

SCIENTIFIC
SECTIONSelf-perceived orthodontic treatment
need evaluated through 3 scales in a
university population

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Objective: To evaluate the self-perceived orthodontic treatment need in a university population evaluated through 3 scales that used different approaches.

Design: Cross-sectional survey.

Setting: University dental clinic, Lima, Peru, 2001.

Materials and methods: Questionnaires that gathered perceptions on dentofacial aesthetic perception and orthodontic treatment need were applied to a randomly selected sample (329) of first year university students (729). Subjects undergoing orthodontic treatment at the time of examination were excluded.

Main outcome measures: Aesthetic component (AC) of the Index of Orthodontic Treatment Need (IOTN), Oral Aesthetics Subjective Index Scale (OASIS) and a visual analogue scale (VAS) were used.

Statistical analysis: Descriptive statistics, Spearman correlation test, Kruskal–Wallis test and Mann–Whitney U-test were used.

Results: For the AC, 87.5% were in the ‘without treatment need’ category, 10.6% in the ‘borderline need’ category and 1.8% in the ‘treatment need’ category. The mean AC score was 3.02 (± 1.49). The mean OASIS score was 11.81 (± 4.84), and the VAS score was 40.16 (± 18.16). Correlations between the 3 self-assessment scales were moderate (AC-OASIS 0.416, AC-VAS 0.541 and OASIS-VAS 0.457). Gender or previous orthodontic treatment had no influence ($p < 0.05$) on the scales.

Conclusions: Differences in the approaches used by each scale to evaluate the self-perception of the aesthetical arrangement of the front teeth may explain the moderate correlation values.

Key words: Self-perceived orthodontic treatment need, IOTN, OASIS, VAS, university students

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Introduction

It is becoming progressively evident that the determination of orthodontic treatment need should not be based exclusively on observable clinical signs, but should also consider functional and aesthetic factors. The aesthetic factors are not easily evaluated and are generally determined subjectively.¹ Nevertheless, identification of a malocclusion by a dental health care professional is a primary factor in motivating an individual to seek orthodontic care.² This decision can be modified by many important factors, such as a combination of consumer and provider aspirations.³ These were summarized by Shaw *et al.*² as patient factors (appearance improvement, age, gender, environment influence and social class), and orthodontist factors (appreciation of

the treatment need, access to services, cost of the treatment and treatment priority).

In another study, Fox *et al.* reported that adolescents gave a different importance to the appearance of their anterior teeth depending if they sought orthodontic treatment or not.⁴ Petersen and Dahlström found that dentists and orthodontists perceived orthodontic treatment needs differently to adolescents.⁵

There are only a few indices or scales that consider the self-perception of the evaluated person regarding their orthodontic treatment need. They are the Index of Orthodontic Treatment Need (IOTN),⁶ the Dental Aesthetic Index (DAI),⁷ the Orthodontic Aesthetic Subjective Impact Scale (OASIS),⁸ and the Index of Complexity Outcome and Need (ICON).⁹

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The IOTN has two components that have been refined through time.^{6,10,11} These are the Dental Health component (DHC), which classifies the dental health need for treatment, and the Aesthetic component (AC), which classifies the aesthetics of the arrangement of the teeth.^{3,6,8,12}

The IOTN measures the treatment need from a provider (normative) viewpoint and this does not always reflect the consumers' view. This problem was addressed by Mandall *et al.* who attempted to develop a patient derived measure.⁸ In this study, they combined scores from a questionnaire and the child's perceived AC score to construct an overall perceived oral aesthetic impact score. They found that subjects with greater clinical orthodontic treatment need usually perceived themselves as worse off than their peers with lower clinical treatment need. Interestingly, children from lower socioeconomic conditions reported higher OASIS scores, yet they were less likely to have received orthodontic treatment. Untreated children who desired orthodontic treatment had higher values in the AC of the IOTN and OASIS.

In summary, there are several approaches to evaluate orthodontic treatment need that have been derived from a provider viewpoint (IOTN) and a consumer viewpoint (OASIS). The present study was designed to evaluate any association between these measures and to investigate possible differences in the determined self-perceived need in a young adult population.

Materials and methods

Three-hundred-and-twenty-nine first year students were randomly selected from a sample of 780 first year university students from Lima, Peru, who had undergone a medical examination. The minimum required

sample was 320 for an α of 95% and a precision error of 3% based on an orthodontic treatment need of 15% (objective need of 28% and self-perceived need of 2% obtained from a pilot study). Health sciences or artistic career students and students in active orthodontic treatment were excluded. All subjects signed a voluntary informed consent form.

A focus group of 10 university students were recruited to assist in structuring the scales used in this study into a clearly understandable format. All the selected students were asked to complete the questionnaires. The primary examiner (CF) was available to respond to subject questions during the questionnaire completion process.

The following structured orthodontic treatment need scales were completed for each subject:

- Aesthetic component of the IOTN (AC)⁶—the subjects were asked to score their teeth with the Aesthetic component of the IOTN.
- Oral Aesthetic Subjective Impact Scale (OASIS)⁸—subjects were asked to answer 5 questions on a 7-point Likert scale about their perception of oral aesthetics; the possible final score ranged between 5 and 35 (Table 1)
- Visual analogue scale (VAS)⁵—subjects marked their aesthetic perception of the appearance of their own teeth on a 100 mm line. They were asked: 'Rate your aesthetic perception of your teeth by putting a cross on the line between the two extremes where 0 is the worst aesthetics you could imagine and 100 the most ideal aesthetics you could imagine'.

Data analysis

Descriptive statistics were used for each variable. The Kolmogorov-Smirnov test was used to evaluate the

Table 1 Oral aesthetic subjective impact scale (oasis)⁸

1. How do you feel about the appearance of your teeth?						
1	2	3	4	5	6	7
Not concerned at all						Very concerned
2. Have you found that other people have commented on the appearance of your teeth?						
1	2	3	4	5	6	7
Not at all						All the time
3. Have you found that other people have teased you about the appearance of your teeth?						
1	2	3	4	5	6	7
Not at all						All the time
4. Do you try to avoid smiling because of the appearance of your teeth?						
1	2	3	4	5	6	7
Not at all						All the time
5. Do you ever cover your mouth because of the appearance of your teeth?						
1	2	3	4	5	6	7
Not at all						All the time

normality of the data. Spearman correlation tests were used to measure association between the self-perceived orthodontic treatment need (AC, OASIS and VAS) scales. Finally, the Kruskal–Wallis test and Mann–Whitney *U* test for independent samples were used to identify any differences between the scales, gender and previous orthodontic treatment.

Results

The sample of 329 included 178 men (54.1%) and 151 women (45.9%) with a mean age of 18.02 years (± 1.54). Forty-three (13.01%) had undergone orthodontic treatment.

For the AC, 87.5% (288) were in the ‘without treatment need’ category, 10.6% (35) in the ‘borderline treatment need’ category and 1.8% (6) in the ‘treatment need’ category. The mean AC score was 3.02 (± 1.49). The mean OASIS score was 11.81 (± 4.84); and the mean VAS score was 40.16 (± 18.16).

The Kolmogorov–Smirnov test demonstrated that the sample did not come from a normally distributed population for any scale. Therefore, non-parametric statistical tests were used for comparison purposes.

Comparison of the mean OASIS and VAS scores according to the AC category showed a trend of higher OASIS scores and lower VAS scores for the subjects with more treatment need (Table 2). Scores were ranked and evaluated through non-parametric tests. The Kruskal–Wallis test showed that there were highly significant differences ($p < 0.001$) between AC groups for OASIS and VAS. Groups were then compared by pairs.

Differences were highly significant ($p < 0.001$; Mann–Whitney *U* test for independent samples) for OASIS and VAS between the ‘without treatment need’ and the ‘borderline treatment need’ categories. No differences were found between the ‘without treatment need’ and the ‘treatment need’ categories, and between the ‘borderline treatment need’ and the ‘treatment need’ categories (Mann–Whitney *U* test for independent samples).

Spearman correlations between the three self-assessment scales were moderately significant ($p < 0.001$; AC–OASIS 0.416, AC–VAS 0.541 and OASIS–VAS 0.457).

No association (Mann–Whitney *U* test for independent samples) between the evaluated scales with gender or previous orthodontic treatment was found ($p > 0.05$).

Discussion

Orthodontic treatment need was not only influenced by objective occlusal characteristics, but also by the subjective appreciation of their own facial aesthetics and socio-cultural conditions.^{1,3,13–19}

The self-perceived need for orthodontic treatment in this population, based on the AC, was less than found in studies that evaluated other populations and cultures.^{6,8,20–23} (Table 3) This difference may result from different cultural and socioeconomic factors, where relatively few of the present sample’s peers had undergone orthodontic treatment (13.01%).

Some difficulties with the AC were identified, which could have an influence in the low percentages of self-perceived orthodontic treatment need. The subjects

Table 2 Descriptive statistics for the OASIS and VAS scores grouped according to AC categories

AC categories	Number of students	Self-perceived scale	Mean score	SD
Without treatment need	288	OASIS	11.29	4.37
		VAS	61.67	17.85
Borderline treatment need	35	OASIS	15.37	5.95
		VAS	47.74	13.09
Treatment need	6	OASIS	16.17	8.57
		VAS	45.83	25.38

Table 3 Comparison of the AC of the IOTN results in different studies

Authors	Sample	No treatment need	Borderline treatment need	Treatment need
Brook and Shaw ⁶	333 11–12-year-old Caucasians	58%	40%	2%
Mandall <i>et al.</i> ⁸	434 14–15-year-old Caucasians and Asiatics	72%	19%	9%
Ucuncu and Ertugay ²³	250 Turkish schoolchildren	90%	5%	5%
de Muelenaere <i>et al.</i> ²⁰	206 South African black dental students	74%		
Birkeland <i>et al.</i> ²¹	224 Norwegian children	78%	13%	9%
Present study	329 Peruvian university students	87%	11%	2%

seemed to have difficulty understanding the idea of selection of the appropriate photograph from the 10 photographs provided in the published scale. Some subjects tried to look for the photographs most resembling their own teeth, instead of selecting the picture that had the same level of aesthetic appeal as their own teeth. This problem was also previously reported for professionals during their initial training in the use of the scale.²⁴ Given the difficulty well educated subjects had with the interpretation of the scale, poorly educated or young patients may experience even greater problems of interpretation.

The other two scales used a different approach to evaluate the self-perceived need. The OASIS uses a Likert type questionnaire and the visual analog scale (VAS) uses a simple line with two marked extremes, both of which appear to be more easily understood by these subjects. Comparison of the mean OASIS and VAS scores according to the AC category showed a trend of higher OASIS scores and lower VAS scores for the subjects with greater treatment need.

Mandall *et al.*⁸ developed the OASIS to permit adolescents to self-determine the grade of concern about the arrangement of their anterior teeth. In their study, subjects with greater clinical orthodontic treatment need usually perceived themselves worse off than their peers with lower clinical treatment need. In that study, untreated children who desired orthodontic treatment had higher values simultaneously in the AC of the IOTN and OASIS. The AC is a specific evaluation of the self-perception of the appearance of their anterior teeth, whereas the OASIS asks several questions about the perceptions of others and themselves, as well as questions about their previous behavior related to the appearance of their teeth. Therefore, differences in the results may be expected.

According to the present results, the VAS seemed to be the most easily perceived need scale to be understood and used by these university students. It also presented the strongest correlation with the other two scales. Differences could also be explained by the different approaches utilized. The VAS scale is more related to the AC in the sense that it is also a general evaluation of the perception of the anterior teeth, but without the use of photographs as facilitator stimuli.

Gender and previous orthodontic treatment did not influence the results. Our results were contradictory when compared with some previous studies that had demonstrated that more females than males perceive an orthodontic treatment need under similar conditions.^{8,25-30} Some authors have reported the same gender bias in adults,^{30,31} but others disagree.^{23,32,33} The difference is probably cultural or socioeconomic.

Two studies^{16,34} reported that young European adults who had previously received orthodontic treatment had similar or higher perception of orthodontic treatment need than untreated subjects. Burgersdijk³⁴ used questions regarding satisfaction with the alignment of the anterior teeth and previous orthodontic treatment, whereas Tuominen¹⁶ used questions regarding orthodontic treatment desire. They did not utilize the more widely accepted self-perception scales. Our results did support their findings, but cultural or socioeconomic differences could make direct comparisons questionable. Further research regarding the influence of previous orthodontic treatment and the self-perceived orthodontic need in Peruvian populations is underway.

In conclusion, application of indices for research purposes should take into account possible cultural or socioeconomic differences that may arise between different populations. It is important that studies identify if they are using a modification of the original IOTN. A comparison between studies using non-identical indices may not be valid.

According to the present results the VAS is as valid as the AC or OASIS in discriminating orthodontic treatment need in this university population. Further research with the VAS as a tool to evaluate self-perceived orthodontic need is required.

Conclusions

- Although AC, OASIS and VAS may, theoretically, evaluate the self-perception of the aesthetical arrangement of the front teeth, differences in the approaches used by each scale may explain the moderate correlation values (between 0.42 and 0.54).
- OASIS score showed a positive relationship and VAS score a negative relationship with the AC categories.
- No influence of gender or previous orthodontic treatment over scale scores was found.

Contributors

Carlos Flores-Mir was responsible for the study conception and design, analysis and interpretation of the data. He participated in the drafting and critical revision of the paper. Fernando R. Salazar participated in the study conception and design, analysis and interpretation of the data. He participated in the drafting and critical revision of the paper. Paul W. Major participated in the study analysis and interpretation of the data. He participated in the drafting and critical revision of the paper. All the listed authors approved the final version of the manuscript to be

published. Ruben Durand made the statistical analysis and gave some useful feedback about perception. Carlos flores-Mir is the guarantor.

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