ORIGINAL ARTICLE

Variations in the perception of the smile line according to examiners from three different social classes

Gustavo Barbosa Ribeiro[1], Alessandra Nogueira Porto[2], Alex Semenoff Segundo[2], Carlos Alberto Muzilli[1], Fernanda Zanol Matos[2], Álvaro Henrique Borges[2], Milton Edson Miranda[1]

[1]Department of Prosthesis, University of Dentistry São Leopoldo Mandic, Campinas, SP, Brazil, [2]Department of Dentistry, University of Cuiabá, Cuiabá, MT, Brazil

Abstract

Objective: This study assessed the variations in the perception of the smile line, according to examiners from three different social classes in the City of Cuiaba, Brazil.
Materials and Methods: A total of 12 smile photographs were taken of female students. These photographs were then classified according to the smile line profile presented by each volunteer (ideal, straight and reverse smile line). We selected which side of the smile matched the esthetic norms; later, the smile photographs were digitally duplicated and modified to obtain a symmetrical smile. After the changes were made, each volunteer was classified into the appropriate category. According to this classification, we carried out the alterations in the other two types of smile photos and placed them in an album for subsequent evaluation of the three types of smiles by examiners from three different social classes: A, B and C.
Results: There was a lower satisfaction of the subjects with regards to the reverse smile for the examiners from Class A. The lowest satisfaction for the Class B examiners was related to the reverse smile. Data of the comparisons among the Class C examiners revealed no statistical difference between groups ($P > 0.05$).
Conclusion: There was no statistical difference between the ideal and straight smiles.

Introduction

The smile analysis is a relatively new concept in dentistry, involving several areas of assessment and planning to fulfill the patients' wishes. Patients are increasingly demanding, desiring esthetic restorations both for anterior and posterior teeth, and no longer accepting results that do not meet an esthetic ideal. However, research has shown that the esthetic perception of lay people is directed to discrepancies and coarse changes, usually related to malocclusion. Thus, small esthetic deviations are not important to the patient.[1]

Facial attractiveness is very important for social interaction and acts, influencing several factors, such as: Success in marriage and relationships, personality assessments, job performance, job prospects and the development of personality. Studies have shown that attractive children and adults are judged and treated more positively than those that are unattractive, even by those who know them. Good-looking children and adults have also shown more positive behaviors and traits.[2,3]

Facial and smile attractiveness appear to be strongly related issues. As a matter of fact, a person's attention is directed to the speaker's eyes and mouth during social interactions. As the mouth is the facial communication center, the smile plays a significant role in facial expression and appearance.[4]

Despite the increasing interest and the available literature on this topic, little attention has been given to psychological or social aspects of the oral appearance. Who should judge oral esthetics, the dentist or the patient? We shall take into account that their opinions often differ.

The present study was aimed to evaluate and compare the esthetics of three types of smiles using photographs, according to the perceptions of individuals from three different classes in Cuiaba, Brazil.

Materials and Methods

A total of 12 students were invited to be volunteers in this study. They were undergraduate students of the faculty of dentistry of Cuiaba-Unic, between the ages of 18 and 25 years, selected by convenience, and were selected due to having a high degree of smile attractiveness. The subjects were photographed while forcing a smile. Prior to beginning this study, it was approved by the Research Ethics Committee at the Sao Leopoldo Mandic Faculty of Dentistry, Campinas, SP, Brazil, under protocol #363/2009.

To be included in the study, volunteers were required to have a smile with features similar to those patterns described in the dental literature: (i) Incisal plane of the upper teeth following the lower lip; (ii) gingival symmetry between homologous teeth; (iii) gingival margin of the maxillary central incisors at the same height with each other and the upper canines, with the gingival margin of the upper lateral incisors located 1 mm below the gingival margins of the central incisors and upper canines; (iv) presenting upper and lower midlines that followed the midline of the face; (v) proportions approximated to the golden ratio, with the width of the central incisor 75-80% of its length, the long axis of the central incisor following the midline, and a tapering size of the posterior teeth from the canine; (vi) presenting good dental alignment; (vii) an absence of clinical signs of periodontal disease or disease history; (viii) presenting a medium or high smile without any marked discrepancy in the smile that could divert the examiners' attention.

The group of examiners was composed of 20 individuals each from differing social classes: A (*n* = 20), B (*n* = 20), and C (*n* = 20). The classification of the examiners was conducted by the current author by private interviews, using a social class questionnaire.

Most examiners were workers of Sebrae Mato (SEBRAE-MT) Brazil, graduated in the humanities, and were categorized into the social classes A, B or C; none of the examiners were students.

The photographs were taken from a frontal position, framing the full face, and the individuals were photographed with a wide smile. The volunteers were requested to make a forced smile, as it is more reproducible, voluntary, static and recommended as a reference for studies that assess the smile.[5] The subjects were instructed to stand erect and looking ahead at a horizontal line, to obtain a natural head position similarly to how patient stands during their everyday life.

The nose and chin were not framed in the photos and hence that only the oral area was captured to minimize the number of confounding variables. For the same reason and purpose, only female smiles were selected with similar skin tones and without any makeup or use of lipstick.[6]

To standardize the photographs, a single professional photographer was employed. He used a specific device to standardize the ideal brightness of the environment to make all photos appear as natural as possible.[6] All photographs were taken with the same digital camera, a Canon macro 100 mm lens at a distance of 1.5 m, and with a maximum resolution quality of 10.5 mp. We used diffused flashes and a white background that was backlit to remove shadows.

After selecting the 12 photographs, the smile line profile of each volunteer was categorized as: (a) Ideal smile: Incisal edges of the maxillary anterior teeth following the curvature of the lower lip; (b) straight smile line: Incisal edges of canines, central and lateral incisors at the same height; (c) reverse smile line: Incisal edges of the maxillary anterior teeth curving opposite of the lower lip.[7] Then, the side of the original smile that better matched the norms of beauty without concerns if the smile was esthetically acceptable or not was chosen. This side was digitally doubled, inverted and pasted over the opposing side of the photo to have a symmetrical smile. Soon after that, the volunteers were cataloged according to their smile profile (ideal, straight or reverse). Given this classification, alterations in the alignment of the incisal edges of maxillary anterior teeth in relation to the lower lip was performed to create the other two types of smiles, and then all of the photographs were organized in an album to be further assessed. The volunteers' photos were randomly positioned according to the three types of smile.

During image manipulation, the incisal edges of the six maxillary anterior teeth were moved relatively to the lower lip. The ideal smile was manipulated so that the maxillary central incisors were 1 mm below the lateral incisors and 2 mm below the canines. The straight smile was manipulated and hence that the six maxillary anterior teeth were at the same incisal height. The reverse smile line had the maxillary central incisors 1 mm above the incisal edge of the maxillary lateral incisor and 2 mm above the maxillary canines. In the three manipulations, the lips were in an upward convex position. The image manipulations are presented in [Figure 1].[8]

Each page had three photographs of each volunteer, including the three types of smile, for a total of 12 pages with 36 photos, and all of which were computer-modified by a single professional of the informatics field. Adobe Photoshop CS4 was used for image modification, similarly to previous studies.[2,7-9]

The album was mounted with pages numbered from 1 to 12, and each photograph was marked with the letters a, b or c, following the sequence seen by the examiner.[6]
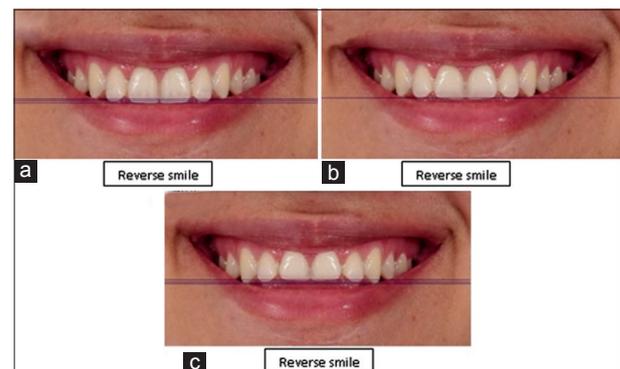
Figure 1: Images manipulated for ideal (a), straight (b) or reverse (c) smiles

Figure 2: Visual analogue scale

The esthetic evaluation was performed using the adapted visual analog scale [Figure 2].[2,6]

This scale varies through increasing values from 1 to 5, starting with esthetically non-attractive until very attractive, with moderate levels: Slightly attractive, neutral and attractive.[11]

Each photograph was identified in the assessment form with a number and was supposed to receive an evaluative mark ranging from 1 to 5, in which 1 was for non-attractive (the worst score), and 5 indicated very attractive (the best score). Data collection was performed by a single researcher, who showed the album to the examiners from the three social classes to proceed with evaluative notes about the respective smiles.

The examiners were not allowed to return to a photo after it had been viewed and evaluated, so that there was no comparison with previous photographs, reducing interference with their assessment and the study outcomes.[12]

Results

The study results were grouped according to the type of smile and the increasing values of attractiveness (1 and 5 to a non-attractive and very attractive smile, respectively). After organizing the groups, a mean was calculated that was compared between the groups of examiners. The statistical test used was analysis of variance (ANOVA) with Bonferroni's *post-hoc* test, and a significance level of 5%.

The data in Figure 1 refers to the scores used in the study for intergroup comparisons. Different letters in the same line indicate statistical differences between groups ($P < 0.05$). When comparing the classes in relation to the three types of individual smiles, no statistical difference was observed between groups ($P > 0.05$).

Class A examiners were found to show a reduced appreciation of esthetics of the reverse smile [Figure 1], with a statistical difference when compared with the other groups ($P < 0.05$). There was no statistical difference between the ideal and straight smiles for Class A ($P > 0.05$).

The findings for the Class B examiners [Figure 1] indicated that the lowest appreciation of esthetics was found for the reverse smile. Nevertheless, there was a statistical difference only for the comparison between the ideal and reverse smiles ($P < 0.05$).

The findings of comparisons among the Class C examiners did not present a statistical difference between groups ($P > 0.05$).

Inter-classes comparisons regarding the three types of individual smiles did not show a statistical difference between groups ($P > 0.05$).

Discussion

In clinical practice, the question may be asked of who would be in charge of choosing the best esthetics for a smile, incorporating comfort and function. The views of dentists, patients, or a combination of both opinions may determine the best way to achieve the most satisfactory results. In the current study, a statistical difference was found in the esthetic evaluation concerning changes in the curvature of the smile line for both the Class A and B examiners. In a study[13] using a sample of people aged 16-26 years, opinions were obtained on the final evaluation of esthetics after orthodontic treatment. Those authors found that the expectations of the patient were not always the same as the orthodontist's, reinforcing the idea that professionals should always ask patients about what their expectations are before treatment. In addition, the current study indicates that there are differences in the assessment of esthetic for variations in the smile line among different social classes.

Esthetic perception is intimately connected with the natural senses of a human being, such as taste, touch, smell, sight, and hearing. These senses modulate the psyche, which unconsciously interprets living experiences or situations.[1] Given this, the current authors found different results in the evaluation of three types of smiles by individuals from three social classes, confirming the aforementioned theory on the individual process of the perception of esthetics. The literature also indicates that the patterns of esthetics and beauty are influenced by external factors such as media, family, social group, professional activity and function, geographical location, religion, and different race peoples.[3]

Several studies[3,11,13] have used photographs of smiling people to verify esthetics or to evaluate facial changes made by computer image manipulation, with the aid of different software programs. Usually, the photographs are evaluated by a diversified audience in different backgrounds, having expressive results, in addition to the ease of accomplishing this kind of study. Accordingly, these same tools and apparatuses were used in the current study.

The volunteers in the present study were required to make a forced, reproducible, voluntary, and static smile in their photographs. This type of smile is recommended as a reference for studies evaluating the smile, which differs from the spontaneous or non-voluntary smiles, which cannot be accurately reproduced, considering that a natural smile is motivated by happiness and emotion at a given moment when one is smiling.[6] However,[14] the use of contemporary videography methods and computerized technologies has been suggested, e.g., video-recording the spontaneous smile-enabling the ability to capture an authentic spontaneous smile and perform digital measurements that seem to be reliable, reproducible and valid for use in clinical practice. Furthermore, it was observed that a posed smile showed reduced, (i) Heights of the smile line, (ii) tooth display, and (iii) smile width, when compared to a spontaneous smile.

Another methodology employed was the use of an internet search on Google images for celebrities that had the best smiles

(including the entire face with a wide smile).[13] The pictures had to be from a frontal position and should have been taken at public events to ensure they had not been edited or modified digitally. On obtaining these photographs, the author could evaluate the specific esthetic criteria of the smiles under assessment.

A study[15] revealed that the presence of straight or reverse smile lines led to a decrease in or loss of esthetics, according to dentists and lay people, in the smiles of both genders (male and female), corroborating the results of the current study. In this respect, the reverse smile assessed by individuals from social Classes A and B had a reduced appreciation of esthetics when compared to the ideal smile.

There is a consensus in the literature regarding the smile format. Most studies show a preference for a convex shape of the smile, characterized by incisal margins of the maxillary central incisors appearing below the cusps of the canines while smiling, following the edge of the lower lip.[6] The lowest esthetic perception found in this current study was related to the reverse smile, as reported by the three social classes, which is in agreement with the results achieved in other studies.[8]

Sarver[15] indicated the importance of the smile line for dentofacial esthetics. When the incisal edges of the maxillary central incisors appear below the cusps of the canines, the smile line looks convex and harmonious with the line of the lower lip. The so called reverse smile line results when the canine cusps appear more occlusally than the edge of the margin of the maxillary central incisors, creating a concave appearance. The literature reports that a convex smile line is more esthetic than the concave smile line from the frontal view.[9,13]

The categorization of smiles in the present study was conducted based on previously set standards,[8-10] with no difficulty in evaluating the smiles and subsequent classification. However, the literature also provides another definition of smiles based on the curvature of the upper lip,[14] as follows: (i) Ascendant, the angle of the mouth is higher than the center of the lower edge of the upper lip; (ii) straight, the angle of the mouth and the center of the lower edge of the upper lip are in a straight line; and (iii) descendant, the angle of the mouth is lower than the center of the lower edge of the upper lip.

According to the aforementioned studies, the patients' needs and wishes for esthetic treatment, and not only the theoretical concepts of dentists, should be considered. In disagreement with this,[3] some authors believe that it is up to the dentist to decide the future role of esthetic treatments, since they have the knowledge and theoretical basis for creating more consistent esthetic smiles. Qualtrough and Burke,[15] however, describe the importance of the patient's participation in the decisions of esthetic treatments for achieving satisfaction and treatment success. Patient satisfaction is the main goal of esthetic treatment, but it is not easily achieved. In addition to the differences in esthetic perceptions between dentists and lay people, dentists must also consider that there are many different types of patients with high, medium and low esthetic requirements. For instance, there are patients who notice small esthetic deviations, whereas others do not realize large changes; therefore, there are many

patients who live with the presence of deviations and others who do not support a minor deviation from standard esthetics.

Conclusion

Thus, based on the results of the present investigation, we could prove these observations when comparing changes in the smile line as evaluated by individuals from three different social classes.

According to the current study, there was no statistical difference between the ideal and straight smiles. From the perspective of the social Class A, there was a statistical difference between the findings for the reverse smile line and the ideal and straight smile lines. For Class B, no statistical difference was observed between the ideal and straight smiles and between the straight and reverse smiles. Nevertheless, there was a statistical difference between the ideal and reverse smile line for Class B. For Class C, there was no significant statistical difference between the three types of smiles, thus showing that individuals from this social class are less perceptive to changes in the smile line.

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