Original Article

The Perception of Smile Attractiveness

Variations from Esthetic Norms, Photographic Framing and Order of Presentation

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ABSTRACT

Objectives: To evaluate the attractiveness of a smile according to variations from esthetic norms, photographic framing, and the order of the presentation of photographs.

Materials and Methods: A photograph of an individual was selected and digitally manipulated to create the following smiles: an ideal control smile (I), a smile with diastema (D1), a smile with midline deviation (LM3), a smile with deviation from the long axes of the lateral incisors (10D), and a smile with an inverted smile arc (LSRV). The manipulated photographs were developed in framings of the face and of the mouth and evaluated by 20 laypeople. For half the evaluators, the presentation started with facial photographs and, for the other half, the presentation began with the mouth shots. Evaluators were asked to rank the photographs from the least to the most attractive; then, each photograph was awarded a mark (scale of 0.0 to 10.0).

Results: In both presentations, the smiles I, LM3, 10D, and LSRV received favorable ratings, whereas the D1 smile got poor ratings. The photographic framings used (face vs mouth) and the order of presentation of the photographs did not influence the rankings.

Conclusion: The absence of variations from beauty norms of a smile has a positive impact on its esthetic perception, but variations from the norms do not necessarily result in reduced attractiveness. (*Angle Orthod.* 2009;79:634–639.)

KEY WORDS: Smile; Esthetic; Perception

INTRODUCTION

An understanding of the factors that help or harm the attractiveness of a smile is an important step in creating attractive smiles. Many studies of beauty standards and norms are supposed to guarantee that clinicians can create the desirable ''golden smile.'' Usually these norms and standards are applied in line with diagnostic methods and esthetic treatment plans.[1–3]

To date, little work has been produced to evaluate the actual influence of applying these beauty norms, and variations from them, on the attractiveness of a smile. A ''golden model'' is achieved when beauty norms and standards are confirmed in the results of esthetic treatments. Many of these esthetic norms and references have come from diverse origins: from principles of esthetics in art, from average measurements of a specific ethnic population, from observations of groups who are considered esthetically privileged, etc.[4–6] However, not all the norms and references have been scientifically proven effective for clinical application. According to Peck and Peck[4] and Oumeish,[6] many factors can influence the formation of esthetic beauty standards, such as culture, income, and age. This implies that the ideals of beauty are always changing.

In the majority of cases, naturally attractive smiles, along with smiles that are esthetically pleasing after dental treatment, do not conform to every one of the beauty norms but are not considered unattractive.[7–9] Currently, a consensus on the levels of acceptability of different variations from esthetic norms does not ex-

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ist, and there is not even an accepted hierarchy of the influence of different esthetic norms. Knowledge in this area will aid the choice of treatments and increase the chances of clinical success.

Various photographic framings can be used in the diagnostic process and analysis of a smile in an attempt to create harmony between smiles and facial structures.[10–12] Proposed framings have included: face without a smile, smiling face, profile, nonsmiling profile, mouth smiling, mouth nonsmiling, and semiprofile nonsmiling.[2,12] It is important to know whether the attractiveness of a smile is influenced by the type of photographic framing used in the analysis. In addition, one must analyze methodologies that might influence the results achieved, such as, for example, the order and fashion of presentation of the photographs.

This work used printed photographs to evaluate the attractiveness of smiles according to their variations from esthetic norms, photographic framing, and the order of presentation.

MATERIALS AND METHODS

Individual Photographs

The present research project obtained approval from the Research Ethics Committee at the Dental Faculty of Araraquara, São Paulo, Brazil (protocol number 29/07).

To develop this pilot study, a male individual was chosen according to the following selection criteria: (1) high degree of facial attractiveness, (2) age between 20 and 28, and (3) smile with characteristics close to textbook[2,11] norms. The individual was photographed using a digital camera (Canon EOS-REBEL) in a frontal pose, smiling, with the head in a naturally relaxed position, so that his whole face would be framed.

The photograph was digitally manipulated[8,9] using Adobe Photoshop 7.0 software to give it the selected norms of beauty. An ideal control smile[13] (I) (Figures 1 and 2) was thereby created to serve as a control and golden model for the rest of the photographs. The other structures of the face were not manipulated. The original smile was used only to create the ideal control smile.

Afterward, smile I (control) was used to make further digital manipulations, ie, to create smiles with variations from esthetic norms. The criteria for the selection of these norms took into account the frequency with which they clinically occur and their clinical significance in esthetic planning. These variations were:

- A smile with midline deviation (LM3): the dental midline was shifted 3 mm in relation to the patient's philtrum (Figure 3)
- A smile with deviation from the long axes of the lateral incisors (10D): the long axes of the lateral incisors were inclined 10 degrees distally in relation to their axes (Figure 4)
- A smile with diastema (D1): a 1-mm-wide diastema was created between the maxillary incisors only (Figure 5)
- A smile with a reverse smile arc (LSRV): the maxillary central and lateral incisal borders were repositioned more apically, creating the contour of an inverted parabola (Figure 6)

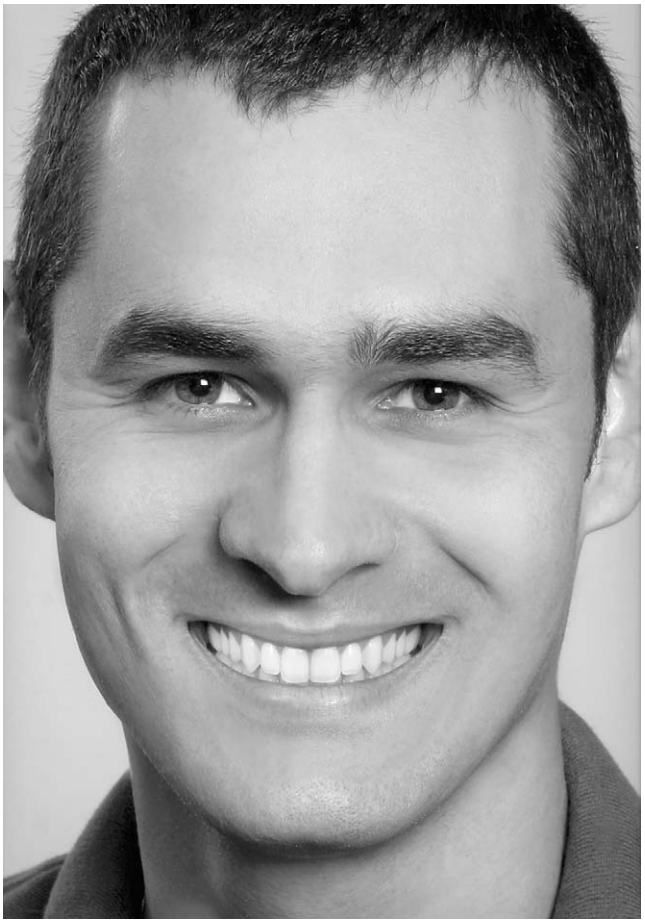

Figure 1. Ideal smile (I), facial photograph.

After the manipulations of the esthetic variations were completed, the facial photographs were edited

Figure 2. Ideal smile (I), mouth-only photograph.

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Figure 3. Smile with midline deviation (LM3).

digitally to obtain photos that showed only the mouth. The manipulated photographs (I, D1, LM3, LSRV, and 10D) were developed in both framings (full face and mouth only) so that they could be evaluated.

Evaluation of the Photographs

Twenty laypeople (10 men and 10 women) were chosen to evaluate the photographs. They were patients or people accompanying patients undergoing dental treatment at the Faculty of Dentistry, São Paulo State University. The criteria for selection of the evaluators were (1) age above 18 years old, (2) recognizable status as laypeople, and (3) voluntary agreement to participate in the study. Demographic data such as income, age, and sex were collected.

For the evaluation, the photographs were coded and separated into two groups: (1) photographs that framed the mouth and (2) photographs that framed the face. The order of presentation in the groups was selected randomly to minimize the influence of this factor. The presentation started with the face shots for half the evaluators and with the mouth shots for the other half.

During the evaluation process, the photographs in each group were presented together, and each evaluator was asked first to organize the photographs, starting with the least attractive and ending with the most attractive, regardless of the framing, and then to rate each photograph (scale of 0.0 to 10.0), with at least one decimal point of difference between marks.

Figure 4. Smile with deviation from the long axes of the lateral incisors (10D).

Figure 5. Smile with diastema (D1).

Statistical Analysis

Analysis of variance and Tukey's test were used to evaluate the mean marks given to the attractiveness of the smiles. Regressive analyses were used to evaluate the relationship between the marks of attractiveness of the two photographic framings for each of the variations from esthetic norms. A 5% level of significance was adopted ($P < .05$).

RESULTS

The distribution of evaluators, according to age and sex, is found in Table 1. The evaluators all had a similar economic status. The evaluations given to the smiles in both framings were not influenced by the sex of the evaluators.

Regarding the age of the evaluators, there was a difference between the age groups only in the judgment of the smiles with diastema (D1); the younger individuals made harsher evaluations of these smiles. Because there were no other influences according to sex and age, these factors were not taken into account in subsequent analyses. The descriptive analyses of marks from 0 to 10 awarded to the ideal control smile (I) and the variations of it (D1, LM3, LSRV, and 10D), in both framings, are given in Table 2.

Differences were found in the judgments made of the various smiles (I, D1, LM3, LSRV and 10D). The marks awarded to smile D1 in both the photographic framings were significantly lower than the averages of the other smiles ($P \leq .001$).

The mean marks given to the smiles I, LM3, and

Figure 6. Smile with reverse smile arc (LSRV).

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Table 1. Distribution of Evaluators According to Age and Sex

	Male		Female	
Age, y	N	%	N	%
24–33	5	25	6	30
34–50	5	25	4	20
Total	10	50	10	50

10D were not different from each other, regardless of the framing, and received favorable evaluations (Figure 7). Regarding the mouth framing, the mean ratings for smile LSRV were significantly lower than those for I, LM3, and 10D ($P \leq .05$); however, these could be considered favorable evaluations, esthetically speaking (Figure 7).

Pearson's correlation was used to analyze the influence of the photographic framing on the perception of the attractiveness of the smiles. The closer the coefficient to 1, the lesser the influence of the framing (Table 3). The sequence in which the photos were shown to the evaluators did not influence the obtained marks.

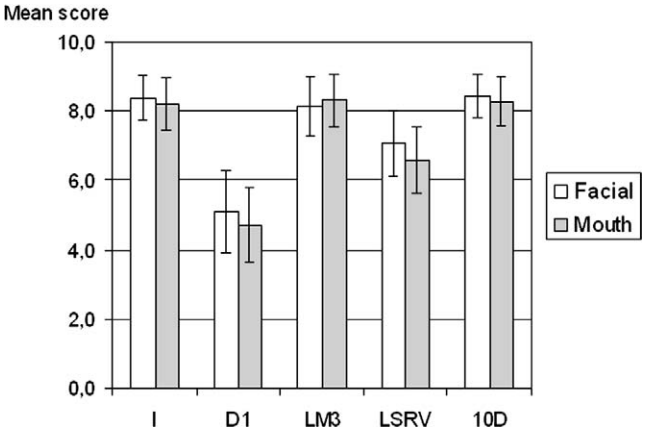

Figure 7. Sample means (columns) and 95% confidence intervals for the population means (bars) of the evaluations of the smiles in different framings. I indicates ideal smile (control); D1, diastema; LSRV, reverse-arc smile; LM3, smile with midline deviation; and 10D, 10-degree inclination of lateral incisors.

DISCUSSION

Sex, age, and income, among other factors, have been considered to influence people's perceptions of the attractiveness of smiles.[14–15,17] However, the present study did not show any influence of sex and age on the evaluations. Only the D1 smile was evaluated more harshly by young individuals. We think this result should be investigated further. Other studies have found no influence of sex or age of the evaluators when judging the attractiveness of smiles.[1,16,18] Regarding age, the fact that the evaluators were all adults may explain the lack of influence found in this study. Perhaps the sex of the model who was photographed would be more influential when grading the attractiveness of the smiles than the sex of the evaluators, as was found in another study.[16]

When observing the influence of variations from beauty norms on the attractiveness of a smile, it was discovered that the ideal smile, in both photographic framings, generally received good evaluations from laypeople, which suggests that it is valid to use the standard model as a reference when constructing a smile. Other works on perception found similar results: smiles without deviations got good evaluations.[8,9,13,17]

Although the LM3 and 10D smiles contained variations, they got positive evaluations, showing that the presence of a variation does not necessarily spoil the attractiveness of a smile. Therefore, when esthetic treatment to obtain a harmonious smile is performed, one does not always need to correct all the variations from esthetic norms. Various factors need to be weighed in this clinical decision, such as: what type of deviation from the norms the smile presents, to what degree it deviates, the opinion of the patient, the cost of treatment, the invasiveness of the procedure, and any time constraints on the patient. In addition, based on our results, the correction of a deviation is not always going to perfect a smile, according to the evaluations of laypeople. Some studies show that laypeople accept a wider range of deviation compared to dentists,[7,8] and because of this a dentist must be careful about imposing his or her own beauty norms upon patients.

It is worth emphasizing that the degrees of deviation from the norm chosen in this study were based on

Table 2. Descriptive Statistics of Marks from 0 to 10 Attributed to the Different Smiles[a] Presented in Both Photographic Framings

	Face Framing					Mouth Framing				
Statistics[b]	I	D1	LM3	LSRV	10D	I	D1	LM3	LSRV	10D
Mean	8.4	5.1	8.1	7.1	8.4	8.2	4.7	8.3	6.6	8.3
SD	1.4	2.6	1.8	2.0	1.4	1.6	2.3	1.7	2.0	1.5
CI (95%)	0.7	1.2	0.9	0.9	0.6	0.8	1.1	0.8	0.9	0.7

[a] I indicates ideal smile (control); D1, diastema; LSRV, reverse-arc smile; LM3, shifted dental midline; and 10D, 10-degree inclination of lateral incisors.

[b] SD indicates standard deviation; and CI, confidence interval.

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Table 3. Coefficient of Regression (a) and Pearson's Correlation (r) Between Face and Mouth Framing

Face × Mouth[a]	a	r
I	0.92	0.85
D1	0.94	0.97
LM3	0.78	0.80
LSRV	1.04	0.91
10D	0.72	0.75

[a] I indicates ideal smile (control); D1, diastema; LSRV, reverse-arc smile; LM3, shifted dental midline; and 10D, 10-degree inclination of lateral incisors.

acceptable amounts of deviation proposed by previous studies.[8,15,18] It was expected that the smiles containing deviations from the norms would receive significantly lower evaluations. More studies of the acceptability of deviations from beauty standards are needed to produce reliable parameters of acceptability that can be used in clinical practice; studies of this issue are still rare.

The D1 smile was the only variation that proved to be a decisive factor in severely compromising the esthetic result. Other studies have shown the compromising effect of a smile with diastema.[8,9] The low acceptability of this factor is perhaps attributable to the esthetic principle broken in D1 smiles, which was its unity. According to this, a smile that creates a sense of unity is considered more attractive.[11,19] In the other smiles (LSRV, LM3, 10D), other principles, such as harmony and balance, were more severely compromised. Perhaps the principle of unity is more important than other esthetic principles[18,19] in the determination of the attractiveness of a smile.

Regarding the D1 smile, it is important to mention the high standard deviation of the mean score. This means that for some of the evaluators, the presence of this deviation did not harm the attractiveness of the smile. The clinical significance is that the elimination of a diastema should be discussed with patients; in general, though, the presence of a diastema reduces the esthetic appeal of a smile.

Some studies found that the perception of the attractiveness of a smile varied according to the photographic framing that was being evaluated.[5,20–22] In the present study, differences were not significant between the evaluation of a smile shown in a face framing and a mouth-only framing. Perhaps one reason for these discrepancies is that different views of the smiles were used in those works; for example, Kerns et al[22] compared smiles in frontal and profile views, and Philips et al[5] compared a complete smiling face, a complete nonsmiling face, and a nonsmiling profile.

In the present study, the only aspect altered was the proximity to the smile in which the photograph was taken. Despite our results, we consider it fundamental when analyzing a smile to use two framings; this allows both the evaluation of a smile in context with the rest of the face and a more detailed analysis of the smile in a close-up view.

The order of presentation of the photographs had no influence on esthetic perceptions of the smile. One element that could explain this result is that, although there were two views of the same smiles, the viewer's optical perspective did not change. Another factor is that the study chose deviations that would not be influenced by the framing, whereas other possible deviations might. A third possibility is the fact that the evaluations of both framings were carried out at the same time.

CONCLUSIONS

- Compliance of a smile with esthetic norms results in its perception as an esthetic smile.
- The presence of deviations from esthetic norms does not necessarily hamper the perception of a smile as esthetically pleasant.
- Large diastemata may have a negative influence on the esthetic evaluation of a smile.
- The photograph framing in which the smiles were observed does not influence the evaluation of its esthetics.
- The sequence in which different smiles are presented for evaluation of their esthetics does not interfere with their judgment.

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