

Smile aesthetics perception of posterior gingival exposure among periodontists, orthodontists, general practitioners, dental students, and laypeople: a cross-sectional study

Influência da exposição gengival posterior na percepção estética do sorriso entre periodontistas, ortodontistas, clínicos gerais, estudantes de odontologia e leigos: um estudo transversal

Lucas Macedo Batitucci AMBRÓSIO¹ , Carina SALAS-GONZALEZ² , Aline de Souza MENDES¹ ,
Aline de Barros Nobrega Dias PACHECO¹ , Pedro Ferreira FOGAÇA NETO¹ , Milene Lorrane da SILVA¹ ,
Ana Luiza Lopes BRAGA¹ , Mayra Laino ALBIERO¹ , Bruna dos Reis VIEIRA¹ , Eduardo Gomes de JESUS¹ ,
Beatriz de Moura SOUZA¹ , Marcela Iunes da SILVEIRA² , Emanuel da Silva ROVAI² 

1 - Universidade de Sorocaba, Departamento de Periodontia. Sorocaba, SP, Brazil.

2 - Universidade Estadual Paulista – Unesp, Instituto de Ciência e Tecnologia, Disciplina de Periodontia. São José dos Campos, SP, Brazil.

How to cite: Ambrósio LMB, Salas-Gonzalez C, Mendes AS, Pacheco ABND, Fogaça PF No, Silva ML, et al. Smile aesthetics perception of posterior gingival exposure among periodontists, orthodontists, general practitioners, dental students, and laypeople: a cross-sectional study. *Braz. Dent. Sci.* 2026;29:e4858. <https://doi.org/10.4322/bds.2026.e4858>

ABSTRACT

Introduction: The smile is one of the key points in the perception of facial aesthetics and is considered pleasant when there is harmony among the teeth, lips, and gums. However, few studies have focused on the impact of posterior gingival exposure (PGE). **Objective:** Therefore, the present study aims to evaluate the effect of gingival exposure in the posterior part of the maxilla on the perception of smile aesthetics in a group of periodontists, orthodontists, general dental practitioners (GDP), dental students, and laypeople. **Methods:** A standardized photograph corresponding to a clinical case without posterior gingival exposure was digitally modified to generate 2, 4, and 6 mm PGE. These were randomized, and the smile aesthetics in the four images were evaluated and scored using a visual analog scale (VAS), where 0 corresponded to aesthetically unacceptable and 100 to the most aesthetically acceptable. The evaluations were carried out by 125 participants, divided into the following groups: GDP, orthodontists, periodontists, dental students, and laypeople. **Results:** According to results, gingival exposures of 6 mm were considered aesthetically unsatisfactory by most participants (72% periodontists, 68% orthodontists, 84% GDP, 76% dental students, and 52% laypeople). Only 0 mm and 2 mm exposures showed significantly higher values on the VAS scale ($p < 0.0001$). **Conclusion:** It can be concluded that 6 mm of posterior maxillary gingival exposure negatively influenced the perception of smile aesthetics in all groups, with laypeople assigning higher attractiveness scores than GDP on the VAS scale at 6 mm. In contrast, 4 mm of gingival exposure appears to represent a threshold of aesthetic tolerance, being more readily accepted, particularly by laypeople and dental students.

KEYWORDS

Crown lengthening; Dental esthetic; Orthodontists; Perception; Periodontists.

RESUMO

Introdução: O sorriso é um dos pontos-chave na percepção da estética facial e é considerado agradável quando há uma harmonia entre dentes, lábios e gengiva. No entanto, poucos estudos se concentram no impacto da exposição gengival posterior (EGP). **Objetivo:** Assim, o presente estudo tem como objetivo avaliar o efeito da exposição gengival de região posterior da maxila na percepção estética do sorriso em um grupo de periodontistas, ortodontistas, dentistas generalistas, estudantes de odontologia e população leiga. **Métodos:** Uma fotografia padronizada correspondente a um caso clínico sem exposição gengival posterior foi modificada digitalmente para gerar exposições gengivais de 2, 4 e 6 mm. Estas foram randomizadas e a estética do sorriso nas quatro imagens

foi avaliada e pontuada usando uma escala visual analógica (EVA), em que 0 correspondia à esteticamente inaceitável e 100 ao mais esteticamente aceitável. As avaliações foram realizadas por 125 participantes, divididos nos seguintes grupos: cirurgiões dentistas gerais, ortodontistas, periodontistas, estudantes de odontologia e leigos. **Resultados:** De acordo com os resultados, as exposições gengivais de 6 mm foram consideradas esteticamente insatisfatórias pela maioria dos participantes (72% dos periodontistas, 68% dos ortodontistas, 84% dos cirurgiões dentistas gerais, 76% dos estudantes de odontologia e 52% dos leigos). Apenas as exposições de 0 mm e 2 mm apresentaram valores significativamente mais altos na escala VAS ($p < 0,0001$). **Conclusão:** Pode-se concluir que as exposições gengivais de 6 mm na região posterior da maxila influenciaram negativamente a percepção da estética do sorriso em todos os grupos, sendo que os leigos atribuíram escores de atratividade significativamente mais altos do que os clínicos gerais na escala visual analógica (EVA) quando a exposição gengival foi de 6 mm. Por outro lado, valores de exposição gengival de 4 mm parecem representar um limiar de tolerância estética, sendo mais bem aceita, especialmente para leigos e estudantes de odontologia.

PALAVRAS-CHAVE

Aumento de coroa; Estética dental; Ortodontia; Percepção; Periodontia.

INTRODUCTION

Smile is one of the key points in the perception of facial aesthetics and is considered pleasant when there is harmony among the teeth, lips, and gums [1,2]. In this context, exacerbated exposure of the gingival tissues in the maxillary arch is known as a gummy smile [3]. It is a non-pathological condition with a varied and often multifactorial etiology [3]. These causes can range from altered passive eruption, hypermobility of the upper lip, and hyperplasia due to medication or plaque accumulation to maxillofacial skeletal alterations [4].

A cross-sectional study correlated the presence of excessive anterior gingival exposure with the respective associated etiologies, making both interracial and intersex comparisons [4]. According to their findings, gummy smiles affect more women and Afro-descendants [4]. In correlation with the possible etiologies, lip hypermobility is the most common cause among patients [3]. There are also reports of an interrelationship between age and gumminess, with a decrease in gingival exposure over the years due to an increase in the width of the mouth at rest and when smiling, along with a reduction in the vertical dimension of the face [5].

Although it is not a pathological condition, studies show that treating gummy smiles can increase self-confidence, attractiveness, and friendliness [6,7]. However, to correctly determine each treatment—botulinum toxin, clinical crown augmentation, orthognathic surgery, or lip repositioning surgery—it is essential to understand the etiology of gingival exposure [4].

The acceptability of gingival exposure in a smile can differ between laypeople and dental professionals. According to a systematic review by Batra and his team, gingival exposure of up to 3 millimeters (mm) is acceptable among laypeople [8]. However, in the study by Ngoc et al. [9] a smile was considered unattractive with gingival exposure of 3 mm for dentists and 4 mm for non-dental professionals [9].

Nonetheless, few studies have evaluated the impact of gingival display in the posterior area of the maxilla. The study by Rodríguez-Martínez and team from 2014 addresses this issue by comparing the perceptions of orthodontists, GDP, and laypeople [10]. However, the authors did not consider the perceptions of other dental specialties involved in diagnosing and correcting excessive gingival exposure, such as periodontists. Another limitation of this study is that the lowest value of gingival exposure evaluated was 4 mm, raising questions about more subtle perceptions of posterior gingival exposure. The same study's results provide only a qualitative analysis, which could be complemented by quantitative research to yield more objective results.

Another study analyzed the characteristics of the maxillary posterior region and its influence on smile aesthetics [11]. It found that the maxillary posterior gingiva and the most posterior teeth shown influenced smile attractiveness, as evaluated by laypeople [11]. A high posterior smile line was considered less attractive than the average low posterior smile line [11].

The literature on the aesthetic analysis of posterior gingival exposure is scarce, especially among dental specialists who are most active in

correcting it. The present study aims to evaluate the influence of different posterior gingival exposures on the aesthetic perception of the smile in groups of laypeople, orthodontists, periodontists, general practitioners, and dental students.

MATERIAL AND METHODS

Study design

This cross-sectional study was written according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [12]. It was approved by the Human Research Ethics Committee at Piracicaba University (CAAE: 59210022.6.1001.5500) and by the Human Research Ethics Committee of São Paulo State University, Institute of Science and Technology (CAAE: 59210022.6.2002.0077).

Study population

From October 2023 to February 2024, participants were informed about the benefits and risks of participating in the study through an informed consent form containing all this information. If they agreed to the form, they signed it.

125 participants were included and divided into five groups (25 participants per group):

(1) Lay people (n=25); (2) Orthodontists (n=25); (3) Periodontists (n=25); (4) GDP (n=25); and (5) Dental students (n=25).

Eligibility criteria varied between groups:

(1) Lay people: adults aged at least 25, with no knowledge of dentistry; (2) Orthodontist: dentists licensed in orthodontics by the Federal Council of Dentistry; (3) Periodontist: dentists licensed in periodontics by the Federal Council of Dentistry; (4) GDP: dentists licensed in dentistry by the Federal Council of Dentistry who do not work in any of the specialties mentioned above; (5) Dental students: students with active enrollment in dental school.

Sample size calculation

The sample size calculation considered the comparison of two averages from the study by Valverde et al. in 2021 [13] (average visual analog scale for laypeople in patients with straight lips and 0 mm of gingival exposure: 68.44 ± 20.87 ; average for 5 mm of gingival exposure: 45.43 ± 24.49). For values of α (bilateral) = 0.05, β = 0.1,

and a difference of 23 points in the mean VAS value, a minimum of 15 participants per group was determined.

Images

A patient who attended in Piracicaba University gave us informed consent to use a photograph of her smile, which was manipulated and used like a catalog in the present study.

The photograph was taken 1 meter away from the subject using a Nikon® camera (D3200, 24.2 MP), a macro lens (Tokina® 100mm / F2.8D), and a circular flash (Yongnuo® Macro Ring Lite).

A natural smile was recorded, exposing the lips, gums, dental arches, mouth corridor, and teeth. The original case shows gingival exposure of 0 mm in the posterior region of the maxilla.

To avoid confounding variables in the smile that could influence the evaluators' judgments, the smile met standardized characteristics according to McNamara et al. [14] and Valverde-Montalva et al. [13]:

Smile with anterior gingival exposure between 1 and 3 mm; the amount of space in the mouth corridor on both sides is 1 to 13% of the total length of the smile; the gingival margins of the central and canine teeth are at the same height and apical to the lateral incisor margin; no presence of biofilm; no dental crowding; no hypodontia; no crossbite; no significant skeletal discrepancies or asymmetries; no changes in the occlusal plane; normal tooth color; no anomalies characterized by trauma, resorption, or endodontic issues; proportions between central, lateral, and canine teeth: 1.62:1:0.62; the incisal edges of the upper teeth are convex, following the edge of the lower lips; straight upper lip curvature.

The photograph obtained according to these parameters was used to modify the amount of gingival exposure in the premolar and molar regions. A computer professional with experience in using Adobe Photoshop (Adobe Systems, San Jose, CA, USA) made these changes. Thus, the four images in the catalog had posterior gingival exposure of 0 mm (the original photograph), 2 mm, 4 mm, and 6 mm (Figure 1).

Next, the images were printed on white paper in an 8x10 cm format using a high-quality color printer (Photosmart 7550, Hewlett Packard,

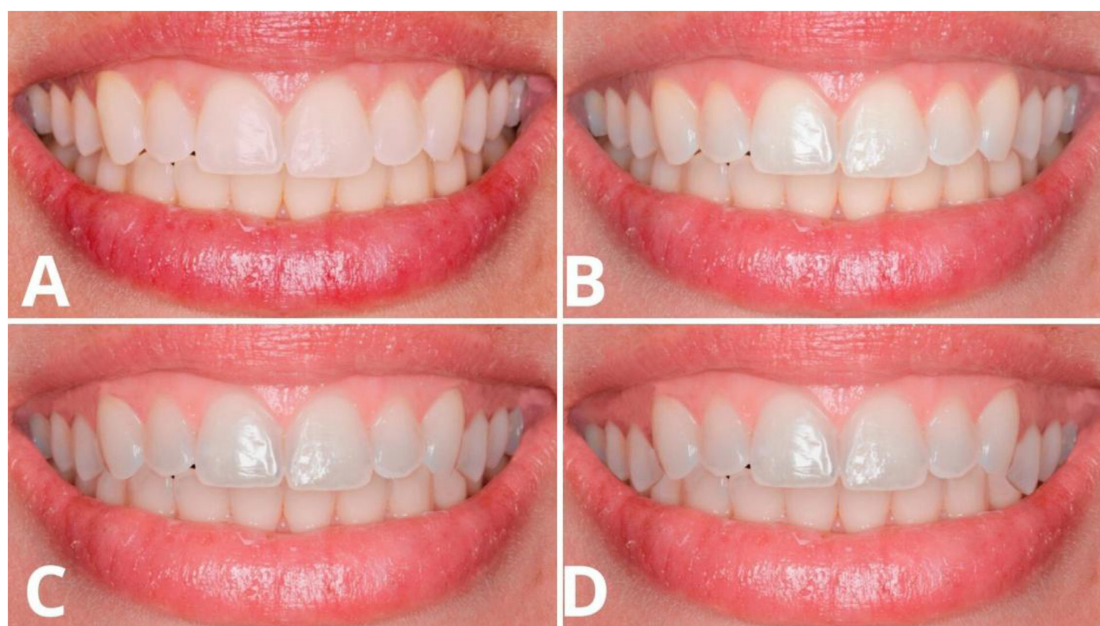


Figure 1 - Catalog photograph with different degrees of posterior gingival exposure (PGE). A. Catalog photograph with 0 mm of PGE; B. Catalog photograph with 2 mm of PGE; C. Catalog photograph with 4 mm of PGE; D. Catalog photograph with 6 mm of PGE.

Palo Alto, Calif.). The order in which the images were presented to the evaluators was randomized using an online randomizer (random.org).

VAS collections

After this randomization, the photos were shown to the participants, who were instructed to score on the VAS (visual analog scale) regarding the aesthetic acceptability of gingival exposure in the posterior area. They were also advised to avoid considering other parameters such as tooth, lip color and shape. Each photo could be analyzed for 45 seconds. The aesthetic score was obtained by measuring the distance in millimeters from the point considered aesthetically unacceptable (zero) to the most aesthetically acceptable (100) mark on the scale [15].

Perception of aesthetically satisfactory and unsatisfactory smiles

To evaluate this dichotomous variable, it was necessary to measure the value within the VAS, as described in the previous section. The smile was considered aesthetically unsatisfactory if the measured value was between 0 and 50. Values between 51 and 100 were considered aesthetically satisfactory [13].

Quantitative analysis

VAS measurements were performed by a single-blind evaluator (MIS) using a digital

caliper (Atitude Mix® —Diadema—Brazil) to measure the values in millimeters from the point considered aesthetically unacceptable (zero) to the most aesthetically acceptable (100) mark on the scale.

Statistical analysis

The data were analyzed using GraphPad Prism® 9.01 statistical software. The Shapiro-Wilk test assessed normality. The chi-square test evaluated differences between dichotomous variables, and the one-way ANOVA assessed continuous variables. For post hoc analysis, Tukey's multiple-comparison test was used for intergroup comparisons, and Dunn's multiple-comparison test for intragroup comparisons.

RESULTS

Participants' age and gender

Table I displays the age and gender distribution of participants. This study involved 125 participants, with each group consisting of 25 individuals: 86 women and 39 men. The average age for the periodontist, orthodontist, and laypeople groups was 39, whereas the general practitioner group had an average age of 34. The dental student group was younger, with an average age of 23. Notably, there were no significant differences in gender among

participants, but age differences were evident, with dental students being the youngest group ($p < 0.05$).

VAS measurements

The VAS measurements regarding the different posterior gingival exposures are shown in Table II. Posterior gingival displays of 0 and 2 mm presented significantly higher values on the VAS scale ($p < 0.05$) than those of 4 and 6 mm in the periodontists' and GDP groups. The 4 mm exposure VAS score for orthodontists was significantly higher than that for 6 mm ($p < 0.05$). In the dental students and laypeople groups, the

PGEs of 0, 2, and 4 mm were better evaluated compared to the exposure of 6 mm ($p < 0.05$). The PGE of 6 mm was significantly lower when assessed by the participants. No statistically significant differences were observed between the groups of evaluators for the exposures of 0, 2, and 4 mm. For the exposure of 6 mm, a statistically significant difference was observed between GDP and laypeople on the VAS scale, with a higher score for laypeople.

Table III presents the perceptions regarding the aesthetics of smiles. Most participants, comprising 72% of periodontists, 68% of orthodontists, 84% of GDP, 76% of dental

Table I - Age (mean + SD) and gender (%) of the participants

	Periodontists	Orthodontists	General practitioners	Dental students	Laypeople
Age	39.04 ± 10.63 ^a	39.92 ± 9.57 ^a	34.64 ± 12.62 ^a	23.60 ± 5.88 ^b	39.16 ± 17.12 ^a
Male	4 (16)	6 (24)	10 (40)	12 (48)	7 (28)
Female	12 (16)	18 (24)	30 (40)	36 (48)	21 (28)

Different lowercase letters indicate statistically significant differences ($p < 0.05$) on age among the groups.

Table II - Mean, standard deviation, and median of VAS scale measurements made by participants regarding different posterior gingival exposures (PGEs)

	0 mm	2 mm	4 mm	6 mm	p value
Periodontists	76.3 ± 20.2 ^a (84.1)	80.3 ± 16.1 ^a (86.2)	61.9 ± 20.1 ^b (65.3)	36.2 ± 19.1 ^{ABb} (31.7)	< 0.05
Orthodontists	79.3 ± 13.3 ^a (78.7)	78.5 ± 21.3 ^{a, b} (83.8)	63.4 ± 21.1 ^{b, c} (64.8)	40.3 ± 29.8 ^{ABc} (39.7)	< 0.05
General practitioners	81.6 ± 15.8 ^a (85)	75.3 ± 24.2 ^a (81.4)	50.3 ± 21 ^b (49.3)	25.7 ± 21.7 ^{Ab} (23.1)	< 0.05
Dental students	73.8 ± 24.6 ^a (84.2)	69.7 ± 24.7 ^a (76.6)	56.3 ± 24.9 ^{a, b} (55)	32.4 ± 27.6 ^{ABb} (20.9)	< 0.05
Laypeople	75.8 ± 24.5 ^a (82.3)	76.5 ± 18 ^a (77.9)	63 ± 22.6 ^{a, b} (68.1)	48.2 ± 24.5 ^{Bb} (49.9)	< 0.05

Different lowercase letters indicate statistically significant differences ($p < 0.05$) intragroup (same row). Different uppercase letters indicate statistically significant differences ($p < 0.05$) intergroup (same column).

Table III - Participants' perceptions of smile aesthetics regarding different posterior gingival exposures (PGEs)

	0 mm		2 mm		4 mm		6 mm	
	S	N/S	S	N/S	S	N/S	S	N/S
Periodontists	80% ^a	20%	96% ^a	4%	80% ^a	20%	28% ^b	72%
Orthodontists	100% ^a	0%	84% ^{a, b}	16%	68% ^b	32%	32% ^c	68%
General practitioners	92% ^a	8%	88% ^a	12%	48% ^b	52%	16% ^c	84%
Dental students	80% ^a	20%	76% ^a	24%	60% ^a	40%	24% ^b	76%
Laypeople	84% ^a	16%	92% ^a	8%	76% ^{a, b}	24%	48% ^b	52%

S = aesthetically satisfactory smile; N/S = aesthetically unsatisfactory smile. Different letters indicate statistically significant differences ($p < 0.05$).

students, and 52% of laypeople, considered a posterior gingival display of 6 mm unsatisfactory.

DISCUSSION

The amount of gingival display is a key factor affecting the aesthetic appeal of a smile [4]. The present study shows that PGE impacts the perception of an aesthetically pleasing smile, whether judged by dental surgeons or laypeople.

Typically, gingival exposure exceeding 3 mm in the front maxilla is deemed unattractive and linked to lower self-esteem in individuals [4,16]. Nonetheless, this threshold should be approached with caution, as it is subjective and can vary based on the observer. For instance, dentists from various specialties might judge the aesthetic quality of a smile more harshly than non-professionals [17]. In our findings, evaluators deemed only measurements exceeding 4 mm unattractive. It's worth noting that this assessment was conducted in the posterior region of the maxilla, not the anterior area, indicating that the posterior region of the maxilla may not be as sensitive as the anterior area regarding the smile's aesthetics.

Various facial attributes, including the face, lips, teeth, and gums, shape the visual appeal of a smile. Additionally, the evaluation methods can impact how a smile is perceived aesthetically [16]. Facial shape affects the aesthetic judgment of a smile concerning gum visibility, where more symmetrical faces tend to minimize the impact of gum exposure compared to longer faces [17]. Research involving laypeople assessing videos of volunteer models revealed that the movement of the smile and facial dynamics significantly influence perceptions of changes in the dentogingival area, indicating that evaluations can vary based on the assessment approach [18]. Nonetheless, there is still limited understanding regarding public perception of posterior gingival exposure.

To our knowledge, only one study has assessed gingival exposure in the posterior sector of the maxilla regarding the perception of smile aesthetics. It did not include periodontists or dental undergraduates. Exposures of up to 6 mm were considered aesthetically acceptable, while exposures of 8 mm were viewed as the least favorable by the participants, particularly orthodontists [10]. However, we observed contrasting results in our study, with exposures of 6 mm associated with lower scores from the participants, along with significant differences between GDP and laypeople.

This disparity between the Rodríguez study and the present study can be explained by our larger sample size or the fact that we did not include photographs with 8 mm gingival exposure, which would reduce the comparative perception between the photos regarding acceptability.

Rodríguez-Martínez et al. [10] conducted a qualitative assessment of aesthetic perceptions between groups, leading to a more subjective evaluation. Both qualitative and quantitative measures were employed in our study to provide a more complete analysis, taking into account subtle perceptions of gingival tissue exposure. Additionally, our original photograph met the characteristics recommended by McNamara et al. [14] and Valverde-Montalva et al. [13] to minimize confounding variables in the smile that could influence the evaluators' judgment. The quantitative analysis of VAS scores into "satisfactory" and "unsatisfactory" was based on previously published criteria to categorize the perception of aesthetic [14]; however, this dichotomization can also be a limitation, as it may result in loss of information and may not fully capture subtle differences in aesthetic perception.

Wei et al. [11] evaluated the impact of the posterior smile line on the smile's attractiveness [11]. They found that a high posterior smile line was considered less attractive than medium or low lines, as evaluated by a group of laypeople. However, it is essential to highlight that the images used in the present study and Rodríguez-Martínez et al. [10] were digitally manipulated, unlike the natural images used in the study by Wei et al. [11]. Therefore, using digitally manipulated images instead of natural images may have impacted the participants' evaluations, which can be seen as a limitation of this study, once in this context other factors like variations in facial type, age, and smile pattern were not taken into consideration. It is also worth noting that the assessments were made from static images and did not include the volunteers' faces, which, according to other studies [18,19], impact the aesthetic perception of a smile. The cross-sectional study design must also be taken into account, suggesting that new studies should include more than one assessment period.

Nevertheless, despite this limitation, most participants considered 6 mm of posterior gingival exposure to be aesthetically unsatisfactory, negatively influencing their perception of smile aesthetics.

Furthermore, when comparing the orthodontic and periodontal specialties, the perception of posterior gingival exposure was similar, with no statistically significant differences between the groups.

CONCLUSION

Gingival exposure in the posterior maxillary region has been shown to negatively interfere with the aesthetic perception of the smile. This perception has not been shown to differ between laypeople, dental surgeons, dental students and those specializing in periodontics and orthodontics in values of 2 mm of exposure. 4 mm of gingival exposure appears to represent a threshold of aesthetic tolerance, being more readily accepted by laypeople and dental students. Nevertheless, at 6 mm of gingival exposure, a statistically significant difference was observed between GDP and laypeople, with laypeople assigning higher attractiveness scores on the VAS scale.

Acknowledgements

The authors would like to thank the patient who granted permission to be photographed and the participants in all groups who performed the photo analyses.

Data availability

Research data is available upon request.

Author's Contributions

LMBA, ASM: Conceptualization. CSG: Data Curation. BMS: Formal Analysis. LMBA, ESR: Funding Acquisition. MLS: Investigation. CSG, ABNDP, MLS, ALLB, MLA, BRV, MIS: Methodology. LMBA, ESR: Project Administration. MLS: Resources. PFFN: Software. LMBA, CSG, ABNDP, EGJ: Writing – Original Draft Preparation. MIS, ESR: Writing – Review & Editing.

Conflict of Interest

No conflicts of interest declared concerning the publication of this article.

Funding

The authors declare that no financial support was received.

Regulatory Statement

This study was conducted in accordance with all the provisions of the local human subjects oversight committee guidelines and policies of University of Piracicaba and Sao Paulo State University. The approval code for this study is: CAAE: 59210022.6.1001.5500

REFERENCES

- Höfel L, Lange M, Jacobsen T. Beauty and the teeth: perception of tooth color and its influence on the overall judgment of facial attractiveness. *Int J Periodontics Restorative Dent*. 2007;27(4):349-57. PMID:17726991.
- Swileh MA, Abuaffan AH, Alhaji MN. Evaluation of the golden proportion and golden standard of maxillary anterior teeth in relation to smile attractiveness. *Braz Dent Sci*. 2019;22(2):178-89. <https://doi.org/10.14295/bds.2019.v22i2.1694>.
- Dym H, Pierre R 2nd. Diagnosis and treatment approaches to a "gummy smile." *Dent Clin North Am*. 2020;64(2):341-9. <https://doi.org/10.1016/j.cden.2019.12.003>. PMID:32111273.
- Tatakis DN, Paramitha V, Lu WE, Guo X. Upper lip characteristics and associated excessive gingival display etiologies in adults: race and sex differences. *J Periodontol*. 2024;95(1):74-83. <https://doi.org/10.1002/JPER.23-0291>. PMID:37436716.
- Souccar NM, Bowen DW, Syed Z, Swain TA, Kau CH, Sarver DM. Smile dimensions in adult African American and Caucasian females and males. *Orthod Craniofac Res*. 2019;22(S1 Suppl 1):186-91. <https://doi.org/10.1111/ocr.12278>. PMID:31074135.
- Beall AE. Can a new smile make you look more intelligent and successful? *Dent Clin North Am*. 2007;51(2):289-97. <https://doi.org/10.1016/j.cden.2007.02.002>. PMID:17532913.
- Malkinson S, Waldrop TC, Gunsolley JC, Lanning SK, Sabatini R. The effect of esthetic crown lengthening on perceptions of a patient's attractiveness, friendliness, trustworthiness, intelligence, and self-confidence. *J Periodontol*. 2013;84(8):1126-33. <https://doi.org/10.1902/jop.2012.120403>. PMID:23137007.
- Batra P, Kaur H, Dawar A, Mehta V. The threshold of acceptability of excessive gingival display by laypersons: a systematic review. *Int J Esthet Dent*. 2022;25(2):216-35. PMID:35587001.
- Ngoc VTN, Tran DK, Dung TM, Anh NV, Nga VT, Anh LQ, et al. Perceptions of dentists and non-professionals on some dental factors affecting smile aesthetics: a study from Vietnam. *Int J Environ Res Public Health*. 2020;17(5):1638. <https://doi.org/10.3390/ijerph17051638>. PMID:32138374.
- Rodríguez-Martínez A, Vicente-Hernández A, Bravo-González LA. Effect of posterior gingival smile on the perception of smile esthetics. *Med Oral Patol Oral Cir Bucal*. 2014;19(1):e82-7. <https://doi.org/10.4317/medoral.19167>. PMID:23986015.
- Wei N, Wang C, Zhang Y, Wei Y, Hu W, Yang X, et al. The influence of the maxillary posterior region on smile aesthetics in a Chinese cohort. *Int Dent J*. 2022;72(5):659-66. <https://doi.org/10.1016/j.identj.2022.02.004>. PMID:35341599.
- Cuschieri S. The STROBE guidelines. *Saudi J Anaesth*. 2019;13(5 Suppl 1):S31-4. https://doi.org/10.4103/sja.SJA_543_18. PMID:30930717.
- Valverde-Montalva SH, Flores-Mir C, Rinchuse D, Arriola-Guillén LE. Influence of upper lip curvature on smile attractiveness in patients with different degrees of gingival smiles: A cross-sectional study with opinions from oral health providers and laypersons. *Am J Orthod Dentofacial Orthop*. 2021;159(4):e321-9. <https://doi.org/10.1016/j.jajodo.2020.10.022>. PMID:33568275.

14. McNamara L, McNamara JA Jr, Ackerman MB, Baccetti T. Hard- and soft-tissue contributions to the esthetics of the posed smile in growing patients seeking orthodontic treatment. *Am J Orthod Dentofacial Orthop.* 2008;133(4):491-9. <https://doi.org/10.1016/j.ajodo.2006.05.042>. PMID:18405812.
15. Hall D, Taylor RW, Jacobson A, Sadowsky PL, Bartolucci A. The perception of optimal profile in African Americans versus white Americans as assessed by orthodontists and the lay public. *Am J Orthod Dentofacial Orthop.* 2000;118(5):514-25. <https://doi.org/10.1067/mod.2000.109102>. PMID:11094365.
16. Zucchelli G, Sharma P, Mounssif I. Esthetics in periodontics and implantology. *Periodontol 2000.* 2018;77(1):7-18. <https://doi.org/10.1111/prd.12207>. PMID:29508445.
17. Pinzan-Vercelino CRM, Costa ACS, Ferreira MC, Bramante FS, Fialho MPN, Gurgel JA. Comparison of gingival display in smile attractiveness among restorative dentists, orthodontists, prosthodontists, periodontists, and laypeople. *J Prosthet Dent.* 2020;123(2):314-21. <https://doi.org/10.1016/j.prosdent.2019.03.023>. PMID:31153615.
18. Malheiros AS, Barboza JR, Pinheiro SM No, Dibai DB, Maia EM Fo, Pinzan-Vercelino CM, et al. Laypersons' esthetic perception of different dentogingival characteristics based on smile dynamics: cross-sectional study. *Int J Dent.* 2024;2024(1):5561640. <https://doi.org/10.1155/2024/5561640>. PMID:38264679.
19. de Lima APB, Conti ACCF, Capelozza L Fo, Cardoso MA, Almeida-Pedrin RR. Influence of facial pattern in smile attractiveness regarding gingival exposure assessed by dentists and laypersons. *Am J Orthod Dentofacial Orthop.* 2019;155(2):224-33. <https://doi.org/10.1016/j.ajodo.2018.03.026>. PMID:30712694.

Marcela Iunes da Silveira
(Corresponding address)

Universidade Estadual Paulista, Instituto de Ciência e Tecnologia, Disciplina de Periodontia, São José dos Campos, SP, Brazil.
Email: marcela.iunes@unesp.br

Editor-in-chief: Sergio Eduardo de Paiva Gonçalves

Editor: Maristela Maia Lobo

Date submitted: 2025 Jun 16

Accept submission: 2026 Jul 24