

An evaluation of the influence of gingival display level in the smile esthetics

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Abstract

Objective: The aim of this study was to evaluate the influence of the amount of gingival display on smile esthetics. **Methods:** Two extraoral photographs were used: One of the close-up smile and one frontal view of the smiling face of four individuals (one Caucasian and one Afro-Brazilian man, and one Caucasian and one Afro-Brazilian woman). The photographs were manipulated in a computer and five images were created for each original photograph with different degrees of gingival display: 0 mm, 1 mm, 3 mm, 5 mm and 7 mm. Then the images were evaluated by 60 individuals who assigned a score from zero to ten to each image on a visual analogue scale. **Results and Conclusions:** Statistical analysis and results showed that levels of gingival display equivalent to 0 mm and 1 mm received the highest mean scores, i.e., 6.6 and 6.2, respectively, and showed no statistical difference between them ($p>0.05$). Gingival displays of 3 mm, 5 mm and 7 mm received lower, decreasing scores of 5.0, 3.5 and 2.9, respectively, without any statistical difference between levels 5 mm and 7 mm ($p>0.05$). Furthermore, the use of close-up photographs of the smile or frontal view photographs of the smiling face showed no statistical difference ($p>0.05$).

Keywords: Esthetic dentistry. Gingiva. Orthodontics. Smile.

Editor's abstract

The smile is a key factor in the composition of an individual's overall beauty. Hence, it's noticed the modern society's growing demand for beautiful, healthy smiles. Several parameters are available to assess smile esthetics, such as the midline, buccal corridor, incisor width/height ratio, incisor crown inclination, gingival contour and amount of gingival display. In the last decade orthodontists have shown a remarkable tendency to treat their patients focusing on improving their smile esthetics. However, although literature cites a wide range of clinical opinions regarding

what would be an ideal or acceptable degree of gingival display, most lack scientific evidence. Indeed, few studies have researched, evaluated and compared different degrees of gingival exposure.

This way, the aim of this study was to assess and compare the degree of esthetic acceptance of five levels of gingival display on smiling and to investigate whether or not there are any differences, in this evaluation, between frontal view extraoral photographs of the smile and close-up smile photographs. Two extraoral photographs were used (one of the close-up smile, Fig 1; one frontal view of the smiling face, Fig

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FIGURE 1 - Example of how the manipulated images of close-up smiles were laid out.



FIGURE 2 - Example of how the manipulated images of smiling faces were laid out.

2) and intraoral frontal views of four individuals, two Afro-Brazilians (one man and one woman) and two Caucasians (one man and one woman). The photographs were manipulated with Adobe® Photoshop® creating different levels of gingival display (0, 1, 3, 5 and 7 mm). The images were randomly assembled then printed on photographic paper and gathered in a photographic album. Sixty individuals, among whom there were orthodontists, oromaxillofacial surgeons and laypersons, were asked to rate the images. Along with the album, each examiner received a form containing a printed simulation of rulers (visual analogue scales), one for each image. They were asked to mark on these rulers with an “X” the degree of esthetic quality associated with each image. Results showed that levels of gingival display equivalent to 0 mm and 1 mm were assigned the highest mean scores, i.e., 6.6 and 6.2, respectively, and showed no statistical difference between them ($p>0.05$). Gingival displays of 3 mm, 5 mm and 7 mm received lower, decreasing scores of 5.0, 3.5 and 2.9, respectively, without any statistical difference between levels 5 mm and 7 mm ($p>0.05$). Furthermore, the use of close-up photographs of the smile or frontal view photographs of the smiling face showed no statistical difference ($p>0.05$).

Questions for the authors

1) To what do the authors attribute the low scores assigned to the photographs in general? Do you believe that this may have influenced the results?

In this type of study absolute values are not a relevant factor, but rather a comparison between the different scores assigned to the variable being investigated (amount of gingival display) as well as between the different groups of raters. Thus, we believe that the “low” values had not influenced on the results.

The highest mean scores found in this study were 6.6 and 6.2 for the group with no gingival display and the group with 1 mm display, respectively. On a scale of 0 to 10, one perceives that these values were not high, thereby demonstrating that these images had not reached high scores from an esthetic point of view. Among the factors to which these low score values can be ascribed, the following stand out: The level of attractiveness of the individuals photographed, the type of image manipulation used, the different groups of raters, the cultural influence of esthetic standards^{1,2} and, especially, the subjective factor inherent in esthetic evaluation. In fact, the old popular saying “beauty is in the eye of the beholder”

influenced the absolute values, but did not influence the comparisons between the images, main purpose of the investigation.

2) Was there disagreement in the assessment among laypersons, orthodontists and surgeons?

Perception varied according to the different levels of gingival display. The results showed that gingival displays of 0 mm and 1 mm yielded no statistically significant difference between the raters, disclosing a similar esthetic perception amongst them ($p>0.05$). In view of 3 mm, 5 mm and 7 mm displays, surgeon behavior was statistically similar to that of orthodontists, whereas the group of laypersons showed statistical differences insofar as it assigned higher scores than the orthodontists in all contexts ($p<0.05$).

Moreover, in general, the laypersons assigned the highest scores while orthodontists were more "stringent" in their assessment and assigned the lowest scores.

These differences as well as the behavior of the raters are better elucidated in another study available in the literature.³

3) Could a 3 mm gingival display be considered the boundary between treatment with or without orthognathic surgery?

In keeping with what was explained above, the "beauty" factor is rather subjective. Therefore, a value of 3 mm of gingival exposure should not be used as a touchstone in deciding whether treatment should be performed with or without orthognathic surgery.

We invite the reader to take a moment to ponder the following: "How many beauty models and actresses have 3 mm or more gingival display on smiling?"

Some adjectives used in the literature, such as "ideal," "acceptable" and "pleasant" defy interpretation. To give you an example, 3 mm gingival display received a mean score of 5.028, i.e., 50%. It is obvious that, as mentioned earlier, an absolute value such as a 5.0 score can hardly characterize a 3 mm gingival display. However, some authors have found that a gingival

display of up to 3 mm, or even 4 mm, is construed as acceptable.^{4,5} The key point, again, is the comparison between the different levels of gingival display and not any absolute score values per se. Moreover, due to differences between the mean scores of 0 mm and 1 mm, and the 3 mm score, and between the latter and the 5 mm and 7 mm scores, one could well argue that a 3 mm gingival display occupies an intermediate position, with the first groups being rated as superior to the last groups.

Therefore, it is a moot question whether or not a 3 mm gingival display, or even a 5 mm or 7 mm display, is unsightly, since characterizing a smile as esthetic or unaesthetic depends on many other factors. This explains why certain national and international beauty models display their gum on smiling but even so their smiles are not considered unpleasant.

Two other crucial factors combine to underpin any clinical decision in favor of or against an ortho-surgical treatment: 1) The etiology of the "gummy" smile, and 2) The patient's chief complaint, because all efforts must be undertaken to ascertain that the orthodontic results meet the patient's expectations.

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