwait observed less demand for treatment in the rural area⁷. An oral health survey on the dental occlusion of schoolchildren in a Brazilian city, showed that the prevalence of malocclusion was higher in those living in rural areas compared with those living in urban areas⁹.

Evidence regarding dissatisfaction with appearance in contemporary societies has shown that cultural expectations can shape beauty ideals. Among these factors, rapid development and urbanization can generate stressful experiences and expectations of economic prosperity in a competitive environment reflecting pressure for acceptance from peers¹⁰. However, no research has been undertaken to investigate the relationship between dental appearance and emotional/social well-being in deprived rural-urban outskirts. Adolescence is a period marked by diverse changes, including physical, mental and social. These are due to individuals forming their identity during this period, as well as learning how to communicate and gain acceptance within peer groups, among other aspects in which new fashions are incorporated and abandoned in a dynamic manner⁶. Teenagers from underprivileged areas undergoing rapid urbanization can be exposed to these pressures, which negatively affect their emotional and social well-being.

The objective of this study was to empirically test if the emotional and social well-being of teenagers living in an urban area in comparison with a rural area might be negatively impacted by unfavorable dental appearance controlled by oral conditions.

METHOD

The Research Ethics Committee of the Public Health School of the University of Sao Paulo approved the study. Parents signed informed consent forms, allowing their teenagers to participate in the study.

A population-based cross-sectional exploratory study was carried out with 12-year-old teenagers from public schools at Parelheiros and Marsilac districts, Sao Paulo City, Brazil. The combined territories of these two districts accounts for 25% of the total city area, while the population density is twenty times lower. The districts' area contains several springs and is considered strategic with regards to natural resources and agricultural activity. The resident population presents skin-color diversity. The human development index (HDI) values for these districts in 2015 were the worst (0.747 and 0.701, respectively) among the city's districts, which contrasts with the best value (0.961). While most of the city's population self-declared as white, most of the population of these districts self-declared as non-White in 2010¹¹, an important indicator of socioeconomic inequality in Brazil.

Despite these figures, there are significant differences between these two districts. According to 2013 demographic data, Parelheiros had 137,819 residents, 10.2% of whom lived in rural areas, and higher population density (929.0 inhabitants per square kilometer) than Marsilac (48.1 inhabitants per square kilometer), which had 8,278 residents, 83.5% of whom lived in rural areas. The agency responsible for the Brazilian demographic census defines rural households as those located in rural areas, i.e., areas outside urban boundaries or other territories that can be described as urban, settlements. The urban boundary of a city or town is locally defined by municipal law, taking into consideration the provision of public utilities, including electricity, water, sewage and garbage collection, among other features¹².

In fact, agricultural activities by the economically active population and difficulty in accessing typically urban services and infrastructure are evident in Marsilac, with these attributes indicating a rural area where a distinct way of life and usually a lower standard of living are observed¹³. Given these differences, Parelheiros and Marsilac districts will be characterized in the following as urban and rural districts, respectively.

The city of São Paulo presents a marked contrast between central and peripheral areas. Over recent years, these peripheral areas have undergone processes of change characterized by the creative and innovative character of the ways of life and products developed by their residents. This contrasts with earlier research perspectives that characterized them exclusively as spaces of poverty, precariousness and crime. An ethnographic study considering teenagers living in an outer suburb, investigating its spaces of sociability and leisure time, highlighted forms of transformation and enjoyment of space, in territorialities defined by codes and symbols of distinction and belonging marked by the repeated stylization of the body¹⁴.

A list of schools with twelve-year-old teenagers enrolled was obtained for each district. More than 90% of the teenagers were enrolled in public schools. There were 29 public schools in the urban district. The schools were ranked according to the number of 12-year-old children attending, ten of which, with a probability proportional to the population size, were randomly drawn. A prevalence rate of 50% was used to calculate sample size assuming a 95% confidence interval, a standard error of 5% and a nonresponse rate of 10%. For operational reasons, the sample size for each school was fixed, corresponding to the ratio between the necessary sample size and the number of schools included in the study. Teenagers of both sexes, with no history of orthodontic treatment and without disease, including systemic and/or neurological ones, were considered eligible for the study.

In the rural district, all schools took part in the study due to the small number of resident teenagers enrolled.

The outcome was the severity of oral health-related quality of life (OHRQoL) due to the emotional and social well-being. Health related quality of life considers the gap between our expectations about our health and our actual experience of it⁵. The OHRQoL was measured using the Brazilian version of the Child Perceptions Questionnaire (CPQ₁₁₋₁₄) - short form. This version comprises 16 items divided into four domains, measuring the impact that oral symptoms, functional limitations, and emotional and social well-being have on quality of life. It has been validated for use with Brazilian children and teenagers¹⁵ and was applied prior to the oral examination.

The exposures were unfavorable dental appearance as measured by the Dental Aesthetic Index (DAI) and clinical conditions that could affect oral health related quality of life, such as untreated dental caries¹⁶ and dental fluorosis¹⁷. The assessment adopted criteria recommended by the World Health Organization¹⁸. The district (rural/urban) where participants resided was indicated due to the above mentioned associated differences.

Occlusal deviation was measured using the DAI, which evaluates dental appearance and classifies malocclusion as minor or absent, definite, severe and handicapping. The DAI includes ten measures and helps epidemiologists evaluate the severity of malocclusion and the need for orthodontic intervention, based on the degree of deviation of dental appearance from social norms¹⁹.

The prevalence of untreated dental caries was determined by the frequency of participants who presented at least one decayed permanent tooth or one recommended for extraction due to caries. Dental fluorosis was measured using the Dean index, which evaluates the enamel of the permanent tooth crown, classifying it according to six categories: "normal" and "questionable", in which enamel seems normal under natural light; and "very mild", "mild", "moderate" and "severe" fluorosis¹⁸. Prevalence of fluorosis was determined using the last four categories. As dental appearance was the main focus of the study, prevalence values of dental fractures¹⁸ and untreated caries in aesthetically important teeth (four canines and eight incisors) were also determined.

Five previously trained dentists carried out the oral examinations in each school using natural light, plane mouth mirrors, tongue depressors, periodontal probes, and gloves. Details regarding training sessions and the relevant exercises are presented elsewhere²⁰. A weighted kappa coefficient of 0.65 was considered the minimum acceptable value for inter-evaluator agreement, to ensure the consistency of examinations related to the conditions of dental crowns and the four DAI categories.

Descriptive statistics were performed using the Mann-Whitney and Kruskal-Wallis tests, exploring the differences between the outcome and exposure variables. The values for the outcome variable ranged from zero (no impact) to 16 (significant impact). Ratios between average values were used to assess the degree of variation of the CPQ₁₁₋₁₄ scores for each variable. Poisson regression, with robust variance, was used due to being more suitable for discrete values, where it is assumed that the mean of the outcome distribution is equivalent to the variance²¹. Average rate ratios (ARR) and 95% confidence intervals (95% CI) were calculated by simple Poisson regression analysis. Multiple regression analysis was carried out to test the hypothesis that residing in an urban area would present associated negative impacts on OHRQoL due to impaired emotional and social well-being adjusted for oral conditions. Demographic characteristics, such as the teenager's sex and skin color, were retained in the multiple model as controlling variables.

The study power was calculated a posteriori. The minimum ARR for the detection of differences was between 1.15 and 1.32, with exposure frequencies between 10 and 50%, assuming the sample size was 589, an 80% power and 95% confidence level. Stata software 12.0 was used for data analyses.

RESULTS

Of the 422 teenagers selected from the urban district and 219 from the rural district, 589 responded to the questionnaire and underwent an oral examination. There was

an overall nonresponse rate of 8.1%, 11.6% and 1.4% for the urban and rural districts, respectively. The reasons for non-participation were lack of authorization from parents/guardians or failure to complete the questionnaire. The demographic data for the populations from both districts showed a prevalence of girls over boys, and mixed colored over white skin (Table 1).

Table 1. Descriptive distribution of CPQ11–14 scores by sociodemographic and dental characteristics

	n(%)	Overall Score	
		Mean (SD)	P value
District			0.058*
Rural	216 (36.7)	12.49 (7.21)	
Urban	373 (63.3)	14.39 (9.12)	
Sex			0.043*
Male	260 (44.1)	12.89 (8.16)	
Female	329 (55.9)	14.33 (8.74)	
Skin color			0.859**
White	167 (28.4)	14.00 (9.19)	
Black	53 (9.0)	14.25 (9.26)	
Mixed	369 (62.6)	13.47 (8.09)	
Untreated dental caries			0.067*
None	396 (67.2)	13.21 (8.21)	
At least one tooth	193 (32.8)	14.68 (9.04)	
Fluorosis			0.677*
No	460 (78.1)	13.74 (8.58)	
Yes	129 (21.9)	13.52 (8.43)	
Malocclusion			0.179**
Minor/None	353 (59.9)	13.35 (8.42)	
Definite	137 (23.6)	14.81 (8.57)	
Severe	56 (9.5)	13.19 (8.44)	
Handicapping	43 (7.3)	13.60 (9.14)	
Overall	589 (100.0)	13.69 (8.52)	

SD: standard deviation; *Mann-Whitney test; **Kruskal-Wallis test

Table 1 presents the mean total (standard deviation) CPQ₁₁₋₁₄ score, which was higher in girls than in boys ($p=0.043$). Differences related to the impact on overall OHRQoL scores near the limit of statistical significance, were observed in teenagers from both the urban and rural districts ($p=0.058$) and for untreated dental caries ($p=0.067$). Skin color, dental fluorosis and malocclusion did not significantly affect overall scores.

Table 2 shows the prevalence values in each district for investigated oral conditions. The prevalence of untreated dental caries (at least one tooth) was higher in the rural district (47.2%, CI95%: 40.5;53.9) than in the urban district (24.4%, CI95%: 20.0;28.8), while the prevalence of dental fluorosis was similar: 19.4% (CI95%: 14.1;24.7) and 23.3% (CI95%: 19.0;27.6) in rural and urban districts, respectively. Severe and very severe malocclusion rates were also similar and accounted for 19.8% (CI95%: 11.9;27.9) and 14.9% (CI95%: 9.7;20.4) of the teenagers in the rural and urban districts, respectively (Table 2). Regarding aesthetically important teeth, the prevalence of anterior caries was 3.2% (CI95% 1.8;4.7) while for dental fractures it was 1.6% (CI95% 0.7;2.7) with no differences between the districts.

Table 2. Prevalence values and 95% confidence intervals of oral conditions among teenagers by district

Oral conditions	District	
	Urban (%; CI95%)	Rural (%; CI95%)
Untreated dental caries	24.4 (20.0; 28.8)	47.2 (40.5; 53.9)
Fluorosis	23.3 (19.0; 27.6)	19.4 (14.1; 24.7)
Severe/Very severe Malocclusion	14.9 (9.7; 20.4)	19.8 (11.9; 27.9)

Table 3 presents the mean values, which varied according to specific domains. Significant differences were observed for functional conditions and social well-being, while the mean values due to oral symptoms did not differ between the teenagers from the rural and urban districts. Comparing boys and girls, oral symptoms and functional conditions were more important than emotional and social well-being. For untreated dental caries, differences of mean values were related to the severity of oral symptoms. For malocclusion, such differences were significant or approached statistical significance in the four domains of OHRQoL; however, the results suggested opposite trends based on the severity of malocclusion. Mean values of oral symptoms and functional conditions were lower, while values of emotional and social well-being were higher for those presenting severe/very severe malocclusion.

Tables 4 and 5 present the unadjusted and adjusted associations between the mean values of emotional and social well-being and the independent variables. Urban district, untreated dental caries and very severe malocclusion were associated with the outcomes. The impact from emotional and social well-being, respectively, was 25% and 39% higher for the teenagers from the urban district; 14% and 16% higher for the teenagers presenting at least one untreated decayed tooth; and 36% and 54% higher for teenagers with a handicapping malocclusion, indicating unfavorable dental appearance.

To discard any confounding effect, we explored a potential association between area of residence and covariates. No association between malocclusion and residence was observed (Prevalence Ratio PR=0.99, CI95% 0.85-1.15 for definite category; PR=0.83, CI95% 0.64-1.07 for severe; PR=0.93, CI95% 0.72-1.20 for handicapping). An inverse association was observed between untreated dental caries and residence, e.g. dental caries was negatively associated with urban district (PR=0.66, CI95% 0.56-0.78).

DISCUSSION

We investigated the emotional and social well-being related to oral conditions of teenagers who lived in two of the poorest districts, farthest from the center of São Paulo city. The results showed two important findings.

Firstly, unfavorable dental appearance and untreated dental caries affected emotional and social well-being. It is already known that severe malocclusion compromises social and

Table 3. Sociodemographic and dental characteristics related to domain-specific CPQ₁₁₋₁₄ scores

	Oral Symptoms		Functional		Emotional		Social	
	Mean(SD)	P value	Mean(SD)	P value	Mean(SD)	P value	Mean(SD)	P value
District		0.307*		0.030*		0.095*		0.033*
Rural	4.52(2.31)		3.27(2.48)		2.63(2.64)		2.02(2.27)	
Urban	4.74(2.55)		3.95(3.08)		3.10(3.04)		2.59(2.83)	
Sex		0.038*		0.006*		0.505*		0.778*
Male	4.40(2.34)		3.39(2.89)		2.79(2.77)		2.30(2.49)	
Female	4.86(2.54)		3.95(2.87)		3.04(3.01)		2.45(2.77)	
Skin color		0.839**		0.694**		0.832**		0.431**
White	4.65(2.49)		3.84(3.03)		3.10 (3.19)		2.41(2.95)	
Black	4.98(3.09)		3.64(2.75)		2.94(2.68)		2.68(2.44)	
Mixed	4.62(2.35)		3.64(2.75)		2.85(2.80)		2.33(2.54)	
Untreated dental caries		0.046*		0.371*		0.189*		0.174*
None	4.50(2.41)		3.63(2.87)		2.81(2.83)		2.24(2.48)	
At least one tooth	4.98(2.55)		3.83(2.93)		3.18(3.05)		2.69(2.96)	
Fluorosis		0.686*		0.798*		0.624*		0.764*
No	4.67(2.46)		3.69(2.86)		2.95(2.89)		2.40(2.64)	
Yes	4.63(2.49)		3.71(3.01)		2.85(2.97)		2.33(2.69)	
Malocclusion		0.038**		0.065**		0.089**		0.053**
Minor/None	4.57(2.49)		3.78(2.91)		2.79(2.94)		2.20(2.54)	
Definite	5.11(2.50)		3.96(2.94)		3.14(2.78)		2.53(2.58)	
Severe	4.71(1.98)		3.23(2.84)		2.73(2.77)		2.52(2.97)	
Handicapping	3.88(2.45)		2.84(2.42)		3.65(3.19)		3.23(3.18)	

SD: standard deviation; *Mann-Whitney test; **Kruskal-Wallis test

Table 4. Simple and adjusted Poisson regression analysis for emotional scores (CPQ₁₁₋₁₄)

	Emotional Well-Being			
	Unadjusted values	P value*	Adjusted values**	P value*
District (Rural as Reference)	1.18 (0.99, 1.39)	0.051	1.25 (1.04, 1.50)	0.015
Sex (male as reference)	1.08 (0.92, 1.28)	0.315	1.07 (0.91, 1.27)	0.371
Skin color (White as reference)				
Black	0.95 (0.71, 1.27)	0.722	0.87 (0.65, 1.17)	0.365
Mixed	0.92 (0.76, 1.11)	0.372	0.93 (0.77, 1.11)	0.422
Untreated dental caries	1.13 (0.96, 1.34)	0.144	1.14 (1.07, 1.21)	<0.000
Fluorosis	0.97 (0.79, 1.18)	0.737	0.97 (0.79, 1.18)	0.727
Malocclusion (Minor/None as ref.)				
Definite	1.12 (0.93, 1.35)	0.214	1.13 (0.94, 1.36)	0.199
Severe	0.98 (0.74, 1.29)	0.878	1.01 (0.76, 1.34)	0.969
Handicapping	1.31 (0.99, 1.73)	0.062	1.36 (1.03, 1.79)	0.030

*Wald test; **Adjusted values of average rate ratio

Table 5. Simple and adjusted Poisson regression analysis for social well-being scores (CPQ₁₁₋₁₄)

	Social Well-Being			
	Unadjusted values	P value*	Adjusted values**	P value*
District (Rural as Reference)	1.28 (1.07, 1.54)	0.009	1.39 (1.15, 1.68)	0.001
Sex (male as reference)	1.07 (0.89, 1.28)	0.482	1.05 (0.88, 1.25)	0.608
Skin color (White as reference)				
Black	1.11 (0.82, 1.51)	0.493	1.02 (0.75, 1.37)	0.918
Mixed	0.97 (0.78, 1.20)	0.778	0.99 (0.79, 1.22)	0.906
Untreated dental caries	1.20 (0.99, 1.45)	0.057	1.16 (1.08, 1.25)	<0.000
Fluorosis	0.97 (0.78, 1.21)	0.804	0.97 (0.77, 1.21)	0.760
Malocclusion (Minor/None as ref.)				
Definite	1.15 (0.93, 1.42)	0.191	1.16 (0.94, 1.42)	0.162
Severe	1.15 (0.82, 1.59)	0.427	1.21 (0.87, 1.67)	0.257
Handicapping	1.47 (1.07, 2.01)	0.017	1.54 (1.12, 2.11)	0.007

*Wald test; **Adjusted values of average rate ratio

emotional well-being². One possible explanation is that it leads to dissatisfaction with dental appearance²². Some studies presented here found a negative association between very severe malocclusion and the social and emotional well-being domains for OHRQoL when adjusting for other clinical conditions such as dental caries^{23,24}. In a sample of Brazilian schoolchildren, untreated dental caries negatively affected emotional well-being, while caries in anterior teeth worsened social well-being¹⁶. Other studies showed the impact on OHRQoL stemming from dental caries morbidity stages^{25,26}. In the present study, prevalence of anterior caries and dental fractures was very low preventing these factors from being associated with unfavorable dental appearance. Differences in mean OHRQoL values due to untreated dental caries were related to oral symptoms with a trend towards association with social well-being in the unadjusted model being observed. It is notable that the adjustment of the variables in both models showed that unfavorable dental appearance is of significant importance for emotional and social well-being independent of clinical conditions and sociodemographic characteristics. Moreover, differences in mean values observed in all CPQ domains₁₁₋₁₄ reinforced malocclusion as an indicator for diminished quality of life.

Secondly, despite the greater prevalence of untreated dental caries in the rural district, teenagers living in the urban district felt that their emotional and social well-being adjusted for the oral conditions investigated, was more strongly impacted.

One of the districts studied is markedly more urbanized. Urban anthropology studies investigating performative expressions of youth groups during leisure time in the periphery of São Paulo City have found that cultural characteristics were strongly influenced by the consumption of certain musical styles and the creation of a visual, using clothes and accessories, bestowing a group identity^{14,27,28}.

Two points are noteworthy. Firstly, inter-district differences related to the rates of severe/very severe malocclusion and dental fluorosis were nonsignificant. If the rates of unfavorable dental appearance had been higher in the urban district as opposed to the rural district, one could argue that the observed association may be related to the difference between prevalence rates. However, rural/urban areas showed no statistically significant association between either unfavorable dental appearance or outcome, so this variable cannot be considered a confounding factor but rather a potential determinant of OHRQoL. Similar to our findings, a study investigating malocclusion among rural and urban Jordanian schoolchildren showed

similar rates of demand for aesthetic orthodontic intervention, however more urban than rural students wanted to have their teeth straightened²⁹. Secondly, untreated dental caries could be a confounding factor if they were positively associated with the urban district, however an inverse association reinforcing the effect of place of residence was observed. Moreover, it is a relevant issue due to a lack of access to dental services, with prevalence being higher in the rural district, corroborating evidence pointing towards a lower standard of living in rural areas^{30,31}.

Thus, one question that emerges for further research would be how differences in self-perception of dental appearance become differences in experience and expectations regarding quality of life. Notably, greater impacts were always observed in relation to social well-being that reflects frequency of stressful social experiences associated with teeth/mouth, such as avoidance of showing teeth, laughing, or talking with other teenagers, being subjected to nicknames and teasing by other students and embarrassing questions asked by other teenagers and even family conflict. It is plausible to assume that adolescents who live in environments presenting of rapid urbanization experience social pressures that drive transformations in how they wear makeup, dress, and speak, among other behaviors. Using qualitative research to explore how these changes are engendered in social relationships between and within peer groups would be important for understanding the differences in expectations about quality of life stemming from emotional and social well-being. The phenomenon of fake braces (flashing multicolored metallic grins) documented by the media in 2006 in Bangkok city, Thailand, and in 2014 in São Paulo city, Brazil, indicates the potential influence fashion has on adolescents^{32,33}, and suggests that dental appearance, as well as body size¹⁰, tend to become more significant to teenagers in a world of accelerated cultural changes due to mass media, internet, social networks and peer interactions.

In contrast to other developmental stages, adolescence is marked by an intense predisposition to peer influence, and teenagers are likely to engage in behaviors that match their perceptions of what is normative, particularly attributes of those who represent idealized identities, such as high-status peers³⁴.

This tendency would be reinforced in a context where orthodontic treatment is usually inaccessible and considered a sign of financial prosperity. If public policy focusing on reducing unequal access to orthodontic treatment had been working, this tendency probably would have been curtailed. However, considering the needs of the teenage population in the study area, the delivery of publicly funded orthodontic services or free appointments continues to be inadequate³⁵.

One hypothesis that could explain the association between the outcomes and the place of residence is that adolescents living in an environment undergoing accelerated urbanization experience pressures that motivate them to diverge from their own behaviors, beliefs and values due to their perception of others. This drives them to follow higher status peers and to build a sense of identity often through dental appearance, with the goal of appearing wealthy and fashionable, to gain popularity, and maintain or widen their social network status³⁴. This hypothesis is reinforced when we understand that the contextual characteristics of geographical place can play a significant role in oral health inequality; however, it challenges the idea that urban environments always mitigate the potential negative effects of rural environments, contributing to better oral health status, or OHRQoL³¹. The findings of this study suggest that urban environmental influences can lead to their own social pressures stemming from dental appearance, and consequently affecting quality of life in terms of emotional and social well-being.

This study employed a cross-sectional design, and the temporal relationship between the outcome and predictors could not be precisely defined; however, the exposures were associated with reduced emotional and social well-being. Severe and very severe malocclusion, untreated dental caries and urban context possibly contributed to the outcome and cannot be considered to represent reverse-causality bias. As the residential areas of the study populations had the lowest HDI values of the city, we were unable to explore potential effects of the socioeconomic condition of the participant's family. Together, the districts comprised 25% of the city area and the sample size was fixed for each school to reduce the field teams transport costs. Given that

this compromises an equal chance for all participants, the point estimates should be interpreted with caution, however the observed associations remain valid. Teenager satisfaction with their body was not measured preventing the verification of a potential link between the outcome and possible social pressures stemming from the more urbanized environment, however adolescents with less attractive teeth tended to be psychosocially disadvantaged⁴ and to report greater esthetic concerns in environments characterized by greater social pressures.

In conclusion, the emotional and social well-being of participants from the urban district, those with unfavorable dental appearance and those presenting at least one untreated decayed tooth, was more strongly affected. Despite the prevalence of severe/very severe malocclusion being similar in both urban and rural districts and untreated dental caries prevalence being higher in the rural district, teenagers living in the urban district felt their emotional and social well-being, adjusted by the oral conditions investigated, to be more negatively affected. This suggests that urban environmental influences can generate stressful social pressures owing to dental appearance, thereby compromising OHRQoL due to the impairment of emotional and social well-being.

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