Original Article

Dental Esthetic Self-perception in Young Adults with and without Previous Orthodontic Treatment

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Abstract: The aim of this study was to determine which dental esthetic self-perception evaluation tool discriminated better between orthodontically treated or untreated Peruvian young adults. A total of 630 students were randomly chosen from the 2000 admitted in 2002 to a private university in Peru. Students undergoing active orthodontic treatment at the time of examination were excluded. Self-perceived dental esthetic appearance was evaluated through Standardized Continuum of Aesthetic Need, Oral Aesthetic Subjective Index Scale, and Visual Analogue Scale (VAS). A stepwise multivariate discriminant analysis was developed to classify orthodontic treatment according to the three evaluation tools. A total of 199 students (31.6%) reported a history of orthodontic treatment. Differences between orthodontically treated and untreated groups were found only for the mean VAS score ($P < .001$). Although three different approaches were used to evaluate dental esthetic self-perception, only VAS allowed the discrimination of the self-perceived dental appearance between orthodontically treated and untreated Peruvian university young adults. Similarities in the self-perceived dental appearance of treated and untreated groups reported in previous epidemiological studies could be explained because different evaluation instruments were used. Further studies are required to support current findings. (*Angle Orthod* 2006; 76:412–416.)

Key Words: Esthetic self-perception; Orthodontic treatment need; Young adults; Dental appearance

INTRODUCTION

Dentofacial esthetics is one important motivational factor to seek orthodontic treatment and, therefore, an improvement in appearance should be an essential treatment goal.[1–3] Personal esthetic perceptions of the dentofacial complex and the associated psychosocial need are relevant to the consumers of orthodontic care. Treatment is therefore often influenced more by demand than by need.[4–7]

In the past, orthodontic treatment need was evaluated from a strictly professional viewpoint (normative need), but several studies have stated that self-perceived dental appearance is also important in the decision to seek orthodontic treatment.[8–11] On the basis of this, different scales such as the Index of Orthodontic Treatment Need (IOTN),[1] the Dental Aesthetic Index,[12] and the Index of Complexity Outcome and Need[13] were developed taking into consideration the perceived dental appearance from the patient's perspective in addition to the normative need determined by professional evaluations.

Independent self-evaluation tools, using different approaches, have also been used to evaluate the self-perceived dental appearance such as the Standardized Continuum of Aesthetic Need (SCAN),[1,14] the Oral Aesthetic Subjective Impact Scale (OASIS),[15] or the Visual Analogue Scale (VAS).[7,16,17]

There are only a few studies in the literature comparing self-perceived dental appearance between

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young adults with and without previous orthodontic treatment. Burgersdijk et al,[18] Tuominen et al,[19] and Tuominen and Tuominen[20] found that orthodontically treated subjects reported a higher perceived need for orthodontic treatment than did the untreated ones. Although Lagerström et al,[21] Lilja-Karlander et al,[22] and Flores-Mir et al[17] showed no significant differences in esthetic self-perception between orthodontically treated and untreated young adults, Kerosuo et al[23] reported a positive effect on dental appearance satisfaction in orthodontically treated young adults.

Although it may be expected that individuals with previous orthodontic treatment would have higher or at least similar self-perception of their dental esthetic appearance than untreated subjects, the contradictory findings previously reported could be explained. Possible reasons include the fact that orthodontic treatment may have raised their expectations,[19] the amount of orthodontic treatment required was high and optimal results were never attained,[18] relapse,[19] young adults have a more critical appraisal of orthodontic treatment need than other age groups,[24] or the subjective orthodontic need perception changes over time even without previous treatment.[25]

In any case, it has to be considered that self-perceived dental appearance is only one of the components of orthodontic treatment effectiveness. Another consideration is that in a publicly funded health care system with sufficient treatment provision and correctly adjusted patient selection criteria, satisfaction is expected to be similar between groups.

An analysis using different dental esthetic self-perception tools may give some light to these contradictory findings. It is expected that differences in the approach used in the reported tools explain different aspects of the dental esthetic self-perception of the young adults, and therefore, an evaluation of different tools simultaneously may increase our knowledge of this topic. The aim of this study was to determine which dental esthetic self-perception evaluation tool discriminated better between orthodontically treated or untreated Peruvian young adults. For this study, perceived dental esthetics is considered equivalent to perceived dental appearance.

MATERIALS AND METHODS

A total of 630 freshmen were randomly selected from a population of 2000 students admitted in 2002 to a private university in Lima, Peru. All selected students signed a voluntary informed consent form, and none of them were receiving active orthodontic treatment. This study was approved by the university ethics board. The sample size was computed to have a 90% power ($\beta = 0.10$) to be able to demonstrate a statistically significant difference of 1 point in any of the used scales between the two groups at the 5% level ($\alpha = 0.05$).

A focus group of university students with characteristics similar to the ones to be interviewed assisted in structuring the OASIS, SCAN, and VAS into a clearly understandable format for their peers. Adequate reliability in the use of these scales by their peers was assumed after this stage.

The data collection was divided in two parts: a structured interview and a self-completed questionnaire. During structured interviews, students were first asked whether they had previously had some kind of orthodontic treatment, even if the treatment was not finished for any reason or if removable or fixed appliances were used.

Thereafter, they scored their teeth on the SCAN. The SCAN (later included as the Aesthetic Component of IOTN)[1,14] presents 10 frontal intraoral photographs progressively ordered from one to 10 in two columns. These photographs were selected at equal intervals from a previously rated sample of one thousand 12-year-old subjects. The subjects were asked to evaluate the position they felt their teeth would lie inside this esthetic scale. No self-examination was allowed, so they have to rely on their memory.

During the questionnaire administration, students registered their self-perceived dental appearance through a 10-cm VAS[7,16,17] by drawing a vertical line to intersect the scale where they considered appropriate. Selected VAS was anchored by the phrases ''Worst imaginable dental aesthetic'' at the zero-cm end and ''Most ideal dental aesthetics'' at the other end.

Finally, students completed a Likert-type 7-point questionnaire scale (possible score ranged between 5 and 35) about the self-perceived effect of appearance of their teeth, using the OASIS.[15] The following questions were formulated to assess the degree of concern or disadvantage that was perceived by the subjects because of the arrangement of their teeth.

- How do you feel about the appearance of your teeth:
- Have you found that other people have commented on the appearance of your teeth?
- Have you found that other people have teased you about the appearance of your teeth?
- Do you try to avoid smiling because of the appearance of your teeth?
- Do you ever cover your mouth because of the appearance of your teeth?

No previous validation or adaptation of those scales has been made for the current population, although this is not likely to be a problem because OASIS uses general questions, which are likely to be understood

TABLE 1. Association Between Previous Orthodontic Treatment and Students' Sex and Age[a]

Covariables	Treated Group	Untreated Group	OR	IC 95%	*P* Value
Sex (%)					.748
Male	103 (31.0)	229 (69.0)	1.00	—	
Female	96 (32.2)	202 (67.8)	1.06	(0.76; 1.48)	
Age (y) (SD)					.049
	17.20 (1.36)	17.53 (2.14)	0.90	(0.81; 0.99)	

[a] Univariate logistic regression analysis was used.

TABLE 2. Comparison of the Esthetic Self-perception Between Orthodontically Treated and Untreated Students[a,b]

Esthetic Self-perception Measure	Statistics	Treated Group (n = 199)	Untreated Group (n = 431)	Mean Difference	*P* Value
OASIS	Mean ± SD	10.92 ± 4.59	11.10 ± 5.28	−0.18	.671
	(Range)	(5–30)	(5–35)		
VAS (mm)	Mean ± SD	48.80 ± 13.83	44.63 ± 13.61	4.17	<.001
	(Range)	(17–100)	(0–100)		
SCAN Scale	Mean ± SD	2.45 ± 1.28	2.54 ± 1.31	−0.09	.392
	(Range)	(1–9)	(1–8)		

[a] OASIS indicates Oral Aesthetic Subjective Index Scale; VAS, Visual Analogue Scale; SCAN, Standardized Continuum of Aesthetic Need.
[b] Stepwise multiple discriminant analysis (Wilks' lambda) was used.

similarly anywhere. A problem may arise if it is used on children or adolescents because assessment of oral impacts inevitably involves questions that are difficult for children under 12 years of age,[26] but this was not the case in this young adult population.

Statistical analysis

The association between previous orthodontic treatment and each covariable (students' sex and age) was evaluated by univariate logistic regression analyses. Then, a stepwise multivariate discriminant analysis was applied to find those esthetic self-perception measures that best discriminated between the orthodontically treated and untreated groups, after assumptions of normality, equality of covariance-variance, and linearity were corroborated.[27]

Successive Kolmogorov-Smirnov tests demonstrated that conformed groups for each evaluated measure came from normally distributed populations ($P > .088$). Equality among variance-covariance matrixes was demonstrated through the M test of Box ($P = .801$).[27] Finally, analysis of the correlations matrix demonstrated that none of the pairs of evaluated measures was strongly associated in a linear form ($r < .416$).[27]

RESULTS

A total of 332 men (52.7%) and 298 women (47.3%) with a mean age of 17.43 years [$IC_{95\%}$ (17.27; 17.48)] were evaluated. Most of them (82.5%) were between 16 and 18 years of age. A previous orthodontic treatment history was reported by 199 (31.6%) students. A statistically significant association was found between previous orthodontic treatment and age ($P = .049$), but no association was found between access to orthodontic treatment and sex ($P = .748$) (Table 1).

Because previous orthodontic treatment was dichotomized, only one discriminant function was calculated using the three esthetic self-perception measures and age as independent variables. According to discriminant analysis, there was an inequality between means of the discriminant function for the treated and untreated groups (Wilks' lambda, $P < .001$), which indicated that at least one of the evaluated measures had a significant effect in the separation of the groups.

To find exactly where the differences between groups were located, each esthetic self-perception measure was individually analyzed, obtaining statistically significant differences between treated and untreated groups only for the mean VAS score (Wilks' lambda, $P < .001$). The students' age did not reach the minimum level of significance in the multivariate model ($P = .052$). Table 2 exhibits descriptive statistics for the esthetic self-perception measured through the OASIS, VAS, and SCAN in students with and without previous orthodontic treatment.

DISCUSSION

Most epidemiological studies published on the frequency of received orthodontic treatment in young adults were based on European populations, where orthodontic treatment is provided under a public health

system. In Finland, 38.5% of the university students were previously orthodontically treated.[19,20] Whereas in Sweden[10] and in Norway,[9,28,] 40.0% and 61.5% of the evaluated young adults, respectively, had received previous orthodontic treatment, in this sample of Peruvian university students, only 31.6% reported a previous orthodontic treatment history. It has to be considered that the sample in this study represents a limited, not necessarily representative, sample of the Peruvian population.

The demographic distribution in this sample was dissimilar between the orthodontically treated and the untreated students, especially according to age. A direct association between previous access to orthodontic treatment and age was found in this sample of university students. When the age of the students was increased by one year, the chance of presenting with previous orthodontic treatment history increased 1.11 times [$IC_{95\%}$(1.01; 1.24)]. Although it seems logical that the frequency of orthodontic treatment will be higher as age increases, the borderline significance found in the bivariate analysis ($P = .049$) has to be considered carefully. When students' age was analyzed in a multivariate context, it was no longer significant at the 5% level. More studies are required to confirm or reject this possible association.

Although several approaches have been reported to evaluate the dental esthetic self-perception of the dentofacial appearance, a significant number of them have not been previously evaluated simultaneously. According to the stepwise multiple discriminant analysis, the mean scores for the esthetic self-perception measured through VAS permitted a better differentiation between orthodontically treated and untreated groups from this specific population than did SCAN or OASIS. The difference between both groups for VAS was of 4.17 mm in a 10-cm scale, being higher in treated than in untreated young adults. This difference of around 4% is statistically significant, but it is not necessarily clinically significant. The determination whether 5%, 10%, or more is clinically significant, however, is subjective.

VAS is a broadly used technique for the measurement of subjective experiences such as pain, fatigue, or sickness,[29] and this test has only recently has been borrowed from other medical sciences to evaluate esthetic perception.[7,16,17] VAS seems to be an economic and simple means to obtain data about an individual's self-perception, and it can be easily adapted for use with individuals from any age group or sociocultural background.[29] Although SCAN scale gained popularity as part of IOTN,[1] some authors have reported difficulties with this scale during data collection.[6,15,17,30] The subjects seemed to have difficulty in classifying their own dental appearance on the published 10-points scale. Some subjects tried to look for the photographs most resembling their own teeth instead of selecting those that had the same level of esthetic appeal as their own teeth.[6,17] OASIS consists of a series of five questions about the effect of dental esthetic features in the adolescent's life.[15]

However, it seems that OASIS or SCAN did not discriminate appropriately between students with and without previous orthodontic treatment. Several possible explanations for the similarity in the dental esthetic self-perception between young adults with and without previous orthodontic treatment history have been reported previously.[18,19,24,25] However, most of these explanations are based more on factors related to the evaluated individuals than on factors related to the study methodology. According to the findings in this study, a new possible explanation could have been the fact that different evaluation instruments were used.[17–23]

Future research should analyze whether students who did not complete their orthodontic treatment also report similar self-perceived dental appearance. It has to be noted that quantification of incomplete treatment is difficult because of the lack of objective records in this population. Level of orthodontic intervention and quality of the orthodontic treatment received are also likely important. Also, the use of more than one VAS with resembling phrases of dental esthetics in the ends of the scale would demonstrate consistency in the responses through the VAS.

Future epidemiological studies regarding the quality of orthodontic treatment obtained are recommended. These studies should evaluate descriptions of the treatment modality, qualifications of the care provider, treatment outcome, and an evaluation in changes in the quality of life.

CONCLUSIONS

- From the three instruments evaluated in this study, only VAS discriminated between orthodontically treated and untreated Peruvian young adults.
- VAS appears to be a simple and economic instrument to obtain data about an individual's dental esthetic self-perception.

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