

Perception of smile attractiveness by dentistry professionals, dental students and laypeople before and after esthetic procedures

Percepção da atratividade do sorriso por cirurgiões-dentistas, estudantes de odontologia e leigos antes e depois de procedimentos estéticos

Percepción del atractivo de la sonrisa por parte de los profesionales de la odontología, estudiantes de odontología y legos antes y después de los procedimientos estéticos

Received: 03/09/2021 | Reviewed: 03/16/2021 | Accept: 03/17/2021 | Published: 03/23/2021

Christine Men Martins

ORCID: <https://orcid.org/0000-0002-5429-509X>

Dental School of Presidente Prudente, Brazil

E-mail: christinemen@hotmail.com

Priscila Bruna Gonçalves Lacerda

ORCID: <https://orcid.org/0000-0001-8914-3355>

Dental School of Presidente Prudente, Brazil

E-mail: priscila_brunagl@hotmail.com

Rafael Massunari Maenosono

ORCID: <https://orcid.org/0000-0002-4621-7710>

Fundacao Municipal de Educação e Cultura, Brazil

E-mail: rafamaenosono@hotmail.com

Anderson Catelan

ORCID: <https://orcid.org/0000-0002-5916-8655>

Dental School of Presidente Prudente, Brazil

E-mail: ander.catelan@gmail.com

Victor Eduardo de Souza Batista

ORCID: <https://orcid.org/0000-0003-0246-8101>

Dental School of Presidente Prudente, Brazil

E-mail: victor_edsb@hotmail.com

Abstract

Dentist community needs to understand the esthetic perception of laypeople and correlate the standards of dental esthetics to avoid unnecessary treatment. Thus, the aim was to compare the perception of smile attractiveness before and after performing esthetic dental procedures by general practitioners (GP), periodontists (P), restorative dentistry (RD), undergraduate students (UGrad), and laypeople (L). Two photographs of smile were taken, before (PSB) and after (PSA) the esthetic dental procedures. Photographs were exposed to 5 groups: GP (n = 20), P (n = 20), RD (n = 20), UGrad (n = 60), and L (n = 20). The smiles were evaluated using the visual scale with scores ranging from 1 (unattractive) to 10 (very attractive). Data were statistically evaluated (Kruskal-Wallis, Dunn, Mann Whitney). The PSA of the esthetic dental procedures was more attractive than PSB ($p < 0.05$). In PSB, P group presented the lowest values of smile attractiveness scores ($p < 0.05$). On the other hand, in PSA, RD group attributed lower values ($p < 0.05$). The perception of smile attractiveness after performing dental procedures was higher than before, and P and RD were more critical in evaluating the smiles before and after treatment, respectively.

Keywords: Smiling; Esthetics; Teaching; Dentistry.

Resumo

A comunidade odontológica precisa entender a percepção estética dos leigos e correlacionar os padrões da estética odontológica para evitar tratamentos desnecessários. Assim, o objetivo foi comparar a percepção da atratividade do sorriso antes e após a realização de procedimentos odontológicos estéticos por clínicos gerais (CG), periodontistas (P), especialistas em dentística (D), alunos de graduação (Grad) e leigos (L). Foram realizadas duas fotografias do sorriso, antes (FSA) e depois (FSD) dos procedimentos estéticos odontológicos. As fotografias foram expostas a 5 grupos: CG (n = 20), P (n = 20), D (n = 20), Grad (n = 60) e L (n = 20). Os sorrisos foram avaliados por meio da escala visual com pontuação variando de 1 (pouco atraente) a 10 (muito atraente). Os dados foram avaliados estatisticamente (Kruskal-Wallis, Dunn, Mann Whitney). A FSD dos procedimentos estéticos odontológicos foi mais atraente que o FSA ($p < 0,05$). Na FSA, o grupo P apresentou os menores valores de escores de atratividade do sorriso ($p < 0,05$). Por outro lado, no FSD, o grupo D atribuiu valores menores ($p < 0,05$). A percepção da atratividade do sorriso após a realização de procedimentos odontológicos foi maior do que antes. P e D foram mais críticos na avaliação dos sorrisos antes e após o tratamento, respectivamente.

Palavras-chave: Sorriso; Estética; Ensino; Odontologia.

Resumen

La comunidad dental necesita comprender la percepción estética de los legos y correlacionar los estándares de la estética dental para evitar tratamientos innecesarios. Así, el objetivo fue comparar la percepción del atractivo de la sonrisa antes y después de la realización de procedimientos estéticos dentales por médicos generales (MG), periodoncistas (P), especialistas en odontología restauradora (D), estudiantes de pregrado (UGrad) y legos (L). Se tomaron dos fotografías de la sonrisa, antes (FSA) y después (FSD) de los procedimientos de estética dental. Las fotografías se expusieron en 5 grupos: MG (n = 20), P (n = 20), D (n = 20), UGrad (n = 60) y L (n = 20). Las sonrisas fueron evaluadas usando la escala visual con puntuaciones que iban de 1 (poco atractivo) a 10 (muy atractivo). Los datos se evaluaron estadísticamente (Kruskal-Wallis, Dunn, Mann Whitney). La FSD de los procedimientos estéticos dentales fue más atractiva que la FSA ($p < 0.05$). En la FSA, el grupo P presentó los valores más bajos de puntajes de atractivo de la sonrisa ($p < 0.05$). Por otro lado, en FSD, el grupo D atribuyó valores más bajos ($p < 0.05$). La percepción del atractivo de la sonrisa después de realizar los procedimientos dentales fue mayor que antes. P y D fueron más críticos en la evaluación de las sonrisas antes y después del tratamiento, respectivamente.

Palabras clave: Sonrisa; Estética; Enseñanza; Odontología.

1. Introduction

The emphasis in dentoalveolar esthetics has increased since 90s due to emotional, social well-being, desire, and pleasure of patient, factors that can result in a better life quality (Isiekwe et al., 2016). For dental clinicians, esthetic seeks physical beauty through correction of specific problems resulting in harmony of proportions and perfect shapes, awakening pleasant sensations and admirations (Alhammedi et al., 2018). Thus, initial smile analysis aims to establish the diagnosis, prognosis, and treatment plan (Pinzan-Vercelino et al. 2020). For this evaluation, periodontal and dental factors are considered, especially in relation to position, shape, size, proportion, symmetry, and parallelism of structures involved (Koidou et al., 2017; Koidou et al., 2018).

Current smile patterns have been based in scientific evidence established to overcome the subjectivity of smile analysis (Pinzan-Vercelino et al., 2020). However, the esthetic perception may be individual and influenced by judgments of those with whom the patient interacts (Pinzan-Vercelino et al., 2020; Jørnung & Fardal, 2007; Van der Geld et al. 2007). Furthermore, patterns have been changeable in a temporal variation and may be imperceptible to laypeople in area (Parrini et al. 2016).

Thus, dentist community needs to understand the esthetic perception of laypeople and correlate the standards of dental esthetics to specialists in different areas of Dentistry – as well as general practitioners and dental students – in order to avoid unnecessary treatment that may be not recognized by patients as details in dental and periodontal contours (Witt & Flores-Mir 2011).

Some studies have evaluated the smile attractiveness in relation to several factors, such as gingival zenith, facial profile, gingival inflammation, pigmentation, contour, and position of free marginal gingiva and interdental papillae (Pinzan-Vercelino et al., 2020; Nomura et al., 2018; Imani et al., 2018; Batra et al., 2018; Al-Saleh et al., 2018). The literature has reported that dental specialists may be more critical in esthetic evaluation of smile (Pinzan-Vercelino et al., 2020; Nomura et al., 2018; Imani et al., 2018). However, laypeople have demonstrated a considerable negative perception of some esthetic changes (Pinzan-Vercelino et al., 2020; Nomura et al., 2018; Imani et al., 2018; Batra et al., 2018).

Thus, the present study aimed compare the smile attractiveness before and after the performance of esthetic dental procedures by general practitioners, periodontists, restorative dentistry specialists, undergraduate students, and laypeople. The null hypothesis tested was that would be no difference in perception of smile attractiveness between before and after esthetic dental procedures and among the evaluated groups.

2. Methodology

Institutional Review Board (CAAE: 53655416.9.0000.5428) approved this study ethically.

A clinical case of periodontal esthetic surgery was performed to increase the clinical crown of right and left upper central incisor and right and left upper lateral incisor, followed by direct composite veneers.

The smiles before (Fig. 1) and after (Fig. 2) the intervention was photographed, and the images were manipulated using computer software (Photoshop CS5; Adobe Systems). The images were sized to provide images with measurements similar to those measured in a real patient. Most of nose, chin, and cheeks were removed to reduce the number of variables in images. The final images were presented in a standardized color and format with a resolution of 300 dots per inch (dpi).

Figure 1: The smile before periodontal esthetic surgery and direct composite veneers interventions.

Figure 2: The smile after periodontal esthetic surgery and direct composite veneers interventions.



Source: Authors.

Volunteers totaled 140 participants. Five groups evaluated the images (Table 1): GP - general practitioners (n = 20); P - periodontists (n = 20); RD - restorative dentistry specialists (n = 20); UGrad - undergraduate students in Dentistry (n = 60); and L - laypeople in Dentistry (n = 20). The inclusion criteria for general practitioners was to have a degree in Dentistry and to be enrolled in Regional Dentistry Council. For specialists, the inclusion criteria referred only to conclusion of their courses before the questionnaire application. Undergraduate students from third, fourth, and final years of Dentistry course were included. The population of students was defined by undergraduate which already have earlier knowledge about restorative dentistry and periodontics. Inclusion criteria for laypeople were to have an undergraduate education, not related with dental training; not be associated with artistic activities; and have no direct contact with dentists, including the partner or children of dentists and/or oral hygiene technicians.

A single researcher presented printed images to volunteers with time observation controlled in 40 s. Volunteers were approached at two different point times, with an interval of at least 15 days. Initial case photo was evaluated in first approach and the final case photo in second approach; however, they were unaware that the photographs are from the same patient. Each volunteer viewed the image only once.

Prior to their evaluation, each volunteer received a brief explanation of study and was asked to evaluate the attractiveness of smile in images using the visual scale with scores. Scale consisted of a horizontal line of 100 mm marked with "unattractive" printed in one end and "very attractive" printed in other end, and had 10 symmetrical points along its line. The evaluators marked with a "X" at the point in scale that stood for their esthetic perceptions of each smile. Afterwards, scores from 1 to 10 were attributed in an increasing way from "unattractive" to "very attractive".

Data were statistically analyzed by nonparametric Kruskal-Wallis test with Dunn's post-test for comparison between

groups, and Mann Whitney's post-test for comparison between before and after for each group. The significance level of 5% was determined for all tests. SPSS program (Chicago, USA) performed all statistical tests.

3. Results

The Table 1 shows the demographic data of the volunteers. Female (69.3%) and male (30.7%) participants were aged between 16 and 40 years old.

Table 1. Participants demographic data according to gender, age, and group of people consulted.

Group*	n	Gender		Age				
		Male	Female	16-20	21-25	26-30	31-35	36-40
GP	20	4	16	0	7	8	2	3
P	20	10	10	0	3	12	2	3
RD	20	11	9	0	3	8	4	5
UGrad	60	11	49	18	39	3	0	0
L	20	7	13	0	12	4	0	4
Total	140	43	97	18	64	35	8	15

*GP: general practitioners; P: periodontists; RD: restorative dentistry specialists; UGrad: undergraduate students; L: laypeople. Source: Authors.

Table 2 summarizes the results of smile attractiveness, containing the mean of scores attributed for before and after clinical case photos within each group, as well as the median, maximum, and minimum values assigned.

Table 2. Mean and standard deviation (SD), median and interquartile range (IR), maximum and minimum values of scores attributed using visual scale to perception of smile attractiveness before and after esthetic periodontal and restorative treatments.

Group	Image							
	Before treatment				After treatment			
	Mean (SD)	Median (IR)	Max	Min	Mean (SD)	Median (IR)	Max	Min
GP	6.8 (1.01)	7 (0.75) ^{B,1}	8	4	9.00 (0.79)	9 (2) ^{AB,2}	10	8
P	5.7 (0.80)	6 (1) ^{A,1}	7	4	8.90 (0.55)	9 (0) ^{AB,2}	10	8
RD	7.0 (0.65)	7 (0) ^{B,1}	8	6	8.10 (0.91)	8 (2) ^{A,2}	10	7
UGrad	6.1 (1.46)	6 (2) ^{AB,1}	9	3	9.10 (0.96)	9 (2) ^{B,2}	10	6
L	7.0 (0.71)	7 (0) ^{B,1}	8	5	9.25 (0.79)	9 (1) ^{B,2}	10	8

*GP: general practitioners; P: periodontists; RD: restorative dentistry specialists; UGrad: undergraduate students; L: laypeople. Different letters indicate statistical difference in columns for intergroup comparison, using Kruskal-Wallis with Dunn post-test ($p < 0.05$). Different numbers indicate statistical difference in lines for intra-group comparison before and after esthetic treatment, using the Kruskal-Wallis with Mann Whitney post-test ($p < 0.05$). Source: Authors.

In general, the smile was more attractive after performing the esthetic procedures, with a statistically significant difference between the initial photo and the final photo for each evaluated group ($p < 0.05$).

For comparison between the groups, in photo before the esthetic interventions, the P group differed statistically from

GP, RD, and L groups, presenting lower values of smile attractiveness scores ($p < 0.05$). The comparison between P group and UGrad group did not differ ($p > 0.05$), as well as the comparison between UGrad group and GP, RD, and L groups ($p > 0.05$).

On the other hand, in photo after the esthetic interventions, the RD group was statistically different from the UGrad and L groups ($p < 0.05$), presenting the lowest value of smile attractiveness scores ($p < 0.05$). The other groups did not show statistically significant differences ($p > 0.05$).

4. Discussion

This research compared the perception of smile attractiveness before and after esthetic procedures by dental clinicians in different specialties, general practitioners, undergraduate students, and laypeople. The null hypothesis was not accepted because the smile was considered more attractive after esthetic procedures; before esthetic procedures, periodontists presented the lowest scores; after treatments, restorative dentistry specialists presented the lowest scores.

The face and its expressions play an important role that can affect multiple aspects of patients' life (Schmidt et al., 2012). Currently, photo-based activity on social networking sites contributes to body image concerns, including body and smile dissatisfaction (Tiggemann et al., 2018; Sampson et al., 2020). Considering these demands, dental clinicians may improve shape, color, position, and size characteristics of teeth and the architecture of soft gum tissue (Goyal et al., 2013; Censi et al., 2014).

In clinical case presented, a slight periodontal esthetic surgery was performed in order to increase the clinical crown. Afterwards, direct composite veneers were performed in superior canine to canine teeth to replace an unsatisfactory adhesive restoration and to improve esthetic. The median scores values before treatments was around 6-7, which is considered satisfactory. Despite difference between before and after of treatment be subtle, statistical difference was observed for all groups, because after esthetic treatment, the median scores values ranged from 8 to 9. This observation may highlight the current high esthetic demand regarding to attractiveness of the smile.

Literature has shown that specialists may be more critical in clinical case evaluation (Pinzan-Vercelino et al., 2020; Nomura et al., 2018). Pinzan-Vercelino et al. (2020) compared the influence of gingival display on perceived smile esthetics among restorative dentistry specialists, orthodontists, prosthodontists, periodontists, and laypeople (Pinzan-Vercelino et al., 2020). They observed that dental specialists were more sensitive about changes in gingival display compared to laypeople (Pinzan-Vercelino et al., 2020). Corroborating with Nomura et al. (2018) that evaluated the smile attractiveness of different gingival zeniths by general dentists, orthodontists, and laypeople (Nomura et al., 2018). Also, they have reported that laypeople observed asymmetric changes in gingival zeniths only superior to 1 mm. In the present study, periodontists and restorative dentistry specialists attributed lower scores before and after, respectively, the procedures (Nomura et al., 2018). However, differently, laypeople presented a trend similar to dental class (Nomura et al., 2018).

Pinzan-Vercelino et al. (2020) justified the critical analysis for periodontists because in their specialty, the periodontal tissues are constantly evaluated (Pinzan-Vercelino et al., 2020). Researches evaluating the perception of dentists and other specialists have reported in the literature; however, the perception of periodontists is scarce. Lima et al. (2019) evaluated the perception of orthodontists, maxillofacial surgeons, and periodontists regarding to gingival exposure, the periodontists attributed better scores when there is no gingival exposure (0 mm), differing from other specialists in dentistry (Lima et al., 2019).

On the other hand, after esthetic procedures, periodontists assigned score 9 and restorative dentistry specialists score 8. Same line of thought to justify the result may be given, since the level of esthetic demand of these professionals after treatment is remarkably high. There is a trend to use ceramic veneers instead of composite resin ones due to its excellent esthetic results and more predictable longevity (Gresnigt et al., 2013; Alothman & Bamasoud 2018). However, direct

composite veneers may be considered as a good conservative option, but surface quality changes are more frequently (Gresnigt et al., 2013; Alothman & Bamasoud 2018). In this case, the direct composite veneers were opted due to the age of patient (19 years), the reduced cost to improve the clinical case, and the possibility of none wear of the dental structure.

5. Conclusion

According to results obtained in this study, the perception of smile attractiveness after performing esthetic dental procedures was higher compared to before, and periodontists and restorative dentistry specialists were more critical in evaluating the smiles before and after treatment, respectively.

This study shows important data to the literature about how subtle changes in the smile can influence the attractiveness of the smile from laymen to specialized professionals. Thus, the triad beautiful and healthy smile, personal social insertion and physical, psychological and emotional well-being discussion comes up in an interesting way. However, we must always take into account the maleficence of over-indication of some aesthetic dental procedures. Based on the results presented, as future perspectives, it is suggested that further research on smile attractiveness be carried out in order to perceive the limits between the improvement of the patients' smile and the over-indication of treatments.

Acknowledgments

The authors thank Gislaïne Vais de Assis, Livia Pizzo Pitteli, Gabriela Maria Monteiro Ramos and Sérgio Luis Salvadego Júnior to collaborate with the current research. The authors deny any conflict of interest.

References

- Alhammadi, M. S., Halboub, E., Al-Mashraqi, A. A., Al-Homoud, M., Wafi, S., Zakari, A., & Mashali, W. (2018). Perception of Facial, Dental, and Smile Esthetics by Dental Students. *J Esthet Restor Dent*, 30, 415-426.
- Alothman, Y., & Bamasoud, M. S. (2018). The Success of Dental Veneers According To Preparation Design and Material Type. *Open Access Maced J Med Sci*, 6, 2402-8.
- Al-Saleh, S., Abu-Raisi, S., Almajed, N., & Bukhary, F. (2018). Esthetic Self-Perception of Smiles Among a Group of Dental Students. *Int J Esthet Dent*, 13, 220-230.
- Batra, P., Daing, A., Azam, I., Miglani, R., & Bhardwaj, A. (2018). Impact of Altered Gingival Characteristics on Smile Esthetics: Laypersons' Perspectives by Q Sort Methodology. *Am J Orthod Dentofacial Orthop*, 154, 82-90.e2.
- Censi, R., Vavassori, V., Borgonovo, A. E., & Re, D. (2014). Esthetic Rehabilitation of a Severely Compromised Anterior Area: Combined Periodontal and Restorative Approach. *Case Rep Dent*, 658790.
- Goyal, M. K., Goyal, S., Hegde, V., Balkrishana, D., & Narayana, A. I. (2013). Recreating an esthetically and functionally acceptable dentition: a multidisciplinary approach. *The International Journal of Periodontics and Restorative Dentistry*, 33, 527-532.
- Gresnigt, M. M., Kalk, W., & Ozcan, M. (2013). Randomized Clinical Trial of Indirect Resin Composite and Ceramic Veneers: Up to 3-year Follow-Up. *J Adhes Dent*, 15:181-90.
- Imani, M. M., Sanei, E., Niaki, E. A., & Shahroudi, A. S. (2018). Esthetic preferences of orthodontists, oral surgeons, and laypersons for Persian facial profiles. *Am J Orthod Dentofacial Orthop*, 154, 412-420.
- Isiekwe, G. I., Sofola, O. O., Onigbogi, O. O., Utomi, I. L., Sanu, O. O., & Costa, O. O. (2016). Dental Esthetics and Oral Health-Related Quality of Life in Young Adults. *Am J Orthod Dentofacial Orthop*, 150, 627-636.
- Jørnung, J., Fardal, Ø. (2007). Perceptions of patients' smiles: a comparison of patients' and dentists' opinions. *J Am Dent Assoc*, 138, 1544-53.
- Koidou, V. P., Chatzopoulos, G. S., & Rosenstiel, S. F. (2018). Quantification of facial and smile esthetics. *J Prosthet Dent*, 119, 270-277.
- Koidou, V. P., Rosenstiel, S. F., & Rashid, R. G. (2017). Celebrity smile esthetics assessment: Smile angulation. *J Prosthet Dent*, 117, 636-641.
- Lima, A. P. B., Conti, A. C. F., Filho, L. C., Cardoso, M. A., & Almeida-Pedrin, R. R. (2019). Influence of facial pattern in smile attractiveness regarding gingival exposure assessed by dentists and laypersons. *American Journal of Orthodontics and Dentofacial Orthopedics*, 155, 224-233.
- Nomura, S., Freitas, K. M. S., Silva, P. P. C. D., Valarelli, F. P., Cançado, R. H., Freitas, M. R., Oliveira, R. C. G., & Oliveira, R. C. G. (2018). Evaluation of the attractiveness of different gingival zeniths in smile esthetics. *Dental Press J Orthod*, 23, 47-57.

- Parrini, S., Rossini, G., Castroflorio, T., Fortini, A., Deregius, A., & Debernardi, C. (2016). Laypeople's Perceptions of Frontal Smile Esthetics: A Systematic Review. *Am J Orthod Dentofacial Orthop*, 150, 740-750.
- Pinzan-Vercelino, C. R. M., Costa, A. C. S., Ferreira, M. C., Bramante, F. S., Fialho, M. P. N., & Gurgel, J. A. (2020). Comparison of gingival display in smile attractiveness among restorative dentists, orthodontists, prosthodontists, periodontists, and laypeople. *J Prosthet Dent*, 123, 314-321.
- Sampson, A., Jeremiah, H. G., Andiappan, M., & Newton, J. T. (2020). The Effect of Viewing Idealised Smile Images Versus Nature Images via Social Media on Immediate Facial Satisfaction in Young Adults: A Randomised Controlled Trial. *J Orthod*, [Online ahead of print].
- Schmidt, K., Levenstein, R., & Ambadar, Z. (2012). Intensity of smiling and attractiveness as facial signals of trustworthiness in women. *Perceptual and Motor Skills*, 113, 964-978.
- Tiggemann, M., Hayden, S., Brown, Z., & Veldhuis, J. (2018). The Effect of Instagram "Likes" on Women's Social Comparison and Body Dissatisfaction. *Body image*, 26, 90-97.
- Van der Geld, P., Oosterveld, P., Van Heck, G., & Kuijpers-Jagtman, A. M. (2007). Smile attractiveness: self-perception and influence on personality. *Angle Orthod*, 77, 759-765.
- Witt, M., & Flores-Mir, C. (2011). Laypeople's preferences regarding frontal dentofacial esthetics: Periodontal factors. *J Am Dent Assoc*, 142, 925-937.