# SELF-PERCEIVED MALOCCLUSION OF NON-ORTHODONTIC PATIENTS AFFECTS ORAL HEALTH-RELATED QUALITY OF LIFE?

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**Palavras-chave**: Qualidade de Vida. Má Oclusão. Ortodontia. Auto-avaliação. Estética.

**RESUMO**

**Objetivo**: Este estudo transversal teve como objetivo avaliar o impacto da má oclusão autopercebida na qualidade de vida relacionada à saúde bucal (OHRQoL) e também avaliar se a autoavaliação estética é semelhante à avaliação profissional. **Métodos**: Foram avaliados 63 adultos com idades entre 18 e 36 anos (28,68 ± 4,99), 42 mulheres e 21 homens, sem histórico de tratamento ortodôntico. A OHRQoL foi avaliada utilizando a versão brasileira do questionário Oral Health Impact Profile (OHIP-14). A percepção da má oclusão foi avaliada utilizando-se o componente estético do Índice de Complexidade, Resultado e Necessidade (ICON) e o nível socioeconômico foi avaliado com os Critérios de Classificação Econômica do Brasil. A análise estatística foi realizada pelo teste de Mann-Whitney, correlações de Spearman e teste de Wilcoxon, com p<0,05. **Resultados**: A pontuação média geral e desvio padrão para o OHIP-14 foi de 5,17 (±6,50). Houve fraca correlação entre o componente estético percebido pelos participantes e a avaliação de sua OHRQoL. Apenas os domínios psicológicos (desconforto psicológico e incapacidade psicológica) apresentaram correlações significativas, porém pobres. O sexo e o nível socioeconômico não afetaram a percepção estética da má oclusão e a OHRQoL. Houve diferença significativa entre as avaliações profissionais e dos participantes. **Conclusão**: Correlações fracas e significativas entre a má-oclusão autopercebida e a OHRQoL foram encontradas em participantes que não procuravam tratamento ortodôntico, onde os maiores impactos foram observados nos domínios desconforto psicológico e incapacidade psicológica. A má-oclusão estética percebida pelos participantes foi significativamente menos relevante do que a avaliação profissional neste grupo estudado.

**Keywords**: Quality of Life. Malocclusion. Orthodontics. Self Concept. Aesthetics.

**ABSTRACT**

**Purpose**: This cross-sectional study evaluates the impact of self-perceived malocclusion on oral health-related quality of life (OHRQoL) and also whether aesthetic self-assessment is similar to professional evaluation. **Methods**: this cross-sectional study gathered 63 adults aged 18–36 years (28.68 ± 4.99), 42 women and 21 men, with no history of orthodontic treatment. OHRQoL was evaluated using the Brazilian short version of the Oral Health Impact Profile questionnaire (OHIP-14). Perception of malocclusion was evaluated using the aesthetic component of the Index of Complexity, Outcome and Need (ICON), socioeconomic status and the Economic Classification Criteria of Brazil. Statistical analysis was conducted using the Mann–Whitney test, Spearman correlations and Wilcoxon test, with $p < 0.05$. **Results**: the overall average score and standard deviation for OHIP-14 was 5.17 (± 6.50). There was a weak correlation between the aesthetic component perceived by the participants and their evaluation of quality of life. Only the psychological domains (psychological discomfort and psychological disability) showed significant poor correlations. Gender and socioeconomic status did not affect aesthetic perception of malocclusion and OHRQoL. There was a significant difference between the professional assessments and those of participants. **Conclusion**: significant weak correlations between self-perceived malocclusion and OHRQoL were found in participants who were not seeking orthodontic treatment; the greatest impacts were seen in the domains of psychological discomfort and psychological disability, and aesthetic self-perceived malocclusion was significantly less relevant than the professional evaluation in this studied group.

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## INTRODUCTION

Malocclusion is considered a public health problem due to its high prevalence, and therefore it is essential to understand its psychosocial effects and the implications for oral health-related quality of life (OHRQoL).

Measurement of OHRQoL aims to obtain information from patients to increase the understanding of the clinician who will provide treatment, to give an idea of how a disease changes OHRQoL, and the factors that are involved. This increases interaction and improves the relationship between professional and patient in order to achieve the best treatment, bringing the reality of the patient to the concept of health.[1]

Severe malocclusion has already been reported in the literature as an important factor that decreases OHRQoL,[2-9] and the correction of malocclusion is positive in improving OHRQoL.[9,10] The link between malocclusion and OHRQoL is complex and still poorly understood. The decision to seek orthodontic treatment is based not only on the severity of malocclusion, but also on the desire of patients to improve their appearance and self-esteem.[11]

Aesthetics are subjective, and the aesthetic perception of treatment need varies from patient to patient. This study evaluates whether the self-perception of a patient regarding their malocclusion affects their OHRQoL, and whether self-evaluation of the aesthetic need for treatment is similar to assessment by an oral health care provider.

## MATERIALS AND METHODS

Sample size calculation was performed in a pilot study with 10 randomly selected participants using BioEstat 5.3 software (Belém, PA, Brazil); the mean and standard deviation of the differences, with a margin of error (1 and 2.4, respectively), were used in the calculation. The bilateral test was applied, and test power of 90% and alpha level of 0.05 were used. The test pointed out the need for 62 participants.

Systematic convenience sampling was used, in which participants were selected in dental clinics from Universidade Federal Fluminense (UFF), following dental appointment schedules between February and June 2015. All patients attending these clinics had undergone previous periodontal treatment when necessary, guaranteeing their periodontal health.

From a total of 192 dental appointments, 63 young adults met the inclusion criteria and were invited to take part in this study. Consent was obtained from each person after the nature and purpose of the study had been explained. The inclusion criteria were: 1 – age between 18 and 35 years, 2 – no history of orthodontic treatment, 3 – no history of chronic periodontal disease, and 4 – no chronic medical conditions or craniofacial anomalies. Forty-two female individuals and 21 male individuals were selected for the study, with a mean age of 28.68 years (± 4.99).

Individuals were given a self-managed questionnaire in order to gather OHRQoL and sociodemographic information.

The Brazilian short version of the Oral Health Impact Profile questionnaire (OHIP-14) was used.[12] OHIP-14 consists of 14 questions related to the frequency of malocclusion impacting 14 daily activities, and items are organized into seven domains related to functional limitation, physical pain, physical disability, psychological discomfort, psychological disability, social disability and handicap. A five-point ordinal scale was used to rate the frequency of a particular event: 0 – never; 1 – hardly ever; 2 – occasionally; 3 – fairly often; 4 – very often/every day. OHIP-14 scores can range from 0 to 56, and domain scores can range from 0 to 8. Additive scores were calculated by adding up the response codes for each item. High scores indicated poor OHRQoL.

The aesthetic component of the Index of Complexity, Outcome and Need (ICON)[13] was used to evaluate the aesthetic perception of malocclusion which was obtained as a subjective judgment, comparing the participant with the occlusion attractiveness scale. The scale ranges from 1 to 10, 10 being less attractive.[14] Participant self-evaluations and professional evaluations were undertaken.

Socioeconomic status was evaluated using the Economic Classification Criteria of Brazil,[15] an economic segmentation tool that uses a survey of household characteristics such as the existence and amount of household items of comfort, level of the family head's education, and access to public services to define the population. The criteria assign points for each characteristic, and an overall score is obtained. Correspondence between test score ranges of the strata and economic classification defined by A1, B1, B2, C1, C2 and D-E is then assessed as shown in Table 1.

The data and the relationships between self-perception of malocclusion and OHRQoL were analyzed using BioEstat software version 5.3 (Belém, PA, Brazil).

Spearman correlation tests were used to evaluate the correlation between the aesthetic needs perceived by the participants and the evaluation of their OHRQoL. It was also used to evaluate if there was a correlation between socioeconomic level and self-perception of malocclusion, and between OHRQoL and socioeconomic level.

The Mann–Whitney test was used to evaluate if there were significant differences between the genders regarding the aesthetic self-perception of malocclusion and the evaluation of OHRQoL.

The Wilcoxon test was applied to evaluate the aesthetic perception of malocclusion by the professional (evaluator) and the participants.

All procedures performed in this study were in accordance with the ethical standards of the institutional research committee (approval number 912.379).

***Table 1***: *Economic classification criteria[15] used for socioeconomic evaluation*

| | | | | | |
|---|---|---|---|---|---|
| **Possession of items** | | | | | |
| **Quantity of items** | | | | | |
| | 0 | 1 | 2 | 3 | 4 or + |
| Toilets | 0 | 3 | 7 | 10 | 14 |
| Domestics | 0 | 3 | 7 | 10 | 13 |
| Automobiles | 0 | 3 | 5 | 8 | 11 |
| Microcomputer | 0 | 3 | 6 | 8 | 11 |
| Dishwasher | 0 | 3 | 6 | 6 | 6 |
| Refrigerator | 0 | 2 | 3 | 5 | 5 |
| Freezer | 0 | 2 | 4 | 6 | 6 |
| Washing machine | 0 | 2 | 4 | 6 | 6 |
| DVD | 0 | 1 | 3 | 4 | 6 |
| Microwave | 0 | 2 | 4 | 4 | 4 |
| Motorcycle | 0 | 1 | 3 | 3 | 3 |
| Clothes dryer | 0 | 2 | 2 | 2 | 2 |
| **Level of education of the household head** | | | | | |
| Illiterate/primary incomplete II | | | | | 0 |
| Fundamental I complete/fundamental II incomplete | | | | | 1 |
| Fundamental incomplete/elementary II incomplete | | | | | 2 |
| Full medium/incomplete university | | | | | 4 |
| Graduated | | | | | 7 |
| **Access to public services** | | | | | |
| | | | | No | Yes |
| Piped water | | | | 0 | 4 |
| Paved street | | | | 0 | 2 |
| **Cuts for establishment of socioeconomic status** | | | | | |
| Class | | | | | Total points |
| A | | | | | 45–100 |
| B1 | | | | | 38–44 |
| B2 | | | | | 28–37 |
| C1 | | | | | 23–28 |
| C2 | | | | | 17–22 |
| D-E | | | | | 0–16 |

***Table 2***: *Distribution of gender, socioeconomic status and aesthetic component of ICON score*

| **Category** | **N** | **%** |
|---|---|---|
| Gender | | |
| Male | 21 | 33.33 |
| Female | 42 | 66.66 |
| Socioeconomic status | | |
| A | 6 | 9.52 |
| B1 | 10 | 15.87 |
| B2 | 16 | 25.39 |
| C1 | 11 | 17.46 |
| C2 | 11 | 17.46 |
| D-E | 9 | 14.28 |
| ICON[a] aesthetic component (self-evaluation) | | |
| ≤ 4 | 55 | 87.30 |
| > 4 | 8 | 12.70 |
| ICON aesthetic component (professional evaluation) | | |
| ≤ 4 | 36 | 57.14 |
| > 4 | 27 | 41.86 |

***Table 3**: Median, interquartile range and range observed in OHIP-14 and its domains and ICON aesthetic components (self- and professional evaluation)*

| OHIP-14 domain | Mean (standard deviation) | Median (interquartile range) | Range Observed | *p* value[a] |
|---|---|---|---|---|
| 1. Functional limitation | 0.10 (0.54) | 0 (0) | 0–4 | |
| 2. Physical pain | 0.65 (1.21) | 0 (1) | 0–4 | |
| 3. Psychological discomfort | 0.66 (1.23) | 0 (1) | 0–4 | |
| 4. Physical disability | 0.19 (0.65) | 0 (0) | 0–4 | |
| 5. Psychological disability | 0.73 (1.35) | 0 (1) | 0–4 | |
| 6. Social disability | 0.22 (0.77) | 0 (0) | 0–4 | |
| 7. Handicap | 0.08 (0.47) | 0 (0) | 0–4 | |
| OHIP-14 total | 5.17 (6.50) | 3 (5.5) | 0–33 | |
| ICON aesthetic component (self-evaluation) | 2.98 (1.55) | 3 (1) | 1–9 | .0002* |
| ICON aesthetic component (professional evaluation) | 3.98 (1.97) | 4 (2.5) | 1–9 | |

***Note**: [a]Wilcoxon test; OHIP-14: Oral Health Impact Profile; ICON: Index of Complexity, Outcome and Need*

***Table 4**: Spearman correlation between ICON aesthetic components (self-evaluation) and OHIP-14 scores*

| | 1. Functional limitation | 2. Physical pain | 3. Psychological discomfort | 4. Physical disability | 5. Psychological disability | 6. Social disability | 7. Handicap | OHIP-14 total |
|---|---|---|---|---|---|---|---|---|
| *r* | 0.1333 | -0.0157 | 0.3499 | 0.0177 | -0.2500 | 0.0751 | 0.0703 | 0.3417 |
| *p* | 0.1365 | 0.8614 | <0.0001* | 0.8441 | 0.0047* | 0.4033 | 0.4338 | 0.0061* |

Note:* *Statistically significant*

# RESULTS

A total of 63 young adults with a mean age of 28.68 years (± 4.99) joined the study. As shown in Table 2, approximately two-thirds of the 63 subjects were females (66.66%). Participants were from different social levels, covering all socioeconomic statuses and were well distributed, with 32 (50.78%) of higher status (A, B1 and B2) and 31 (49.10%) of lower status (C1, C2 and D-E). The self-evaluations of the ICON aesthetic component reported eight (12.70%) individuals with an aesthetic need for orthodontic treatment (ICON > 4), and professional evaluation reported 27 (41.86%).

Table 3 shows the mean, standard deviation, median, interquartile range and range observed in OHIP-14 and its domains and the ICON aesthetic component (self- and professional evaluation) for all 63 subjects. The overall mean score and standard deviation (SD) for OHIP-14 was 5.17 (± 6.50). Domain 5 (psychological disability) was most affected, with a mean score of 0.73 (± 1.35). Domain 7 (handicap) was less affected, with a mean score of 0.08 (± 0.47).

There was a weak correlation between the aesthetic component perceived by the participants and the evaluation of their quality of life (Table 4). Only the psychological domains (psychological discomfort and psychological disability) showed significant correlations, but they were considered poor.

There was no significant difference between the genders ($p = 0.8554$) regarding the aesthetic self-perception of malocclusion, and no significant difference between the genders in relation to the assessment of quality of life ($p = 0.0802$).

The Spearman rank-order correlation coefficients between socioeconomic status and the ICON aesthetic component (self-evaluation) and between socioeconomic status and OHIP-14 showed no correlation ($r = 0.0423$; $p = 0.7421$ and $r = 0.1803$; $p = 0.1573$, respectively).

In relation to the aesthetic perception of malocclusion and the professional evaluation, there was a significant difference between the professional assessments and those of participants ($p = 0.0002$) (Table 3).

# DISCUSSION

Many studies have already evaluated the effect of malocclusion on OHRQoL.[3-9,16-18] However, many researchers evaluated malocclusion through clinical examination

performed by professionals, or normative parameters that conceptualize the complexity level of malocclusion, also performed by professionals. Aesthetics are subjective, and aesthetic perception of the need for treatment varies from patient to patient. Some patients have severe malocclusions and are not concerned with their aesthetic appearance, while others have light malocclusions and are concerned about its impact on their quality of life.[13,16,19] The novelty of this study lies in the fact that the main evaluation was that of the participants. This evaluation involved self-perception of their own malocclusion.

Another important point was that the population studied was not waiting to start orthodontic treatment, and so were probably not concerned with their aesthetic appearance, which could have a negative impact on their OHRQoL. The small number of participants who declared that they did not need aesthetic treatment (ICON d" 4) compared to those who needed aesthetic treatment (ICON > 4) confirmed this point.

It was also possible to identify a low impact of malocclusion on the OHRQoL of those participants who were not seeking orthodontic treatment. The OHIP-14 index can range from 0–56; in this study, the variation found was 0–33, with a mean of 5.17 (± 6.50). Studies that evaluated patients waiting for orthodontic treatment found higher values in their evaluation of OHRQoL.[9,17]

A positive correlation between the aesthetic perception of their own malocclusion and a worsening of their OHRQoL was observed, as also reported by Bellot-Arcís et al. concerning college students.[20] However, this correlation was classified as low. Silvola et al.[2] and Taylor et al.[11] did not associate greater perception of malocclusion with the worsening of OHRQoL. Only psychological domains showed a significant correlation with the OHRQoL evaluation, although they were weak, agreeing with Bellot-Arcís et al.[20] who showed a significant linear relationship between aesthetic self-perception of a smile and psychological impact on the individual.

The psychological component has already been reported by other authors as an important factor in OHRQoL.[16,21,22] Aesthetic and social problems negatively impact OHRQoL and should be taken into account in order to evaluate the needs and goals of orthodontic treatment.

No difference was found between the genders in relation to the perception of malocclusion. Nevertheless, this result has to be interpreted cautiously, since the sample was not matched by gender. Feu et al.[22] also did not find a difference in the demand for orthodontic treatment between men and women. Other authors found no differences between the genders in the evaluation of OHRQoL,[10,17] although some reported that women have a keener aesthetic perception than men.[23-26]

The socioeconomic level of the participants did not affect their ratings. This was also reported by Palomares et al.,[10] showing no effect of socioeconomic status in relation to OHRQoL. However, studies with more robust samples that focused on the influence of socioeconomic factors in OHRQoL showed a negative impact in OHRQoL associated with a low socioeconomic level. Vettore and Aqeeli found in a large sample of Brazilians that adults living in cities with low socioeconomic development were more likely to report negative impact in OHRQoL,[27] and Piovesan et al. reported that poorer scores of OHRQoL were observed in children whose mothers had not completed primary education and in those with lower household income.[28]

The mean evaluation of aesthetic need for malocclusion by the professional (appraiser) was higher than the mean for the participants (Table 2), indicating a more careful evaluation, with a significant difference between these evaluations. Similarly, Silvola et al.[2] identified differences between evaluators and lay people, with a tendency for professionals to detect malocclusion more easily. Feu et al.[22] found a weak correlation between the aesthetic need for orthodontic treatment, according to the professional appraiser and according to the participant. Prahl-Andersen [29] found differences between the aesthetic need for orthodontic treatment as evaluated by lay people and professionals and stressed the importance of taking into account the patient's self-perception at the time of the orthodontic treatment.

There was a difficulty in finding a valid index for the specific population studied which could evaluate OHRQoL regarding orthodontic problems. There are still flaws in the use of the OHIP-14 index regarding malocclusion. It is very difficult in the subjective area to detach aesthetic smile perceptions such as changes in color, shape of teeth, pigmentations, deficient restorations and inadequate prostheses of aesthetic smile perception from the malocclusion itself. Although the examiner clarified to all participants that their answers should be based on the positioning of the teeth and the fitting of the dentition, to the lay population it hard to dissociate smile characteristics from malocclusion. Therefore, it is important for future studies that an index to evaluate OHRQoL, concerning only malocclusion problems, is created and validated. Liu, McGrath and Hagg[16] noted that this new instrument must include more questions with answers based on psychological origin since they are relevant in the evaluation.

This research revealed that the patient's view is different from that of the orthodontist, especially when an

issue is more subjective, such as the aesthetic factor. As the participants were a group not seeking orthodontic treatment, the results showed less importance of the aesthetic perception of their malocclusion and also that there was a low negative impact on OHRQoL for these participants, despite a correlation between aesthetic self-perception of malocclusion and OHRQoL. It was also noted that the only domains that showed significant correlations were psychological, strengthening evidence for the subjectivity of issues related to the aesthetics of malocclusion. It is understood, therefore, that there is a need to listen more to patients regarding their perception of malocclusion and the impact of this on their OHRQoL, using subjective criteria in a complementary way to the normative indices which establish the need for orthodontic treatment.

The participants in our research were young adults. The demand for orthodontic treatment has been greatly increasing in this age group, probably for aesthetic reasons. So, more studies to evaluate their OHRQoL are needed. The present results showed the importance of listening to the patient's needs before proposing an orthodontic treatment plan.

On the other hand, our study did not compare individuals seeking orthodontic treatment with those that were not. Comprehensive research comparing these two different groups would be very welcome.

Significant weak correlations between self-perceived malocclusion and OHRQoL were found in young adults who were not seeking orthodontic treatment. The domains of psychological discomfort and psychological disability presented the greatest impacts. As the aesthetic self-perceived malocclusion was significantly less relevant than the professional evaluation, dentists, and specifically orthodontists, should take it in account when addressing this kind of patient.

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